
DMS-100* FAMILY

All Products Computing-Module Loads

Provisioning Manual - Active Detail

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Volume Separator - Front Page

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Chapter 16

CABINETS AND FRAMES

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CABINETS AND FRAMES

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1.0 ECM125 - DMS Common Equipment

1.1 Overview

This ECM describes the following DMS-100 Common Equipment:

NT0X07	Frame Common Assembly
NT0X25	Framework Assemblies
NT0X32	EMI Adapters for LCE Frame
NT0X49	Light Fixture Assemblies
NT0X71	Frame Doors
NT0X73	Frame End Guard Assembly
EARTHPROT	Earthquake Protection
T_CABLING	Cabling Requirements

Standard lighting in the DMS area will be provided by frame-mounted modular units. One unit will be fastened on each side of each frame (at the top) and will contain two (2) 15 Watt lamps. Low intensity lighting, which involves the operation of only the first units at the end of each line-up, will also serve the emergency lighting requirements.

The Commercial AC Free option utilizes the Center Aisle Lighting concept by placing the lights off the DMS framework and onto the Integrated Ground Plane. These lights are isolated from the DMS framework and referenced to the Integrated Collector Bus (ICB). These lights will be powered by commercial AC and controlled by low voltage relays with the switches located in end guards.

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

The frame doors section details doors for non-earthquake frame-works only.

The P0711698 Tape is used on the DMS SuperNode only.

1.2.2 Hardware Usage Restrictions

The frame doors section details doors for non-earthquake frame-works only.

The P0711698 Tape is used on the DMS SuperNode only.

1.2.3 Hardware Dependencies

Not applicable.

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1.2.3.1 P and C Side Port Requirements

1.2.3.2 DMS BUS Port Requirements

1.2.3.3 Circuits Per Card

1.2.3.4 Discrimination Numbering

1.2.4 Provisioning Considerations

Refer to Engineering Manual Sections.

When provisioning the expansion of an EMI Remote office, 7 ft. frame LCEs can no longer be used and only the Model B Cabinet CLCE can be used. The 7 ft. frame is no longer available for EMI expansion which is the design intent of EC 024-95648. Hardware kits provided in EMS NT0X32 support expansion of 1 to 3 Model B Cabinet CLCEs to a frame line-up.

The NTRX59BA, Remote EMI Frame to CLCE Hardware Kit provides the equipment to attach the first Model B Cabinet CLCE to the remote EMI frame line-up. The NTRX5912 Power Cable Kit is used to link the 2nd Model B Cabinet CLCE to the first Model B Cabinet CLCE. The NTRX5912 kit is also used to link the 3rd Model B Cabinet CLCE to the 2nd Model B Cabinet CLCE.

1.2.5 Office Layout Information

None.

1.2.6 Traffic Tables

Not applicable.

1.3 Product/System Specification

1.3.1 Physical Characteristics

Not applicable.

1.3.2 EMI/Earthquake Information

See Section 2.4 Provisioning Considerations for EMI provisioning information.

See EMA15-02-000 (EARTHPROT) for provisioning considerations for Earthquake Protection.

1.3.3 Sparing Information

Not applicable.

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1.3.4 Power Feed and Fusing Requirements

1.3.5 Current Drain Information

1.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

Not applicable.

1.4.2 Software Usage Restrictions

Not applicable.

1.4.3 Memory Provisioning

Not applicable.

1.5 Real Time Impact

Not applicable.

2.0 ECM155 - Product Change Kits For Light Fixture Assemblies

2.1 Overview

Not applicable.

2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

Not applicable.

2.2.2 Hardware Dependencies

Not applicable.

2.2.2.1 P and C Side Port Requirements

Not applicable

2.2.2.2 DMS BUS Port Requirements

Not applicable

2.2.2.3 Circuits Per Card

Not applicable

2.2.2.4 Discrimination Numbering

Not applicable

2.2.3 Provisioning Considerations

2.2.4 Office Layout Information

Not applicable.

2.2.5 Traffic Tables

Not applicable.

2.3 Product/System Specification

2.3.1 Physical Characteristics

Not applicable.

2.3.2 EMI/Earthquake Information

Not applicable.

2.3.3 Sparing Information

Not applicable.

2.3.4 Power Feed and Fusing Requirements

Not applicable.

2.3.5 Current Drain Information

Not applicable.

2.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

2.4.1 Required Software Packages and Interdependencies

Not applicable.

2.4.2 Software Usage Restrictions

Not applicable.

2.4.3 Memory Provisioning

Not applicable.

2.5 Real Time Impact

Not applicable.

3.0 ECM172 - Earthquake Frameworks: NT0X25AH and NT0X25AJ

3.1 Overview

3.2 Hardware Provisioning

3.2.1 Hardware Usage Restrictions

Not applicable.

3.2.2 Hardware Dependencies

Not applicable.

3.2.2.1 P and C Side Port Requirements

Not applicable

3.2.2.2 DMS BUS Port Requirements

Not applicable

3.2.2.3 Circuits Per Card

Not applicable

3.2.2.4 Discrimination Numbering

Not applicable

3.2.3 Provisioning Considerations

3.2.4 Office Layout Information

Not applicable.

3.2.5 Traffic Tables

Not applicable.

3.3 Product/System Specification

3.3.1 Physical Characteristics

Not applicable.

3.3.2 EMI/Earthquake Information

Not applicable.

3.3.3 Sparing Information

Not applicable.

3.3.4 Power Feed and Fusing Requirements

Not applicable.

3.3.5 Current Drain Information

Not applicable.

3.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

3.4.1 Required Software Packages and Interdependencies

Not applicable.

3.4.2 Software Usage Restrictions

Not applicable.

3.4.3 Memory Provisioning

Not applicable.

3.5 Real Time Impact

Not applicable.

4.0 ECM449 - MCGM (NTNX47BA) and MC7M.

4.1 Overview

The Meridian Cabinet General Module (MCGM) NTNX47BA is associated with Meridian Cabinetized Systems.

The MCGM NTNX47BA will provide the capability to add custom hardware such as MTM, STM, TM8, T8A, TAN, DIO, MTD, DDU, ROS and DS-5 MODEM SHELF to cabinetized systems as required.

In the MTXD environment an additional DIO and DS-5 modem shelf are required to support the large number of high level data link controllers (NT6X91__) required to serve the Cell Site Controllers(CSC's).

The MCGM NTNX47BA is always provided with a cooling unit and FSP.

See Figure 1 on page 16-11 for MCGM provisioning options.

4.2 Hardware Provisioning

4.2.1 Hardware Usage Restrictions

Configuration of any one MCGM cabinet must not require more than four (4) network ports per MCGM cabinet, ie; no more than two(2) STM shelves or combination of four (4) STM, MTM, TM8, T8A, or TAN modules.

Four (4) STM shelves may be provisioned, but with only the bottom two STM shelves being wired to the network. The upper two STM shelves are provided for provisioning EDRAM or CTM circuit packs only.

With the introduction of the ISM shelf in the MCAM3 (NTNX37AD) cabinet, the STM, MTM, TM8 & T8A shelves will be replaced by the ISM shelf in the MCAM3.

The DIO, MTD, DDU, and MODEM shelves do not require network ports.

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4.2.1.1 MTXD NT40 NETWORK GROWTH RESTRICTION USING DIO/MODEM PAIRS.

Provisioning of the DIO/DS-5 MODEM pairs are for MTXD APPLICATIONS ONLY for using HDLC cp's (NT6X91__).

If upgrading to an MCGM2 with two DIO/MODEM pairs (4 IOC's) the network growth is limited to two MNET cabinets in an NT40 environment(MCOR).

If the MCGM2 cabinet with two DIO shelves is provisioned using an MCOR then C003A and C003B are NOT useable and must be replaced with cover plates on the bulkhead. Their connections on the backplane must also be cut. Please see " Hardware Dependencies"

The MTXD HDLC MODEM/DIO configuration will be provisioned in functional pairs. One modem shelf will be paired with one DIO shelf in the top half of the cabinet, shelf positions 33,47 and the other pair can be provisioned in the lower half of the cabinet, shelf positions 05,19. Wiring kits are required for the internal wiring between the DIO, Modem, and Bulkhead.

The GDC modem shelf NT5X09BA is provisionable on the MCGM NTN47BA only for Richardson (RNS) or Bramalea (BRW). It is not RNS (RTP) approved.

4.2.2 Hardware Dependencies

External bulkhead cabling to CMC/MS ports will be required if a DIO is provisioned in the MCGM cabinet.

A cooling unit and FSP are always provided with the NTN47BA MCGM cabinet.

For detail see " Hardware Usage Restrictions" on page 16-8 , " Provisioning Considerations" on page 16-10 and " Office Layout Information" on page 16-12

For MTXD applications when adding an MCGM2 with DIO/MODEM pairs for cell site support. An analysis must be made as to projected Network growth. If office is to expand beyond 2-3 networks depending on whether one or two DIO/MODEM pairs are added the office must use SuperNode.

4.2.2.1 P and C Side Port Requirements

Each STM, MTM, TM8, T8A and TAN requires one network port.

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4.2.2.2 DMS BUS Port Requirements

Each IOC requires one MS port per MS plane.

4.2.2.3 Circuits Per Card

4.2.2.4 Discrimination Numbering

4.2.3 Provisioning Considerations

This cabinet will provide the capability to add custom feature hardware to a given site when specifically required. By concentrating all customization in this cabinet, the remainder of the switch can be provisioned consistently the same, site-to-site.

The MCGM cabinet can be provisioned with combinations of the following modules as required depending on fusing requirements of each. Refer to ISNX47BA note 309.

TM8	MTD	T8A		MTXD	DIO
	DDU	MTM	MODEM SHELF		MODEM SHELF
STM	DIO	ROS	MTM/DRAM		

The NT1X89BB EMPC is also required for inter-switch MTXD X.25 links replacing the NT6X91BB CP.

4.2.3.1 PROVISIONING OF P-SIDE PORTS

4.2.3.2 P-SIDE PORT ALLOCATION CHARTS

4.2.3.3 C-SIDE LINK PROVISIONING

4.2.3.4 CC MIS PROVISIONING (Call Center MIS)

For provisioning the CC MIS switch link RS232 (EIA) can be utilized for the required X.25 protocol. The type of interface utilized is transparent to the CC MIS. It is a customer option whether to utilize either RS232 or V.35 physical interface. On the MCGM RS232(EIA) is only available for the physical interface unless the NTN47DI kit is provisioned.

The NT1X89BB EMPC is the required I/O card for the Switch to CC MIS connection.

Redundant X.25 links are a customer option feature. The intent of this feature is to make the link from the CC MIS to the switch redundant such that there will be minimum loss of data in the case of any link failure. Redundancy will involve the addition of another NT1X89 EMPC card. Only one X.25 link will be active at a time. In order for the Switch to support the link redundancy feature the following software packages must be used:

* NTXE65AA

„ = Replaced by ISM shelf (NTFX4101)

		FSP	NTNX26MA	
60				
	OPTIONS:	DIO	NTNX3401	
		STM/STM	NT7X3004	„
		DS-5R MODEM SHF	NT5X09BA	
47				
	OPTIONS:	TAN	NT5X00AD	„
		TM8	NT2X5201	„
		T8A	NT2X5228	„
		MTM	NT2X58CA	„
		MTM/DRAM	NT2X58CB	„
		STM/STM	NT7X3004	„
		ROS	NT3X95AA/BB	
		MTD(2 SHELVES)	A0277744	
	(MTXD)	DS-5R MODEM SHF	NT5X09BA	
33				
	OPTIONS:	TAN	NT5X00AD	
		TM8	NT2X5201	„
		T8A	NT2X5228	„
		MTM	NT2X58CA	„
		MTM/DRAM	NT2X58CB	„
		STM/STM	NT7X3004	„
		MTD(2 SHELVES)	A0277744	
	(MTXD)	DIO	NTNX3401	
19				
	OPTIONS:	TAN	NT5X00AD	
		TM8	NT2X5201	„
		T8A	NT2X5228	„
		MTM	NT2X58CA	„
		MTM/DRAM	NT2X58CB	„
		STM/STM	NT7X3004	„
		DDU	NT4X00AF	
		MTD(2 SHELVES)	A0277744	
		DS-5R MODEM SHF	NT5X09BA	
05				
00		COOLING UNIT	NTNX27CA	

Figure 1. MERIDIAN CABINET GENERAL MODULE NTNX47BA

* NTXN85AA

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The cabling interfaces, cables, and associated shelf and slots for the NT1X89 on the MCGM (NTNX47BA) are:

- * NTNX36FB: RS232(EIA) SHELF 47 SLOTS 7-10,19,20

(See ECM37706 for CC MIS connections on the MCEX)

- * NTNX36PW: External cable from MCGM bulkhead to V.35 modem.

On new cabinets or cabinets with release 03 or later DIO shelf, the 1X89 may be provisioned in any DIO provisionable slot position 6 to 13 & 17 to 23", and must be provided with a B/P to bulkhead cable. If the 1X89 is operated in V.35 mode, a max of 3 per IOC can be provided due to the through-put of the MS.

Other possible interfaces to other DMS equipment are as follows:

CUSTOM NON-EMI IOE

- * NT0X26LY: RS232(EIA) CUSTOM NON-EMI
- * NT0X96EF: V.35

CUSTOM EMI IOE

- * NT0X26RE IOE TO FBH
- * NT0X26RD FBH TO MODEM

The NTNX47DI kit is provisioned for high capacity CC-MIS applications that require many V.35 connections to external equipment.

4.2.4 Office Layout Information

The MCGM cabinet can be located in any aisle, however, fuse positions on the PDP of MCAM OR MCPM must be available. For CMC/MS port considerations, refer to "Hardware Usage Restrictions" on page 16-8 and "Hardware Dependencies" on page 16-9

If an MTD is provided on the MCGM cabinet, it must be within 15 cable feet of it's serving DIO (Dual Input/Output control module). An MTD or DDU can be provided in a co-located MCGM cabinet.

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4.2.5 Traffic Tables

N/A

4.2.5.1 MTXD PROVISIONING CONSIDERATIONS FOR DIO/MODEM PAIRS.

FOR MTXD PROVISIONING ONLY: Provision functional pairs: first pair DUAL IOC (DIO), NTNX3401 at shelf position 47, and NT5X09BA DS-5 Modem at shelf position 33. Provision the second pair at shelf positions 19(DIO), and 05(modem).

Provision one NTNX47BL DIO/MODEM Hardware Kit when engineering one DIO/modem pair(pos. 47,33). Provision one NTNX47BM DIO/MODEM Hardware kit when engineering two DIO/modem pairs (47,33 & 19,05).

The following is the interconnect between the paired DIO/MODEM for MTXD. The interconnect is the same for both pairs.

4.2.5.2 MODEM PROVISIONING FOR THE MTXD MODEM/DIO

Provision one 4800 baud modem for each NT6X91AB CP for a CSC link where 4800 baud modems are required. Provision one 9600 baud modem for each NT6X91CA CP for a CSC link where 9600 baud is required. Provision one 9600 baud modem for each NT6X91BA CP for an MTX link.

The quantity of NT6X91CA CP's is equal to the number of cell sites plus an additional amount for modem pooling determined by customer engineering. The quantity of NT6X91BA cp's is equal to the number of MTX links. Pooling is determined at time of CI between customer and NT Engineering. The absolute minimum recommended pooling is 30%, with a general recommended standard of 50%. Pooling can be 100% for maximum reliability.

4.3 Product/System Specification

4.3.1 Physical Characteristics

4.3.2 EMI/Earthquake Information

Refer to NTP 555-4001-103 Meridian SL100 Cabinetized, section 2.10, Earthquake Resistance.

4.3.3 Sparing Information

Not defined at this time.

As a rule of thumb, provision as spare, a minimum of one each circuit pack up to a maximum of 10% of the total count of that item.

NT5X09 MODEM SHELF POS. 33, 05		NTNX3401 DIO POS. 47, 19	
C001	-----	06 (slot)	
C002	-----	07	
C003	-----	08	
C004	-----	09	
C005	-----	10	
C006	-----	11 (note1)	IOC X
C007	-----	12	
C008	-----	13	
C009	-----	17	
C0010	-----	18	
C0011	-----	19	
C0012	-----	20	
C0013	-----	21	IOC X
C0014	-----	22	
C0015	-----	23	
C0016	+---NOT USED		

NOTE 1: WHEN USING THE TWO MTXD DIO/MODEM PAIRS
THE DIO AT POS. 47 WILL BE THE FIRST (IOC 2-3)
AND THE DIO AT POS. 19 WILL BE the second DIO
(IOC 4-5).

Figure 2. DIO/MODEM Interconnection

4.3.4 Power Feed and Fusing Requirements

NTNX3401 DIO POS. 47, 19			NT5X09 MODEM SHELF POS. 33, 05		NTNX47BA BULKHEAD CONN. FOR TIP&RING
IOC#	CP#	SLOT#		SLOT POS.	
00	01	06	-----	01	
01	02	17	-----	09	
00	03	07	-----	02	
01	04	18	-----	10	-----C001
00	05	08	-----	03	
01	06	19	-----	11	
00	07	09	-----	04	
01	08	20	-----	12	
00	09	10	-----	05	
01	10	21	-----	13	
00	11	11	-----	06	
01	12	22	-----	14	-----C002
00	13	12	-----	07	
01	14	23	-----	15	
00	15	13	-----	08	

Note: Provision NT6X91 cp's evenly across both IOC's in the DIO in the following order as shown above.

Figure 3. DIO/NT6X91's Provisioning

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FSP DESIG	FUSE	POTENTIAL	ONE PER
F01	10A	-48V(1)	SHELF
F02	10A	-48V(1)	SHELF
F03	10A	-48V(2)	SHELF
F04	10A	-48V(3)	SHELF
F05	10A	-48V(3)	SHELF
F06	10A	-48V(4)	SHELF
F07	1-1/3A	-48VABS	ALM CP
F08	1-1/3A	-48VABS	ALM CP
F09	1-1/3A	-48VABS	ALM CP
F10	1-1/3A	-48VABS	TST.JACK,FAN LAMP/FAN ALM
F11	3.0A	-48V(2)	C.U.
F12	5.0A	-48VT	SHELF
F13	5.0A	-48VT	SHELF

Voltage Limits: POTENTIAL -48V
RANGE -44V TO -56V

The modules provisionable on the MCGM cabinet will require fusing on the MCGM FSP NTNX26MA as follows. When provisioning shelves fusing used must be kept track of since only certain combinations of shelves can be allowed due to restrictions in the fusing and available power requirement (Also see ISNX47BA Note 309).

	TALK	TALK	TALK	TALK	NO			
SH F01(A)	F02(A)	F03(A)	F04(B)	F05(B)	F06(B)	F12(A)	F13(A)	TE
MODEM				47				1
DIO		47		47				1
MTD	33		19					
DDU 05					05			2
TM8 05	#33,*05		19		05	19	33,\$05	5
T8A 05	#33,*05		19		05	19	33,\$05	5
MTM 05	#33,*05		19		05	19	33,\$05	5
STM 05	#33		19	47				
R0S 19	#33		19		33			2,4

* - Use this fuse as an alternate if the R0S shelf is provided and the DIO/MODEM pair is provisioned at 47/33.

\$ - Use F13(A) for shelf position 05 talk battery feed when DIO/MODEM pair is provisioned at shelf positions 47/33 instead of F06(B) or when R05 is provisioned at shelf position 33.

- F02(A) and F13(A) may be used for shelf position 05 if a DIO/MODEM pair is provisioned at 47/33 respectively.

Notes:

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- 1) Provisioned at shelf position 47 only.
- 2) DDU cannot be provisioned in same cabinet with ROS.
- 3) Provision one DDU max per MCGM cabinet.
- 4) Provision at shelf position 33 or 19.
- 5) Special jumpers must be installed for Talk Battery.

Refer to Installation Manual (IM925) for strapping requirements.

4.3.4.1 FUSING REQUIREMENTS FOR DIO/MODEM PAIRS FOR MTXD APPLICATIONS

The modules provisionable on the MCGM cabinet for the MTXD will require fusing on the MCGM FSP NTN26MA as follows:

		TALK			TALK		TALK	TALK	NO
SH	F01(A)	F02(A)	F03(A)	F04(B)	F05(B)	F06(B)	F12(A)	F13(A)	TE
MODEM	05			*05					1
MODEM	33			*33					1
DIO		19			19				
DIO			47			47			

* - Use F12(A) for the MODEM shelf when ROS is provisioned at shelf position 19.

Notes:

- 1) For redundant modem shelf power converter operation, ensure that the following jumpers are in the OUT position in each modem power converter:
 - 1) X1
 - 2) X2
- 2) Also ensure that the following jumpers are installed on the modem shelf backpanel:
 - 1) X1
 - 2) X2
 - 3) X3
 - 4) X4

4.3.5 Current Drain Information

The current drain per MCGM NTN47BA is 15.0 AMPS.

4.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

4.4.1 Required Software Packages and Interdependencies

N/A

4.4.2 Software Usage Restrictions

N/A

4.4.3 Memory Provisioning

N/A

4.5 Real Time Impact

N/A

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5.0 ECM464 - Offshore Cabinetized System

5.1 Overview

The Australian DMS-300 International Gateway Switch is based on the DMS-300 supplied to Turkey with the following enhancements:

- Signalling systems necessary to introduce the product into the Australian National Network.
- Enhancements to the Call Detail Recording, Operational Measurements and Call Progression tone systems.

Similarly, the DMS-300 Gateway Switch for Madley-B Digital International Switching Centre (DISC) in the United Kingdom is based on existing technology, adapted for that market. In general, the markets outside North America, Caribbean and Latin America, Japan and Turkey are termed "Offshore".

The Offshore equipment is cabinetized and based on a Supernode core. Existing Meridian cabinets are provisioned; in addition, a number of new cabinets are introduced to accomodate the Offshore requirements. These are:

- NTFX33AA International Cabinet Trunk Module Fiber (FCTM)

The FCTM houses one or two ILGC/IDTC dual shelf modules in a cabinet configuration supporting both copper (DS-30) and fiber (DS-512) network interfaces. Refer to ECM-646 for detailed information.

- NTNX33FA Meridian Cabinet Trunk Module (MCTM)

The MCTM houses one or two International Digital Trunk Controller (IDTC) modules in a cabinet configuration supporting only copper (DS-30) network interface. Refer to ECM-648 for detailed information.

- NTNX33GA Fiber Cabinet Trunk Module ISDN (FCTM-ISDN)

The FCTM-ISDN houses one or two International ISDN LGC/DTC dual shelf modules in a cabinet configuration supporting both copper and fiber network interfaces. Refer to ECM-649 for detailed information.

- NTFX33CA Offshore Line Trunk Equipment Module ISDN (LTEM)

The NTFX33CA Offshore Line Trunk Equipment ISDN Module cabinet houses one or two Offshore LGCI/DTCI/LTCI/PLGC/PDTC dual shelf modules in a cabinet configuration for applications not re-

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quiring fiber network interfaces. It supports both PCM-30 and DS-1 trunk interfaces for applications in various markets. Refer to ECM-704 for detailed information.

The LTEM is being introduced for the Advanced Service Unit (ASU) project in the UK.

The NT6X02UB PLGC/PDTC Common Circuit Pack (Offshore) is the common circuit pack fill in the LTEM in the UK.

The NTFX33CB LGCI/DTCI Common Circuit Pack (Offshore) is the common circuit pack fill in the LTEM in Japan.

- NTFX37AA International Cabinet Auxiliary Module (ICAM)

The NTFX37AA ICAM houses two International Packaged Trunk Module (IPTM) shelves and a Power Distribution Panel (PDP).

- NTFX37AB International Cabinet Auxiliary Module (ICAM)

The NTFX37AB ICAM houses two IMTM or IMTM-DRA shelves. Power from the bulkhead may be fed out to three MCMI cabinets.

- NTFX47AA International Cabinet General MODULE (ICGM)

The ICGM cabinet provides the capability to add custom feature hardware when required, such as DIO, MTD, DDU, ROS, ROTL, ITM8, IT8A, IMTM, and IMTM-DRA modules.

- NTNX94AA Meridian Cabinet CCS6 Extension (MC6E)

The MC6E houses the DMS CCITT No.6 signalling hardware for DMS-300 applications. It houses up to 48 Signalling Terminals (ST) on three Signalling Terminal Array #6 shelves.

- NTNX95AA Meridian Cabinet Data Modem Expansion (MCDE)

In the CCIS/CCITT #6 environment, Phase Shift Keying (PSK) is used to transmit serial binary data over analog channels. The MCDE houses analog 2400 baud modems which modulate/demodulate serial binary data to/from PSK. A DC modem is dedicated to each signalling terminal. The MCDE is provisioned in conjunction with the MC6E cabinet.

- NTNX96AA Meridian Cabinet Miscellaneous (MCMI)

The MCMI can be configured for use as a power distribution bay, in which case it is equipped with a provisionable Power Assembly containing standard fuse and ground panels. Within this configuration there is a choice of top or bottom ground feed.

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Alternatively, the MCMI can be used as a general purpose bay to house miscellaneous equipment. In this configuration, a provisionable Frame Supervisory Panel may be equipped to power active equipment.

- NTNX97AA International Digital Network Interconnect (IDNI)

The International Digital Network Interconnect (IDNI) is a facility for organizing the interconnection of the junctor face ports of Network Modules in a given plane. It consists of an International cabinet on which are mounted Network Junctor Connecting (NJC) Panels. Flexible arrangement of the junctor connections is provided by means of standard provisionable patch cords. The IDNI is designed to support network cables entering through the top

DMS-300 Overseas Gateway (Madley)

The following circuit packs (CPs) were introduced for use on the NTFX33AA frame:

NT6X27BA PCM-30 Interface CP, now MD and replaced by NT6X27BB, NT6X62DA CCITT N5 version Special Tone Receiver CP, NT6X42CA Channel Supervision Message & N5 Channel Splitter CP, NT6X55CA 8-port Digital Test Access 64Kbit Interface CP, and NTCX50AA Echo Canceller Control Paddleboard.

These new circuit packs are required to equip the DMS-300 Gateway with CCITT No. 5 signaling.

NT6X27BA/BB

The NT6X27BA/BB PCM-30 Interface Circuit Packs provide all the features of the NT6X27AA/AB and AC circuit packs while adding features such as:

- Full compliance to CCITT
- Improved alarm handling
- Support for DCME

The formerly provided NT6X27AC and NT6X27BA PCM-30 Interface Circuit Packs have been changed to MD status and replaced with the NT6X27BB. However, if an existing NT6X27AC is replaced with NT6X27BB AND the software being used is pre-BCS-34, then the NT6X27BB must be datafilled as an NT6X27AC.

The NT6X27AA PCM-30 Interface CP has been changed to MD status and replaced with the NT6X27AB, and, for additions and maintenance of existing frames ONLY, the NT6X27AB is still available.

When the enhancements of the NT6X27BB are required in an existing frame equipped with NT6X27AAs or NT6X27ABs, each of the NT6X27AA

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or NT6X27AB in the frame must be replaced with a NT6X27BB. Do not provision NT6X27BB in a frame already equipped with NT6X27AAs or NT6X27ABs.

Provide the NT6X27BB to equip all new frames.

NT6X62DA

The NT6X62DA is the CCITT N5 version STR (Specialized Tone Receiver). The application of this circuit pack is for the detection of CCITT No. 5 signaling tones. These 2400Hz and 2600Hz tones are used in international networks for circuit supervisory functions. The circuit pack is used to constantly monitor channels which are in-service for the CCITT N5 line signaling tones.

NT6X42CA

The NT6X42CA is the Channel Supervision Message (CSM) circuit pack which performs all the required functions for CSM messaging between the peripherals. The circuit pack also splits the N5 channel on a call-by-call basis to prevent the leakage of tones to further exchanges in the link-by-link signaling path.

NT6X55CA

The NT6X55CA 8-port Digital Test Access circuit pack provides physical level access for eight 64Kbit/sec links in the PCM-30 Digital Trunk Controller (PDTG). The physical access to the links is restricted to timeslots 1 to 4 of DS30 ports 0 and 1 in the DS60 data stream.

NTCX50AA

The NTCX50AA Echo Canceller Control (ECC) circuit pack is a paddle-board for the backplane slot where the NT6X28AA PCM-30 signaling circuit pack is provisioned. The function of the circuit pack is to allow the signaling processor to communicate with remote echo cancellers using RS-232-C/RS-423 transmission protocol.

5.2 Hardware Provisioning

5.2.1 Hardware Usage Restrictions

Not applicable.

5.2.2 Hardware Dependencies

Not applicable.

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5.2.2.1 P and C Side Port Requirements

Not applicable.

5.2.2.2 DMS BUS Port Requirements

Not applicable.

5.2.2.3 Circuits Per Card

Not applicable.

5.2.2.4 Discrimination Numbering

Not applicable.

5.2.3 Provisioning Considerations

- NTFX33AA International Cabinet Trunk Module Fiber (FCTM)

Provision up to two (2) NTFX33BA Cabinetized Fiber ILGC/IDTC Common CP per FCTM. For each module requiring copper interface to the network, provision two (2) NT6X40AC DS-30 Interface CP. For each module requiring fiber interface to an Enhanced Network, provide two (2) NT6X40CA DS-512 Interface CP, two (2) NT6X40DA DS-512 Link Paddleboard, and one (1) NT6X02BU FXPM Bracket Assembly.

On the peripheral side, provision up to eight (8) NT6X27BB PCM-30 Interface CP to interface up to sixteen PCM-30 links (2 links per CP). Provision four (4) NT6X48AA DS-30A Interface CP to interface Line Concentrating Equipment (LCEs).

Refer to the Engineering Manual section for provisioning details for the cabinet equipment and other circuit packs.

- NTFX33CA Offshore Line Trunk Equipment ISDN (LTEM) Module

The Offshore Line Trunk Equipment ISDN Module (LTEM) is provisioned depending on the application as follows:

OFFSHORE APPLICATIONS EXCEPT JAPAN:

The shelves within the LTEM cabinet are provisioned in the same way as the domestic ISDN frame NT6X01AB, except that PCM-30 interfaces are used instead of DS-1 and some circuit pack vintages are different for the Offshore market.

Refer to ECM-647 for NTFX33CA provisioning.

Refer to the Engineering Manual sections for details on circuit pack vintages and cabinet hardware provisioning.

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Provision up to two (2) NT6X02UB PLGC/PDTC Common Circuit Pack (Offshore) per LTEM.

Provision up to eight (8) NT6X27BB PCM-30 Interface CP per PLGC/PDTC module, to interface up to sixteen PCM-30 links (2 links per CP).

When the Calling Number Delivery/Calling Number Display (CND) feature is required, provision two (2) NT6X78AB CLASS Modem Resource CPs for each PLGC/PDTC module.

JAPAN APPLICATIONS:

The shelves within the LTEM cabinet are provisioned in the same way as the domestic ISDN frame NT6X01AB, and some circuit pack vintages are different for the market in Japan.

Refer to ECM-647 for NTFX33CA provisioning.

Refer to the Engineering Manual sections for details on circuit pack vintages and cabinet hardware provisioning.

Provision up to two (2) NTFX33CB LGCI/LTCI/DTCI Common Circuit Pack (Offshore) per LTEM.

provide maximum ten (10) NT6X50AB, DS1 Extended Frame Format CP, per CPCI module as per customer requirements.

When the Calling Number Delivery/Calling Number Display (CND) feature is required, provision two (2) NT6X78AA CLASS Modem Resource CPs for each LGCI/LTCI/DTCI module.

- NTFX37AA International Cabinet Auxiliary Module (ICAM)

The NTFX37AA ICAM can be provisioned to support the Office Alarm Unit (OAU) function. Provide one NTFX37BA Common Circuit Pack per cabinet as well as the circuit packs required to support the OAU function. The remaining free CP slots of the two shelves can be provisioned with maintenance and service circuit packs.

Alternatively each IPTM shelf may be equipped with the NTFX37BB Common Circuit Pack to support the provisionable maintenance and service circuit packs in the remaining free CP slots of the shelf (One or two NTFX37BB per ICAM).

- NTFX37AB International Cabinet Auxiliary Module (ICAM)

The NTFX37AB ICAM can be provisioned to support the Office Alarm Unit (OAU) function. Provision two NT2X58BC shelves together with the circuit packs required to support the OAU function.

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The remaining free CP slots of the two shelves can be provisioned with maintenance and service circuit packs.

Alternatively provision each of the two shelf positions as follows:

- IMTM Configuration:
NT2X58BC shelf and appropriate packs, or
- IMTM-DRA Configuration:
NT2X58BD shelf and appropriate packs.

- NTFX47AA International Cabinet General MODULE (ICGM)

The ICGM cabinet provides the capability to add custom feature hardware when required, such as DIO, MTD, DDU, ROS, ROTL, ITM8, IT8A, IMTM, and IMTM-DRA modules. By concentrating all customization in this cabinet, the remainder of the switch can be provisioned consistently the same, site-to-site.

- NTNX33FA Meridian Cabinet Trunk Module (MCTM)

| The previously provided NTNX33TA Meridian International Digital
| Trunk Control (IDTC) modules have been MD'ed. replaced by
| NTNX33FB then NTNX33FC. Provision up to eight (8) NT6X27BB
PCM-30 Interface CP per IDTC, to interface up to sixteen PCM-30
links (2 links per CP).

- NTNX33GA Fiber Cabinet Trunk Module ISDN (FCTM-ISDN)

Provision up to two (2) NTNX33GB LGCI/DTCI Fiber Common CP (Offshore) per FCTM-ISDN. The shelves within the FCTM-ISDN cabinet are provisioned the same as the domestic ISDN frame (NT6X01AB), except that PCM-30 interfaces are used instead of DS-1, and some circuit pack vintages are different for the Offshore market. Maximum eight (8) PCM-30 Interface CP (supporting 16 PCM-30 links) may be equipped. Refer to the Engineering Manual sections for details on circuit pack vintages and cabinet hardware provisioning. Refer to ECM-649 for NTNX33GA provisioning.

- NTNX94AA Meridian Cabinet CCS6 Extension (MC6E)

Equip MC6E with one (1) NT6X65AA Signalling Terminal (ST) CP per CCITT No. 6 signalling link, to a maximum of 48 STs per cabinet.

- NTNX95AA Meridian Cabinet Data Modem Expansion (MCDE)

Provision one (1) A0302338 Modem CP on the MCDE for every ST equipped in the MC6E.

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- NTNX96AA Meridian Cabinet Miscellaneous (MCM)

If the MCM is to be configured for power distribution, provision either NTNX9601 or NTNX9606 Miscellaneous Power Assembly. Both assemblies provide two power distribution fuse panels, one 'A' feed and the other 'B' feed. Each fuse panel distributes power to up to fifteen individually fused loads. The NTNX9601 is equipped with a ground panel located at the bottom of the cabinet, while the NTNX9606 ground panel is located at the top of the cabinet.

If the MCM is to be configured to house active (powered) miscellaneous equipment, provide one (1) Miscellaneous Equipment Frame Supervisory Panel (FSP). NT0X88AB FSP supplies non-filtered power, while NT0X88AF FSP supplies filtered power to the equipment. In this configuration, miscellaneous equipment may be mounted in the cabinet subject to a maximum power dissipation limit of 600 watts. Refer to provisioning rules for NT0X02AB Miscellaneous Equipment Frame for a list of valid miscellaneous equipment.

In addition, the following cabinets are applicable to the Off-shore switch. Refer to the appropriate ECM for provisioning rules for these products:

- NTNX97AA International Digital Network Interconnect (IDNI)

When the International Digital Network Interconnect (IDNI) is not employed, the cabinetized DMS system is limited to a maximum of 10 networks with fixed network cabling. The IDNI permits the system to expand to a maximum of 28 networks with flexible re-configuration via patch cords.

One IDNI cabinet is required for each 16 Network Modules (NM) per plane. Offices whose ultimate network size will not exceed 8 networks per plane and where floor space is at a premium may combine junctors of both planes on the same IDNI cabinet.

The NTFX97AA IDNI houses up to sixteen (16) NTNX97AB Network Junctor Connecting (NJC) Panels in a International cabinet configuration. The NTFX97AA IDNI has been manufacturer discontinued and replaced by NTNX97AA.

Provide one (1) NJC Panel per plane for NTNX40AA-type network. Note that each NTNX40AA Meridian Cabinet Network Module houses two dual-plane networks or four planes total. Four-position crossover patch cords are selected by length according to the running distance between the two ports which are to be interconnected.

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In addition the following cabinets are applicable to the Off-shore switch. Refer to the appropriate ECM for provisioning rules for these products:

PEC	Abbr	Description	Reference
NTNX22BA	MCSS	Meridian Cabinet Spare Storage	ECM-366
NTNX29BA	MCSM-8	Meridian Cabinet Service Module - 8	ECM-366
NTNX31AA	MCEP	Merid. Cabinet EIOC Processor Module	ECM-377
NTNX32AA	MCEX	Meridian Cabinet Extension Module	ECM-377
NTNX34BA	MC6M	Meridian Cabinet CCS#6 Module	ECM-366
NTNX35AA	MCEM	Meridian Cabinet EIOC Memory Module	ECM-377
NTNX37AB	MCAM	Meridian Cabinet Auxiliary Module	ECM-442
NTNX40AA	MCNM	Meridian Cabinet Network Module	ECM-366
NTNX47BA	MCGM	Meridian Cabinet General Module	ECM-449
NT9X01JA	DPCC	Dual Plane Combined Core	ECM-616
NT9X70AA/BA	LIM	Link Interface Module	ECM-626

5.2.4 Office Layout Information

Please refer to Northern Telecom Practice 555-4001-103 Integrated Services Network Meridian SL-100 Cabinetized General Description.

- NTNX97AA International Digital Network Interconnect (IDNI)

The front of the NJC Panels faces the rear of the IDNI cabinet. Cabling enters from above and is routed to the front of the cabinet where it terminates on the appropriate connector, numbered C00 to C15, on the rear of each NJC Panel.

The connectors are wired internally in pairs to eight terminal strips on the front of the NJC Panel (rear of the cabinet); C00 and C 1 are wired to Terminal Strip 0 (TS00), C02 and C03 are wired to TS01, and so forth up to TS07.

Each Terminal Strip has eight columns of four pins. A junctor port occupies one column of pins. Junctor ports are numbered from left to right as viewed from the front of the NJC Panel. Thus, TS00 contains junctor ports 0-7, TS01 contains junctor ports 8-15, and so forth up to TS07 (ports 56-63).

Four-position crossover patch cords are used to interconnect one junctor port to another as required. Patch cords running between IDNI cabinets are routed through an opening in the side of the cabinet at the rear (hence the rear-facing panels).

The IDNI should be located as close as possible to the network cabinets. If future office expansion is anticipated, ensure space is allowed for additional IDNI cabinets to allow all IDNI to be located beside each other in the lineup.

5.2.5 Traffic Tables

Not applicable.

5.3 Product/System Specification

5.3.1 Physical Characteristics

Maximum power dissipation for miscellaneous equipment mounted on the NTN96AA Meridian Cabinet Miscellaneous (MCM) is 600 watts.

Fusing and current drain information for the four cabinets introduced specifically for Australia is not available at this time.

5.3.2 EMI/Earthquake Information

EMI COMPLIANT	PEC	ABBREVIATED NAME
YES	NTFX33AA	FCTM
YES	NTNX33FA	MCTM
YES	NTNX33GA	FCTM-ISDN
YES	NTFX37AA	ICAM
YES	NTFX37AB	ICAM
YES	NTFX47AA	ICGM
YES	NTNX94AA	MC6E
YES	NTNX95AA	MCDE
NO	NTNX96AA	MCM
NO	NTFX97AA	IDNI

For resistance to earthquake damage, Anchor Kits are required. When installing cabinet in ATC Zone 6 or 7, NEBS Zone 4 or UBC Zone R, provision NTN2540 kit for slab-type flooring or NTN2578 for computer flooring.

In non-earthquake zones, a Frame Mounting Kit is sufficient. Provision NTN2579 kit for slab-type flooring or NTN2580 for computer flooring.

5.3.3 Sparing Information

Standard sparing algorithms apply.

5.3.4 Power Feed and Fusing Requirements

Not Applicable

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5.3.5 Current Drain Information

Not Applicable

5.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

5.4.1 Required Software Packages and Interdependencies

The base S/W packages to be ordered for the Australia DMS-300 are as follows:

NTX000AA	BILGE
NTX001AA	COMMON BASIC
NTX041AB	CCITT NO.7 MTP AUSTRALIAN SCREENING
NTX051AA	AUTOMATIC TRUNK TESTING
NTX053AA	MAINTENANCE ASSISTANCE PACKAGE
NTX055AA	TTP
NTX055AB	TTP - DIGIT VERIFICATION
NTX055AC	TTP - TRANSMISSION MEASUREMENTS
NTX056AA	ENHANCED ADMINISTRATION
NTX059AB	POLLING OF OM AND AMA DATA
NTX060AB	NETWORK MANAGEMENT
NTX060BB	NETWORK MANAGEMENT - ENHANCED
NTX065AA	SERVICE ANALYSIS
NTX074AA	DISK DATA STORAGE SYSTEM
NTX176AA	NON-RESIDENT ADMINISTRATIVE AIDS
NTX177AA	NON-RESIDENT GENERAL UTILITIES
NTX178AA	NON-RESIDENT DIAGNOSTIC UTILITIES
NTX270AA	NEW PERIPHERAL MAINTENANCE
NTX274AA	DTC-30 CARRIER MAINTENANCE
NTX291AA	ENHANCED REAL-TIME INDICATOR
NTX292BA	ENHANCED SECURITY - WITHOUT PASSWORD ENCRYPTION
NTX300AA	INTERNATIONAL SWITCHING CENTRE - BASIC
NTX301AA	ISC - MAINTENANCE
NTX302AA	ISC - ATME 2
NTX303AB	ISC - CALL DETAIL RECORDING
NTX307AA	CCITT NO.6 SIGNALLING SYSTEM
NTX308AA	TASI "B" INTERFACE
NTX904AA	R2 SIGNALLING BASE
NTX905AA	ISC-R2 SIGNALLING
NTXB53AA	CCITT NO.7 - ISUP
NTXB71AA	R2 - DOMESTIC UTILITIES
NTXH40AA	CCITT NO.7 TUP
NTXH41AA	DMS-300 TRUNK SIGNALLING
NTXH42AA	TUP - DMS-300
NTXH43AA	DMS-300 ATUP SIGNALLING
NTXH44AA	Australian TUP for DMS-300
NTXH45AA	OTC Tones

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Refer to ECM-626 for required DMS-Core software packages.

5.4.2 Software Usage Restrictions

Not applicable.

5.4.3 Memory Provisioning

Refer to MEMCALC for memory provisioning.

5.5 Real Time Impact

There is no real-time impact as a result of products introduced by this ECM.

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6.0 ECM600 - DMS-100 Cabinetized

6.1 Overview

This project was introduced to re-package the existing DMS-100 product line into 28 inch cabinets. The project is referred to as DMS-100 Cabinetization (Model A). DMS-100 Cabinetized provides a more effective design for EMI compliance.

The project development will be divided into phases. Phase 1 will include development of cabinetized versions of the PDC, IOE, MIS, LCE, TME, CPE, DSN, SLC and DNI frames. There will also be development of a modular FSP prototype, LCE signal connectorization, low voltage control "AC free", double hole frame ground and enhanced endguard control with aisle identification card included in Phase 1. Phase 1' introduces the CPCI module and the CLMI ISDN line cabinet. Subsequent phases will add cabinets and capabilities which will be covered in future issues of this ECM.

The cabinet will be a unified steel structure that will support four standard 26 inch wide by 13 inch high DMS-100 shelves and an FSP. The integral cooling unit (for applications that require cooling) will mount in the base of the cabinet. Intra lineup cabling can be routed within the EMI shield horizontally between cabinets. The cabinets will be light grey with medium blue accent.

As a result of the Cabinet A "MD" project, various cabinets as indicated herein have been rated "Manufacture Discontinued". Please refer to the Cabinet B replacement indicated, or reference ECM 683.

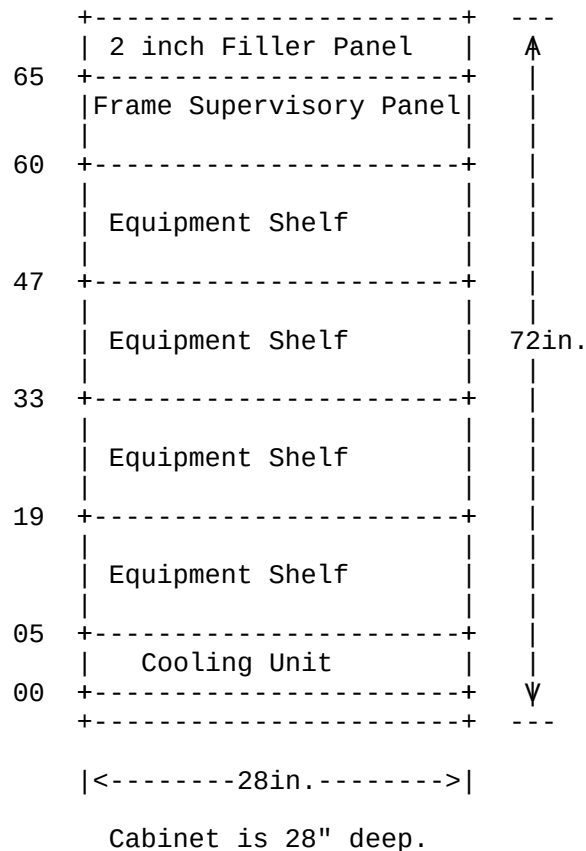


Figure 4. DMS-100 CABINETIZED LAYOUT

6.2 Hardware Provisioning

6.2.1 Hardware Usage Restrictions

6.2.2 Hardware Dependencies

DMS-100 Cabinetized equipment is intended to replace the existing DMS-100 product line. To maintain the EMI capability of the cabinetized system, CABINETIZED EQUIPMENT MUST NOT BE MIXED WITH FRAMES.

6.2.2.1 P and C Side Port Requirements

6.2.2.2 DMS BUS Port Requirements

6.2.2.3 Circuits Per Card

6.2.2.4 Discrimination Numbering

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6.2.3 Provisioning Considerations

The equipment included in the DMS-100 Cabinetized project is primarily the DMS-100 product repackaged into cabinets. Building Block provisioning methods have been incorporated to simplify ordering Cabinetized equipment and associated hardware.

6.2.3.1 Cabinetized Line Concentrating Equipment (CLCE)

This Cabinet is rated "MD". Refer to NTRX30CA.

The NTRX30AA Cabinetized LCE is a cabinet module that maintains the current functionality of the DMS-100 LCE frame. Like the LCE, it will contain two fully duplicated LCMS, each with ten drawers providing 640 line card capacity. Each CLCE will utilize a single backplane for the duplicated controller, processor and power converter cards. This backplane eliminates over 95% of the LCE wirewrapped connections by use of connectors. All wiring between the duplicated controller processor and convertor is integrated into the dual shelf backplane. The line drawer fusing has been moved to the side of the respective shelf to allow packaging of the seven foot LCE into a six foot cabinet.

Connectorization is provided to a rear bulkhead for DS-30A links, metallic test access and line drawer tip and ring connections. The FSP is mounted at the top of the cabinet and contains duplicated ringing generators, a cooling fan unit and equipment for cabinet power distribution and alarms. A cooling unit is also mounted in the bottom of the cabinet. To accomodate the cutover by directory number feature, the +15V and ground is brought out to a terminal block on an applique panel at the rear of the cabinet. The cables from the CLCE line drawers to the bulkhead are included with the cabinet (Always Provided).

The NTRX30AA is always provided in the NTZZ08DB building block.

6.2.3.2 Cabinetized Line Module ISDN (CLMI)

This Cabinet is rated "MD". Refer to NTRX30DA.

The NTRX30BA Cabinetized LMI is a cabinet module that maintains the current functionality of the DMS-100 LCEI frame. Like the LCEI, it will contain two fully duplicated LCMs, each with eight drawers providing 480 single slot 2B1Q lines.

The FSP is mounted at the top of the cabinet and contains duplicated ringing generators, a cooling fan unit and equipment for cabinet power distribution and alarms. A cooling unit is also mounted in the bottom of the cabinet. The cables from the CLCE line drawers to the bulkhead are included with the cabinet (Always Provided).

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The NTRX30BA is always provided in the NTZZ33AA building block.

6.2.3.3 Cabinetized Power Distribution Center (CPDC)

This Cabinet is rated "MD". Refer to NTRX31CA.

The NTRX31AA Cabinetized PDC houses equipment required to interface between the -48V office batteries and up to 84 individual loads within the DMS-100 system. The CPDC will contain power distribution shelves, an FSP which includes DC distribution filtering and one optional inverter shelf which will serve convenience outlets.

The CPDC will provide the capability to use circuit breakers rather than fuses, connectors in place of bolted connections and the ability to add CPDC shelves as required. EMI compliance is achieved at the cabinet level for all input power cabling and at the system level for all power distribution. The maximum capacity of the CPDC is 200 Amps per feed.

The NTRX31AA is always provided in the NTZZ13LA building block.

6.2.3.4 Cabinetized Trunk Module Equipment (CTME)

This Cabinet is rated "MD". Refer to NTRX32CA.

The NTRX32AA CTME is the cabinet module which has the same basic functions as the DMS-100 TME frame. The cabinet may contain up to four shelf modules (MTM, DRA, TM8, AXU) which are provisionable in positions 5, 19, 33 and 47 except the AXU which is restricted to position 47 only. When an MTM is functioning as the alarm system (OAU), the shelf should be mounted below the AXU in position 33. The NTZZ31BA building block contains one (1) AXU, one (1) OAU, and the associated hardware required for the office alarm system. A Meridian cabinet FSP will be utilized in Phase 1 until the new modular FSP is available (Phase 2).

The MTM used for the Office Alarm Unit (OAU) on the CTME is to use the following circuit pack mounting positions:

PEC	SLOT
-----	-----
NT2X45AB	01
NT0X70AA	02
NT2X53AA	03
NT2X59AA	04
RESERVED FOR NT3X82AA	05, 06
RESERVED FOR NT2X57AA	07
RESERVED FOR NT3X83AA, NT3X84AA	08
RESERVED FOR NT3X85AA	09
RESERVED FOR NT0X10AA	10
RESERVED FOR NT0X10AA	11

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RESERVED FOR NT0X10AA	12
RESERVED FOR NT0X10AA	13
PROVISIONABLE	14
PROVISIONABLE	15
PROVISIONABLE	16

The NTRX32AA is always provided in the NTZZ31AA building block. Personality plates are always provided in the TM8/MTM/DRA building blocks. Cabling will be via filtered connectors in the rear EMI bulkheads.

6.2.3.5 Cabinetized Input Output Equipment (CIOE)

This Cabinet is rated "MD". Refer to NTRX33DA.

The NTRX33AA CIOE will house Data Processing Peripheral (DPP), Input Output Controller (IOC), Magnetic Tape Drive (MTD), Disk Drive Units (DDU), and Stratum II and 2.5 Clocks.

The basic CIOE will be equipped with a Frame Supervisory Panel (FSP), a cooling unit (CU), and an Input Output Controller (IOC). The NTZZ32AA building block comes always provided with one NTRX33AA, one FSP, and one CU. One (1) NTZZ32EA IOC Package should be ordered per CIOE. The MTD, DDUs, DPPs and Stratum equipment is optional and provisionable in building block packages. The FSP will be in shelf position 60, the IOC in position 19 and the cooling unit in position 00. When provisioned, the DDU will always be mounted in shelf position 05, the Stratum in position 05 and the MTD or DPP in position 33. The Phase 1 CIOE will support only one IOC per cabinet. Personality plates are always provided in the building block packages.

DDU (NT1X55DA) controller cards can be assigned to only slot 4 or slot 6 of the IOC shelf in the CIOE. The cables from these slots to the bulkhead are not normally provided since the MTD/DDU/DPP do not require them. While it is not recommended, use of these slots for other devices will require that cables (4 per slot) be provisioned. Therefore, IOC slots 4 and 6 are reserved for MTD/DPP/DDU controllers only. The MTD,DPP or DDU connected to these slots must be inside the same Faraday cage of the CIOE.

Shielded cable will be used for DS30 connection to ECORE through bulkhead. All cable connections from the IOC to MTDs, DDUs and DPPs will be direct, rather than through the bulkhead. A Meridian cabinet FSP will be utilized for Phase 1 and the modular FSP will be included in Phase 2.

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6.2.3.6 Cabinetized Miscellaneous Equipment (CMIS)

This Cabinet is rated "MD". Refer to NTRX56AA.

The CMIS accomodates miscellaneous DMS-100 common systems and other hardware required in a DMS-100 office. The equipment in the CMIS is currently provisionable. The CMIS has been subdivided into eight (8) 7 inch zones. building block. Equipment that is working together should be mounted together in one zone. Equipment that may be mounted is being added in a phased introduction.

Available equipment:

- LaMarche inverter unit - NTZZ18QA
- Inactive system timing circuit - NTZZ18LA
- DTH/ROTL - NTZZ18PA
- Case/Datatel AC shelf rack - NTZZ18MA
- Case/Datatel DC shelf rack - NTZZ18NA
- Common equipment shelf - NTZZ18YA
- Terminal block assembly - NT3X25BA
- CMIS Terminal block assembly - NTZZ18ZA
- Audible and visual alarm extension unit - NTZZ18VA
- Audible alarm cutoff control unit - NTZZ18WA
- Audible alarm cutoff key panel - NT5X86AB
- Pylon RG-2 ringing generator - Part of NTZZ18VA
- Digital Alarm Scanner - NTZZ18XA
- Multiple Loop Test Applique Shelf - NTZZ18UA
- Cook Digital Announcer - NT5M0N__, NTZZ23

The following diagram depicts the CMIS configuration that is currently supported:

Height			
---	+	-----+	
5 in.		NTRX45AA Frame Supervisory Panel	
---	+	-----+	--> Shelf position 60
7 in.		H	
---	+	-----+	--> Shelf position 53
7 in.		G	
---	+	-----+	--> Shelf position 46
7 in.		F	
---	+	-----+	--> Shelf position 39
7 in.		E	
---	+	-----+	--> Shelf Position 32
7 in.		D	
---	+	-----+	--> Shelf position 25
7 in.		C	
---	+	-----+	--> Shelf Position 18
7 in.		B	
---	+	-----+	--> Shelf Position 11
7 in.		A	
---	+	-----+	--> Shelf Position 04
4 in.		Cooling Unit	
---	+	-----+	--> Shelf position 00

Figure 5. Cabinetized Miscellaneous Equipment

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Internal cables from the CMIS shelves to the cabinet bulkhead are always provided in the individual unit building block packages.

The PDC fusing for the CMIS is identical to the frame version of the MIS (Four 20 Amp fuses). The LaMarche inverter will be fused directly at the CPDC.

6.2.3.7 Cabinetized Dual Shelf Network (CDSN)

This Cabinet is rated "MD". Refer to ENET Application.

The NTRX35AA CDSN cabinet can contain up to two fully duplicated dual shelf network modules. All connectors to and from the network module are connected through the bulkhead for EMI protection. In the top of the cabinet is the FSP which distributes power, control and alarms to the cabinet. In the base of the cabinet there is a fan unit for forced air cooling. Personality plates will be Always Provided for the CDSN.

The NTRX35AA CDSN cabinet is always provided in the NTZZ07FA building block model. The NTZZ07FA can be provisioned with up to two complete networks, NTZZ07GA or NTZZ07JA. The NTZZ07GA, Network Common CP Kit, should be provisioned for each Network Module that will be non-junctored at the CDNI. The NTZZ07JA, Network Common CP Kit, should be provisioned for each Network Module that will be junctored at the the CDNI.

6.2.3.8 Cabinetized Common Peripheral Equipment (CCPE)

This Cabinet is rated "MD". No Replacement.

The NTRX36AB CCPE cabinet mounts two dual shelf XPM modules and comes always provided with the ISDN-Ready backplane. All connections to the network and DS1 links shall be through the bulkhead for EMI protection. The FSP is mounted in the top of the cabinet and a fan unit is mounted in the base.

The NTRX36AB CCPE cabinet is always provided in the NTZZ22CA building block. Two dual shelf XPM modules can be mounted on the NTZZ22CA.

6.2.3.9 Cabinetized Speech Link Connection (CSLC)

This Cabinet is rated "MD". Refer to ENET Application.

The NTRX37AA CSLC cabinet provides a patch cord cross-connect facility for interconnecting peripheral equipment and network peripheral face ports to facilitate network loading administration.

Cabinetized equipment will use a single identifier (CSLC) for both planar and combined cabinets. The discrimination number will be used to identify the different usage of the cabinet. Planar cab-

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inets will be CSLC 0-00, CSLC 1-00 and the combined cabinets will be CSLC 00, CSLC 01, etc.

The NTZZ21CA building block comes always provided with the NTRX37AA.

6.2.3.10 Cabinetized Digital Network Interconnection (CDNI)

This Cabinet is rated "MD". Refer to ENET Application.

The NTRX38AA CDNI provides a patch cord junctor cross-connect facility for interconnecting between the network juncture face ports of Network Modules in the same plane.

Cabinetized equipment will use a single identifier (CDNI) for both planar and combined cabinets. The discrimination number will be used to identify the different usage of the cabinet. Planar cabinets will be CDNI 0-00, CDNI 1-00 and the combined cabinets will be CDNI 00, CDNI 01, etc.

The NTZZ20CA building block comes always provided with the NTRX38AA.

6.2.3.11 Dual Plane Combined Core (DPCC)

Refer to ECM626 for provisioning considerations on SuperNode(S/DMS) in a Cabinetized office. The SuperNode house one Computing Module (CM), two Message Switch (MS), and one System Load Module (SLM) shelf assembly.

6.2.3.12 Enhanced Network (ENET)

Refer to ECM627 for provisioning considerations on ENET(S/DMS) in a Cabinetized office. The ENET houses up to four ENET shelves per plane. Each shelf provides a nominal switching capacity of 32K channels.

6.2.3.13 Link Peripheral Processor (LPP/LIM)

Refer to ECM386 for provisioning considerations on LPP in a Cabinetized office. Refer to ECM609 for LPP Building Block provisioning. When a LPP is provisioned in a lineup, one of each of the following EMI endpanels should be provisioned on the cabinet: NTRX73AD, NTRX73AE.

Refer to ECM620 for provisioning considerations on LPP in a S/DMS Cabinet.

6.2.3.14 Cabinetized Miscellaneous Spare Storage (CMSS)

This Cabinet is rated "MD". Refer to NTRX49BA.

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The Cabinetized Miscellaneous Spare Storage (CMSS) provides for storage of spare circuit packs. The storage cabinet can be provisioned with up to four spare storage shelf assemblies which can hold 0.875, 1.125, or SuperNode size circuit packs.

6.2.4 Office Layout Information

The DMS-100 Cabinetized equipment will be restricted to lineups of no more than eleven (11) 28" cabinets or five (5) 42" cabinets. The first cabinet in each lineup will be a Cabinetized Power Distribution Center (CPDC). Future growth will be limited to the end of the lineup on the opposite side of the CPDC.

If more than one CSLC exists in an office then the cabinets must be located directly across one another in separate lineups due to heavy cabling requirements. The same restriction applies to CDNI cabinets.

No break in a line-up will be allowed when using cabinetized equipment. If an obstruction exists in a lineup, a new lineup (with CPDC) must be used, rather than an empty space to accommodate the obstruction. An empty cabinet may be provisioned in a line-up for future use as long as it is inside the faraday cage.

Cabinetized equipment will be installed according to whether the office requires earthquake bracing or not. Building Studies will order one of the following kits per cabinet:

Slab Floor

Earthquake Anchor Kit NTRX2512 (4 Anchors and Isolator Pad)

DMS-100 Cabinetized will use the same power and grounding topology as the Integrated System Ground (ISG) DMS. DMS-100 Cabinetized will require power only from a -48VDC source and equipment requiring any type of power that cannot be obtained from this feed will not be used within the DMS-100 Cabinetized.

Lighting equipment will be a separate entity from the DMS-100 Cabinetized and will not be provided as an integral part of the switch. Center aisle lighting is the preferred lighting system for Cabinetized offices.

AC power will be available only for two applications. One as a customer requested option to power a pair of duplex receptacles, one at each end of the lineup. Provision one NTRX31AD, LaMarche Inverter Kit, per CPDC. The other, to provide 115VAC to miscellaneous equipment mounted in a CMIS cabinet. The NTZZ18QA LaMarche Inverter Unit can power up to four AC-powered units which must be mounted in the same cabinet as the inverter itself.

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The following general application rules will impact the Cabinetized equipment layout:

- Dual Plane Core Cabinet (DPCC), CIOE and CMIS (with modems for the IOC) must be located adjacent to each other in the same lineup.
- There will be no DC coupled signal interconnection between equipment in separate lineups.
- LIU and associated CMIS modem equipment must be located in a cluster in the same lineup.
- LGE and associated LCE equipment must be powered from the same CPDC.
- Cabinetization will conform to corporate standard CS4122.
- Cabinets arranged in a cluster will have a #6 AWG cable "equaliser" run along their base. A #6 AWG cable will be run from the logic return bus in each of these cabinets and H-tapped to the #6 AWG cluster equaliser. #6 to #6 AWG H-Tap will be the Thomas & Betts 63110.
- A #0 AWG logic return collector cable will be run along the base of each lineup. A #6 AWG cable will be run from any cluster equalisers in the lineup and also from any separate equipment logic return bus not part of a cluster and H-tapped to the collector cable. The collector cable will terminate at an EMI feed-thru filter located on the CPDC EMI bulkhead. #6 to #0 AWG H-Tap will be the Thomas & Betts 63125.
- A #0 AWG cable will be run from the CPDC feed-thru filter to the DMS system Logic Return Equaliser Bus (LRE).
- All logic return H-taps will be equipped with a protective cover (Thomas & Betts: HT20CFR).
- Two hole lugs will be used wherever possible to terminate cable.
- All Cabinetized equipment will be isolated from contact with any incidental ground and bonded to the DMS Single Point Ground. A #0 AWG framework ground collector cable will be run along the base of each lineup. A #6 AWG cable will be run from the ground studs on each cabinet and H-tapped to

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the collector cable. The collector cable will terminate at the ground studs on the bottom of the CPDC EMI bulkhead. A #0 AWG cable will be run from the CPDC ground studs to the DMS system Framework Ground Equaliser Bus (FGE).

- All power distribution, logic return and ground cabling will be of the flexible style. Secondary power distribution cables between cabinets and the CPDC shall be #8 or #10 AWG and supplied with each cabinet. All cables will be supplied for maximum length and cut to length and terminated by the installer.

DMS-100 Cabinetized Cable Racks

DMS-100 Cabinetized will use a set of universal cross aisle trays. These trays will be 3" high by 12" wide. They will be provisionable in lengths from one to six feet in increments of 4 inches. Cross aisle mounting kits will be utilized to mount the cross aisle trays to the Cabinetized cable tray (NTNX5511). When mounting from cabinet to cabinet, a NTNX5512 cross aisle kit should be used. This kit provides a one inch (in half inch increments) vertical adjustment to allow leveling of the tray. It also allows three-fourths of an inch horizontal adjustment for centering. The kit is mounted to the NTNX5511 with standard hardware using one starwasher to provide frame grounding. Height from floor to the base of the tray should be approximately eight feet.

Though not currently supported, when mounting from Cabinetized DMS-100 to an existing DMS-100, a NTNX5512 cable cross aisle kit should be provisioned on the Cabinetized side and a NTNX5528 cable cross aisle kit should be provisioned on the DMS-100 side. An isolation strip is provided with this kit to provide isolation between the two lineups. No lineup to lineup frame isolation is required when cross aisling from Cabinet to Cabinet.

When cross aisling from Cabinet to SuperNode is required, the ladder rack should be used for cable handling. When cross aisling from SuperNode to SuperNode, continue to use the current SuperNode cable tray with redesigned oxford grey cross aisle trays.

When cross aisles are required between a Cabinet and a DMS-100 and the cable tray exceeds 10.10 inches, ladder rack should be used for cable handling. If an office requires a cross aisle tray length that exceeds 68.5 inches, ladder rack should be used. No cross aisle trays should be used in a seismic engineered office. Ladder rack should be used for cable handling in earthquake engineered applications.

Refer to Figure 8 on page 16-46 for DMS-100 Cabinetized cable handling part numbers:

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+-----+-----+		
FROM DMS-100 CABINETIZED	TO DMS-100 CABINETIZED	
+-----+-----+		
Cross Aisle Kit NTNX5512	Cross Aisle Kit NTNX5512	
+-----+-----+		
FROM DMS-100 CABINETIZED	TO DMS-100	
+-----+-----+		
Cross Aisle Kit NTNX5512	Cross Aisle Kit NTNX5528	
+-----+-----+		
Cable Tray Assembly (Length to be job engineered)		
+-----+-----+		
NTRX5513	B0232838	Cable Tray Assembly 12.50
P0715950	P0715950	12.0 X 12.5 Cable Duct
P0715965	P0715965	12.5 Divider
+-----+-----+		
NTRX5514	B0232837	Cable Tray Assembly 16.50
P0715949	P0715949	12.0 X 16.5 Cable Duct
P0715964	P0715964	16.5 Divider
+-----+-----+		
NTRX5515	B0232836	Cable Tray Assembly 20.50
P0715948	P0715948	12.0 X 20.5 Cable Duct
P0715963	P0715963	20.5 Divider
+-----+-----+		
NTRX5516	B0232835	Cable Tray Assembly 24.50
P0715947	P0715947	12.0 X 24.5 Cable Duct
P0715962	P0715962	24.5 Divider
+-----+-----+		
NTRX5517	B0232834	Cable Tray Assembly 28.50
P0715946	P0715946	12.0 X 28.5 Cable Duct
P0715961	P0715961	28.5 Divider
+-----+-----+		
NTRX5518	B0232833	Cable Tray Assembly 32.50
P0715945	P0715945	12.0 X 32.5 Cable Duct
P0715960	P0715960	32.5 Divider
+-----+-----+		
NTRX5519	B0232832	Cable Tray Assembly 36.50
P0715944	P0715944	12.0 X 36.5 Cable Duct
P0715959	P0715959	36.5 Divider
+-----+-----+		
NTRX5520	B0232831	Cable Tray Assembly 40.50
P0715943	P0715943	12.0 X 40.5 Cable Duct
P0715958	P0715958	40.5 Divider
+-----+-----+		
NTRX5521	B0232830	Cable Tray Assembly 44.50
P0715942	P0715942	12.0 X 44.5 Cable Duct
P0715957	P0715957	44.5 Divider
+-----+-----+		

Figure 6. Continued on Next Page

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+-----+-----+-----+-----+			
NTRX5522	B0232829	Cable Tray Assembly 48.50	
P0715941	P0715941	12.0 X 48.5 Cable Duct	
P0715956	P0715956	48.5 Divider	
+-----+-----+-----+-----+			
NTRX5523	B0232828	Cable Tray Assembly 52.50	
P0715940	P0715940	12.0 X 52.5 Cable Duct	
P0715955	P0715955	52.5 Divider	
+-----+-----+-----+-----+			
NTRX5524	B0232827	Cable Tray Assembly 56.50	
P0715939	P0715939	12.0 X 56.5 Cable Duct	
P0715954	P0715954	56.5 Divider	
+-----+-----+-----+-----+			
NTRX5525	B0232826	Cable Tray Assembly 60.50	
P0715938	P0715938	12.0 X 60.5 Cable Duct	
P0715953	P0715953	60.5 Divider	
+-----+-----+-----+-----+			
NTRX5526	B0232825	Cable Tray Assembly 64.50	
P0715937	P0715937	12.0 X 64.5 Cable Duct	
P0715952	P0715952	64.5 Divider	
+-----+-----+-----+-----+			
NTRX5527	B0232824	Cable Tray Assembly 68.50	
P0715936	P0715936	12.0 X 68.5 Cable Duct	
P0715951	P0715951	68.5 Divider	
+-----+-----+-----+-----+			
NTNX5528	B0232905	Cross Aisle kit (DMS-100 side)	
+-----+-----+-----+-----+			
NTRX5530	B0232946	Main Cross Aisle Duct Assembly	
P0726513	P0726513	Main Aisle Mounting Bracket Top	
P0726528	P0726528	Main Aisle Mounting Brkt. Bottom	
+-----+-----+-----+-----+			
NTRX5529	B0232947	Main Cross Aisle Weld Assembly	
P0726609	P0726609	Main Cross Aisle Cable Duct	
P0726612	P0726612	Main Cross Aisle Duct Divider	
+-----+-----+-----+-----+			
NTRX5531	B0233096	Cable Assy.(Main Aisle Gnding.)	
+-----+-----+-----+-----+			
NTRX5532	B0233055	10 inch Cable Rack Support kit	
P0726983	P0726983	10 inch Cable Rack Support brkt.	
+-----+-----+-----+-----+			
NTRX5533	B0233056	12 inch Cable Rack Support kit	
P0726982	P0726982	12 inch Cable Rack Support brkt.	
+-----+-----+-----+-----+			
NTRX5535	B0233058	14 inch Cable Rack Support kit	
P0726981	P0726981	14 inch Cable Rack Support brkt.	
+-----+-----+-----+-----+			
NTRX5536	B0233059	16 inch Cable Rack Support kit	
P0726864	P0726864	16 inch Cable Rack Support brkt.	
+-----+-----+-----+-----+			

Figure 7. Continued on Next Page

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NTRX5537	B0233060	18 inch Cable Rack Support kit
P0726863	P0726863	18 inch Cable Rack Support brkt.
NTRX5534	B0233060	12 in. Overframe Cable Duct Sprt
P0726984	P0726984	12 in. Overframe Cable Duct Brkt
NTRX5538	B0233122	Lighting Frame Support Assembly
P0727257	P0727257	Mounting Bracket CAL 24 inch
P0727256	P0727256	Mounting Bracket CAL 26 inch
P0727255	P0727255	Mounting Bracket CAL 28 inch
P0727254	P0727254	Mounting Bracket CAL 30 inch
P0727253	P0727253	Channel 51 inch CAL
NTNX5510	B0232284	Cable Tray Mechanical Assembly
P0715857	P0715857	Cable Trough
P0715858	P0715858	Cable Tray rear divider
P0688745	P0688745	Cable Tray front divider
P0713966	P0713966	Cable Tray bracket right
P0713977	P0713977	Cable Tray bracket left
P0726788	P0726788	Brace Top
NTNX5511	B0232799	Cable Tray and Mounting Hardware
NTNX5512	B0232805	Cable Cross Aisle Kit
P0715855	P0715855	Cable Aisle Bracket Base
P0715854	P0715854	Cable Aisle Bracket Top

Figure 8. DMS-100 Cabinetized Cable Handling Part Numbers

DMS-100 Cabinetized Discrimination Numbering

Cabinetized equipment is currently not allowed to be mixed with frame type equipment in an office. Future development may allow mixed office configurations, so equipment should be numbered to prevent confusion when the two equipment types eventually coexist. Note that while, for example, LCE 00 and CLCE 00 could both exist in the same office, the LCMS would require unique numbering.

Endguard Designation Labels

DMS-100 Cabinetized endguards are shipped with a Slipsheet, P 715815, and a Window Panel, P0727378, that are used to mount labels for each cabinet position in a lineup. There is a column on the slipsheet for each position in the lineup to list cabinet name, cabinet number, and up to four module names and numbers per cabinet. The slipsheet mounts in a pocket on the endguard along with the window panel which provides column headings for the slipsheet.

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Refer to MS0X60AA, Issue 26 or later, for a list of the Cabinetized DMS-100 endguard labels. This drawings describes which and how many labels are on each sheet.

6.2.5 Traffic Tables

Not applicable.

6.3 Product/System Specification

6.3.1 Physical Characteristics

The DMS-100 Cabinetized equipment is 72" high, 28" wide and 28" deep. The cabinet will have two center-open doors (both front and rear).

All 28" Cabinetized equipment, except the CMIS, is fused using four (4) 3 Amp Circuit Breakers (two A feeds and two B feeds). The CMIS is fused using two (2) 30Amp Circuit Breakers (one A feed and one B feed). Cooling units are fused at the FSP rather than the PDC.

S/DMS style cabinets (NT9X95AA framework) are fused per the following chart:

	10 Amp -----	30 Amp -----
SuperNode, LPP (S/DMS)	1A,1B	4A,4B
ENET Plane 0 (S/DMS)	2A	8A
ENET Plane 1 (S/DMS)	2B	8B

6.3.2 EMI/Earthquake Information

DMS-100 Cabinetized requires no additional bracing or stiffening hardware when applied in an earthquake environment. The cabinet must be bolted to the floor with four bolts and anchors. For raised floor installations in active seismic zones, a sub-structure support between the concrete sub-floor and the raised flooring is required. (The sub-structure is not provided as part of this program.) A qualified seismic engineer should be consulted regarding additional bracing on a per job basis.

Building Studies should provide one NTNX2512 kit per cabinet when Cabinetized equipment is applied in an earthquake configuration.

DMS-100 Cabinetized provides EMI compliant functionality when equipped with shielded cables. The cabinet doors and bulkheads provide shielding for the equipment to meet EMI standards.

6.3.3 Sparing Information

Sparing practices are not impacted by the application of cabinets. Equipment should be spared per existing practices.

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6.3.4 Power Feed and Fusing Requirements

Fusing, for cabinets with fusing requirements, is always provided. Fusing to the central office Power Panel is determined by Power Engineering based on the maximum current drain per cabinet. See "Current Drain Information" on page 16-48 .

6.3.5 Current Drain Information

CABINET	DISSIPATION WATTS	CURRENT DRAIN
CLCE	1350 *	28Amp *
CLMI	1350 *	28Amp *
CTME	875	18Amp
CIOE	850	18Amp
CCPE	1003	21Amp
CDSN	706	15Amp
CMS7	1125	23Amp
CIDC	1150	24Amp
CIPE	1256	26Amp
CSLC	0	
CDNI	0	
CPDC	167	4Amp
CMIS	779	16Amp
0	0	0

* Traffic dependent. Values given are based on traffic of 9.6 CCS per line with a 500 ohm average loop resistance.

Figure 9. Current Drain Information

6.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

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6.4.1 Required Software Packages and Interdependencies

Not applicable.

6.4.2 Software Usage Restrictions

Not applicable.

6.4.3 Memory Provisioning

Not applicable.

6.5 Real Time Impact

Not applicable.

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7.0 ECM636 - International DMS-100 Model A Cabinetized Equipment

7.1 Overview

This document, in conjunction with ECM-600, describes the provisioning rules for the following international DMS-100 Model A cabinetized equipment: CLCE, CLMI, CTME, CIOE, CDSN, CSLC, CDNI and CMSS.

This equipment is designed to meet the European Community safety requirements, including the specific safety requirements for the UK, and global electromagnetic radiation EN Class A requirements for the European Community and Australia.

The DMS-100 Model A Cabinetized base product is described in ECM-600 covering cabinets for use in North America.

This ECM-636 describes most of the cabinets developed specifically for use in the international market where the power supply is 48VDC, as well as the international aspects of the base cabinets described in ECM-600.

The following table references sources of information regarding all of the available international DMS-100 Model A cabinets, including those not covered by this ECM.

Figure 11 on page 16-52 /.end illustrates a typical DMS-100 Model A cabinet layout.

DMS-100 Model A Cabinets for International Applications				
Abbrev.	Equipment Description	ECM	Eng.Man. Section	Cabinet PEC
CLCE	Line Concentrating Equip.	ECM-636	NTZZ37LA	NTRX30AA
CLMI	LCM ISDN	ECM-636	NTZZ33AA	NTRX30BA
CPDC	Power Distribution Center	ECM-631	NTZZ37MA	NTRX31AA
CTME	Trunk Module Equipment	ECM-636	NTZZ37QA	NTRX32AA
CIOE	Input Output Equipment	ECM-636	NTZZ37AM	NTRX33AA
CMIS	Miscellaneous Equipment	ECM-655	NTRX34AB	NTRX34AB
CDSN	Dual Shelf Network	ECM-636	NTZZ37XA	NTRX35AA
CSLC	Speech Link Connecting	ECM-636	NTZZ21CA	NTRX37AA
CDNI	Digital Network Interconnect	ECM-636	NTZZ20CA	NTRX38AA
CIPE	Intl. Periph. Equip. ISDN	ECM-659	NTZZ37AA	NTRX46AA
CIDC	Intl. Digital Cntrl. non-ISDN	ECM-660	NTZZ37EA	NTRX47AA
CMS7	Message Switch 7	ECM-661	NTZZ37HA	NTRX48AA
CMSS	Maintenance Spare Storage	ECM-636	NTRX49AA	NTRX49AA

Figure 10. DMS-100 MODEL A CABINETS

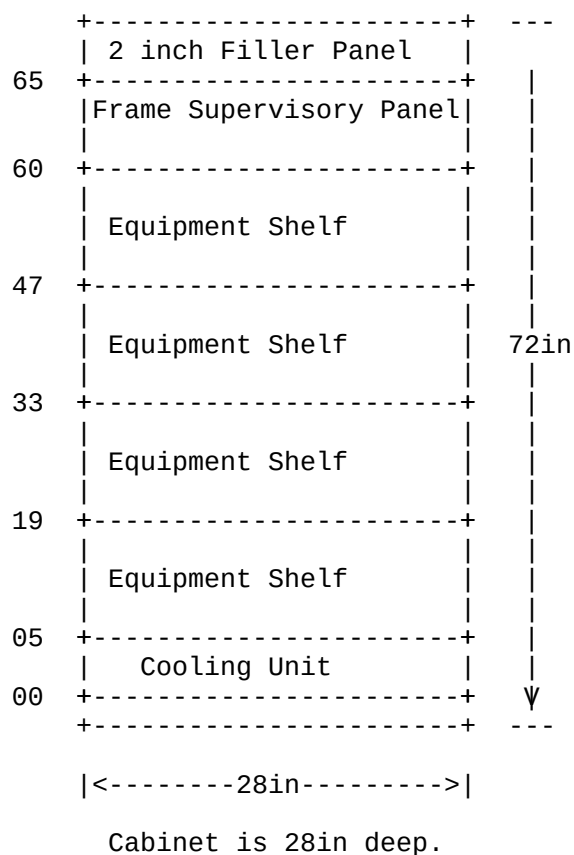


Figure 11. DMS-100 MODEL A CABINET LAYOUT.

7.2 Hardware Provisioning

7.2.1 Hardware Usage Restrictions

Only the following DMS-100 Model A cabinets are available for the international market at this time:

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PEC	ABBREV. NAME	TITLE
NTRX30AA	CLCE	Cabinetized Line Concentrating Equipment
NTRX30BA	CLMI	Cabinetized Line Module ISDN
NTRX31AA	CPDC	Cabinetized Power Distribution Center
NTRX32AA	CTME	Cabinetized Trunk Module Equipment
NTRX33AA	CIOE	Cabinetized Input Output Equipment
NTRX34AA	CMIS	Cabinetized Miscellaneous Equipment
NTRX35AA	CDSN	Cabinetized Dual Shelf Network
NTRX37AA	CSLC	Cabinetized Speech Link Connection
NTRX38AA	CDNI	Cabinetized Digital Network Interconnect
NTRX46AA	CIPE	Cabinetized International Peripheral Equipment
NTRX47AA	CIDC	Cabinetized International Digital Controller
NTRX48AA	CMS7	Cabinetized (International) Message Switch 7
NTRX49AA	MCSS	Cabinetized Miscellaneous Spare Storage

Figure 12. International DMS-100 Model A Cabinets

7.2.2 Hardware Dependencies

The international DMS-100 cabinetized equipment is intended to replace the existing international DMS-100 product lines including frames and Meridian cabinets. To maintain the EMI integrity of the cabinetized system, DMS-100 Model A cabinets should not be mixed with frames or Meridian cabinets.

7.2.3 P and C Side Port Requirements

Not applicable.

7.2.4 DMS BUS Port Requirements

Not applicable.

7.2.5 Circuits Per Card

Not applicable.

7.2.6 Discrimination Numbering

Not applicable.

7.2.7 Provisioning Considerations

NTRX30AA International CLCE

The provisioning considerations of ECM-600 are modified for the international Cabinetized Line Concentrating Equipment (CLCE) as follows:

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- For each equipped ILCM provide:
 - one (1) NT6X04BB ILCM Common Circuit Pack,
 - up to ten (10) NT6X05AA Line Drawers, or
 - up to ten (10) NT6X05BA International Line Drawers, or
 - up to ten (10) NT6X05AX Line Drawer Fillers,
- For each international CLCE provide:
 - two (2) NT6X30AB Ringing Generators (UK), or
 - two (2) NT6X30DA Ringing Generators (China), or
 - two (2) NT6X30AE Ringing Generators (Australia).

NTRX30AA is always provided in building block NTZZ37LA International CLCE.

NTRX30BA International CLMI

The provisioning considerations of ECM-600 are modified for the international Cabinetized Line Module ISDN (CLMI) as follows:

- For each international CLMI provide:
 - two (2) NT6X30AB Ringing Generators (UK), or
 - two (2) NT6X30DA Ringing Generators (China), or
 - two (2) NT6X30AE Ringing Generators (Australia), and
 - one (1) P0733738 Terminal Block Safety Cover when required.

The Terminal Block Safety Cover must be provisioned for UK markets and may be provisioned on customer request in other markets.

NTRX30BA is always provided in building block NTZZ33AA Cabinetized Line Module ISDN (CLMI) in ECM-600.

NTRX31AA Cabinetized Power Distribution Center (CPDC)

Please refer to ECM-631.

NTRX32AA Cabinetized Trunk Module Equipment (CTME)

The provisioning considerations of ECM-600 are modified for the international Cabinetized Trunk Module Equipment (CTME) as follows:

- For each international CTME provide:
 - one (1) NTZZ37RA International CTME AXU/OAU Package occupying shelf positions 33 and 47, and/or
 - For each shelf position 05, 19, 33, and/or 47
 - one (1) NTZZ37SA International CTME DRA Package,

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- one (1) NTZZ37TA International CTME MTM Package,
- one (1) NTZZ37VA International CTME T8A Package, and/or
- one (1) NTZZ37WA International CTME TM8 Package.

Provide safety features as follows:

- For each CTME, provide as required:
 - one (1) P0730668 Terminal Block Cover,
 - two (2) P0707195 Latches, and
 - two (2) A0368391 Terminal Block Covers.

The NTRX32AA is always provided in building block NTZZ37QA International CTME.

For each NTZZ37RA, NTZZ37SA, or NTZZ37TA provide an IMTM Common CP as follows:

- For Turkey, provide:
 - one (1) NT2X58AY IMTM Common CP,
- For Special applications in the UK and Spain, provide:
 - one (1) NT2X58BB IMTM Common CP,
- For the Caribbean Expansion Plan (CEP), provide:
 - one (1) NT2X58CL IMTM Common CP, and
- For Mercury DMS-250, provide:
 - one (1) NT2X58DB IMTM Common CP.

Refer to table A of Engineering Manual section EMB14-01-000 for the circuit packs which may be provisioned on an international OAU, IDRA, IMTM, IT8A, or ITM8.

NTRX33AA Cabinetized Input Output Equipment (CIOE)

The provisioning considerations of ECM-600 are modified for the international Cabinetized Input Output Equipment (CIOE) as follows:

- For each international CIOE provide:
 - in shelf position 05:
 - one (1) NTZZ37EM International CIOE DDU Package, or
 - one (1) NTZZ37FM International CIOE Stratum 2.5 ROS Package, or
 - one (1) NTZZ32HA CIOE Stratum II ROS Package,
 - in shelf position 19:
 - one (1) NTZZ37CR International CIOE IOC Package,
 - in each shelf position 33:
 - one (1) NTZZ37BM International CIOE MTD Package, or
 - one (1) NTZZ37DM International CIOE DPP Package,

Provide safety features as follows:

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- For each CIOE, provide as required:
 - one (1) P0730668 Terminal Block Cover,
 - two (2) P0707195 Latches, and
 - two (2) A0368391 Terminal Block Covers.

The NTRX33AA is always provided in building block NTZZ37AM International CIOE.

NTRX34AB Cabinetized Miscellaneous Equipment (CMIS)

Refer to ECM-655.

NTRX35AA Cabinetized Dual Shelf Network (CDSN)

The NTRX35AA and NTZZ37XA have been Manufacture Discontinued.

The provisioning considerations of ECM-600 are modified for the international NTRX35AA Cabinetized Dual Shelf Network (CDSN) as follows:

When the CDSN is equipped with one (1) Network Module (nd network not provided), provide for each CDSN:

- one (1) NTZZ37YA International CDSN Common CP (positions 33 and 05), and
- one (1) NT6X02AB Filler Faceplates (positions 47 and 19).

When the NTZZ37XA is equipped with two (2) Network Module per plane, provide for each CDSN:

- two (2) NTZZ37YA International CDSN Common CPs (positions 33 and 05 for the 1st network, and positions 47 and 19 for the 2nd network).

For each CDSN provide per customer requirements:

- one (1) NTRX3531 Power & Ground Cover Kit.

The Power & Ground Cover Kit must be provisioned for UK markets and may be provisioned on customer request in other markets.

The NTRX35AA is always provided in building block NTZZ37XA International CDSN.

NTRX37AA Cabinetized Speech Link Connecting (CSLC)

The provision rules of ECM-600 apply to the NTRX37AA Cabinetized Speech Link Connecting (CSLC) in international applications.

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NTRX37AA is always provided in building block NTZZ21CA Cabinetized Speech Link Connecting (CSLC).

NTRX38AA Cabinetized Digital Network Interconnect (CDNI)

The provision rules of ECM-600 apply to the NTRX38AA Cabinetized Digital Network Interconnect (CDNI) in international applications.

NTRX38AA is always provided in building block NTZZ20CA Cabinetized Digital Network Interconnect (CDNI)

NTRX46AA Cabinetized International Peripheral Equipment (CIPE)

Please refer to ECM-659.

NTRX47AA Cabinetized International Digital Controller (CIDC)

Please refer to ECM-660.

NTRX48AA Cabinetized Message Switch 7 (CMS7)

Please refer to ECM-661.

NTRX49AA Cabinetized Maintenance Spare Storage (CMSS)

The provision rules of ECM-600 apply to the NTRX49AA Cabinetized Maintenance Spare Storage (CMSS) in international applications.

7.2.8 Office Layout Information

Please refer to ECM-600 DMS-100 Cabinetized.

7.2.9 Traffic Tables

Not Applicable.

7.3 Product/System Specification

7.3.1 Physical Characteristics

Please refer to ECM-600 DMS-100 Cabinetized.

7.3.2 EMI/Earthquake Information

Not applicable.

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7.3.3 Sparing Information

Sparing practices are not impacted by the application of cabinets. Equipment should be spared per existing practices.

7.3.4 Power Feed and Fusing Requirements

Not applicable.

7.3.5 Current Drain Information

Not applicable.

7.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

7.4.1 Required Software Packages and Interdependencies

Software provisioning is not affected by the application of cabinetized equipment.

7.4.2 Software Usage Restrictions

Not Applicable.

7.4.3 Memory Provisioning

Not Applicable.

7.5 Real Time Impact

Not Applicable.

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8.0 ECM683 - Global Cabinetization

8.1 Overview

Product/System Overview

The DMS product has begun the transition from frames to cabinets in order to comply with international EMI and safety regulations. At the outset of the project, the cabinets were known as 'Stream-line' cabinets. This name is no longer used. The cabinets designed in the first DMS 100 Cabinetization project are now referred to as DMS-100 Cabinets (Model A). A number of issues have resulted from the initial design of the Model A Cabinets. These issues are being addressed by the Global Cabinetization project. The cabinet designs produced from the later Global Cabinetization project are known as DMS 100 Cabinets (Model B) This ECM describes the differences between Model B Cabinets and the earlier design Model A Cabinets. The improvements provided by Model B are described in detail, as well as the differences in engineering rules.

The principle focus of this stage of the Global Cabinetization program is to modify the DMS system power distribution so that it has configuration flexibility that, at least, equals the frame-based DMS 100. This is accomplished by the introduction of a new CPDC that distributes power external to the EMI shield provided by the system cabinets. EMI is prevented from being radiated by the externally routed power cabling by means of External Power Filter Modules fitted in each cabinet at the point of entry of the power cables. This power arrangement is also known as "external power" arrangement. This external power scheme enables frame-based office extension by cabinetized equipment. , as well as providing compatibility with the existing cabinetized equipment (Model A). Model A systems use 'horizontal' (internal) power arrangement. The Model A Cabinet has been rated "Manufacture Discontinued".

The Model B product includes a 21 inch wide cabling cabinet known as the "C21", a 28 inch wide "C28" for the standard cabinet applications and a 42 inch wide "C42" for SuperNode, ENET and LPP use. Both Fiberworld Grey and Maple Brown assemblies have been created as part of this program. Model B C28 and C42 cabinets are available in either grey or brown.

The Global Cable Conveyance (GCC) system is a new cable management system available for C21, C28 and C42 cabinets. This system is being offered on all NT products for initials, extensions and remote offices as the eventual replacement for existing cable troughs, ladder racking and related materials. GCC is now available as a customer option to the existing C21, C28 and C42 cable troughs. Overframe cable troughs are included in the respective cabinet Mechanical Assembly Engineering Manual Sections, and the

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remaining cross aisle cable troughs and support hardware are provisioned by the Field Engineer. For additional information, refer to GCC Handbook HB0X37GC.

8.1.1 C21 Cabinet

The C21 cabinet offers additional cabling space for C42 applications with heavy input/output requirements. It can also be used to "pre-cable" an office by installing the C21 and running and connectorizing the cables before the C42 is installed. When the C42 is installed, cabling only involves connecting to the bulkhead. The C21 is not an EMC "tight" cabinet. The C21 does not have center opening doors but uses front and rear cosmetic panels that are removable with an Allen wrench. These panels are available in both brown and grey and are required for all applications.

8.1.2 Optimized C28 Cabinet

The Model B C28 cabinet has been designed to address issues that appeared during engineering and installation of Model A systems. Model B design provides increased flexibility of configuration and improved ease of installation. The following enhancements have been made to the C28 cabinet:

- Redesigned bulkhead to improve access to backplane.
- Top access bulkhead for future input/output flexibility.
- External Power Filter Module, supporting both
- Overhead and under floor cabling.
- Door hinging and latching mechanism improved
- Floor anchor access improved
- Flame spread barrier incorporated

8.1.3 C42 Cabinet

The C42 replaces the DMS SuperNode cabinet and contains up to four SuperNode size shelves, a removable cooling unit and an FSP. The cabinet, complete with its doors and bulkheads or filler panels, forms an EMC enclosure around the internal electrical equipment. This enclosure is maintained at the end of lineups with end panels and through C21 cabinets with its optional EMC cable duct.

8.1.4 System Level Mechanicals

System level mechanicals of the Model B design incorporate improvements over Model A. These improvements are summarized as follows:

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- Uses common support brackets for center aisle lighting, cable rack and main cross aisle cable troughs. These brackets meet seismic requirements without additional wall or ceiling support.
- Uses new 120V AC routing methods for Centralized CPDC lineup applications.
- Uses new endguard labels to accommodate lineups with more than eleven cabinets.
- Changes to endguard assemblies enables accommodation of new filtered EMI strategy for alarms and longer lineups.
- Uses Universal Cable Troughs, Cross Aisle Cable Troughs for fiber optic cables and Main Aisle Cable Troughs.
- Uses optional Global Cable Conveyance (GCC) Cable Trough system.

8.1.5 Modular Supervisory Panel (MSP)

The Modular Supervisory Panel NTRX40AA has a wide range of configurable options. Supervisory Panels are configured to meet the needs of each type of C28 cabinet. Supervisory Panels provide power distribution and protection, alarms indication and control and basic maintenance functions. The basic unit includes the Shelf Module equipped with an Alarm Backplane Assembly. Other modules are provisioned at the cabinet level. They include:

- Alarm Module
- Breaker Modules
- Fuse Module
- Talk Battery Module

8.2 Hardware Provisioning

8.2.1 Hardware Usage Restrictions

8.2.1.1 Modular Supervisory Panel

The MSP provides alarm monitor and control functions for C28 cabinets. It is provisioned with modules to provide the capabilities needed for a specific function. Up to ten Breaker Modules, each with two breakers, may be provisioned for -48 VDC distribution. Up to eight Fuse Modules, each with eight breakers, may be provided for protection of sub-circuits. A total of thirteen Fuse and Breaker modules may be provisioned. Up to two Talk Battery Modules may be provided for filtered -48 VDC distribution.

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8.2.1.2 Cabinetized Power Distribution Center (CPDC)

Secondary power cables for a centralized Model B CPDC (external powering) shall be #10 AWG unless specifically required by the customer or dictated by the installation (voltage drop) to be #8 AWG or #6 AWG cable.

As the position of the Model B CPDC is moved away from the center of the system, the mix of cables sizes is skewed to the larger sizes. As the number of cables increases, the size of the cable bundle also increases and the total area of the bundle approaches the total avail-able area (24 sq. in.) at the top of the CPDC. The resulting congestion can cause cable dressing problems and is to be avoided. Mixes of cable (#10 AWG/#8 AWG/#6 AWG) where the percentage of #8 and #6 exceed 25 percent of the total quantity of cables bundled will result in congestion at the top of the CPDC.

Cable bundles exceeding four (4) inches in diameter must be ovalized to fit through the space available.

8.2.1.3 System Application Restrictions

All initial offices require an ENET for the call switching function in an office equipped with Model B cabinets. For extension of-fices, a JNET frame with a DNI and SLC provides the same functions. Note: the ENET and the JNET cannot coexist in the same office.

8.2.2 Hardware Dependencies

In order to avoid the restrictions in office layout defined for the original cabinetized product, individual cabinets must be equipped with Power and Alarm Filter Modules. These have been made available for the existing CLCE, CLMI, CCPE and CMIS and are incorporated into the design of all Model B Optimized C28 cabinets. These modules allow overhead filtered power input, under floor filtered power input as well as through the lineup powering.

8.2.2.1 P and C Side Port Requirements

8.2.2.2 DMS BUS Port Requirements

8.2.2.3 Circuits Per Card

8.2.2.4 Discrimination Numbering

8.2.3 Provisioning Considerations

Each Model B cabinet is described in terms of the differences between the Model B and original Streamline versions (Model A) and the effect these differences have on provisioning. Items not described as different will function as in the original Streamline product and will be provisioned as before.

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8.2.3.1 System Aspects

Provisioning Rules for Extension to Model A Equipment

With the Model B Cabinetization procedures becoming Generally Available (GA), the engineering rules for Model A Cabinetization have become classified as "Retired". That is, Model A will be supported for maintenance purposes only. Because of this, extensions to Model A equipment, will be made using Model B equipment.

Some shelf modules have been introduced as part of the Model B development project, e.g. MTM shelves. These shelves are compatible with Model A cabinets. For extension engineering purposes, refer to ECM 600 for, the engineering rules for equipment developed for Model B Cabinets, in Model A Cabinets.

Model B cabinets (horizontally powered) can be added to existing Model A horizontally powered lineups.

Model A CPDC is capable of supplying power to a maximum of three Model B cabinets with the vertical power arrangement in an otherwise horizontally powered lineup.

Power Routing Arrangement

The standard powering scheme for Model B cabinet systems is the 'external powering' scheme. With this scheme, a cabinet lineup may receive power from a power distribution center which is not necessarily in the same lineup. The power distribution center (PDC) and the cables delivering power to the cabinets from the CPDC are not enclosed in an EMI shield or cage. EMI which is generated in the equipment cabinet is filtered from the power supply cables at the point where the power cables enter each cabinet. To enable extensions to Model A cabinet lineups, where the extension exceeds three cabinets, the 'Horizontal' power option may be used in the extending cabinets. The Model A CPDC which is required in all Model A cabinet lineups is capable of supplying up to three cabinets configured for 'external' power.

Model A cabinetized systems, on the other hand, use the 'horizontal powering' scheme. With this scheme, each cabinet lineup contains a CPDC. The CPDC and the cables delivering power to the equipment cabinets are completely enclosed in the EMI envelope or cage formed by the cabinet lineup. EMI filters remove EMI from conductors, such as the battery power feeds to the CPDC, at the point of entry to the cabinet lineup.

For systems which are required to comply with EMI emission standard EN2 or equivalent, the 'Horizontal' power arrangement option should be used in Model B systems.

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Summary of Permitted Model B Power Arrangements

Model B cabinets can be added to existing lineups, either Model A or Model B, and be powered horizontally.

Model B cabinets can be inserted in "spaces" in Model A lineups and be powered horizontally.

New lineups of Model B cabinets can be added and be powered vertically from a Model B CPDC, which is the standard scheme for Cabinet Model B initial offices.

Model A CPDC is capable of supplying power to a maximum of three Model B cabinets with the vertical power arrangement in an otherwise horizontally powered lineup.

8.2.3.2 C28-Type Cabinets

General

All C28 Cabinet Products are provisioned as 'Functional Blocks'. C28 Cabinet functional blocks, generally, are configured to satisfy the requirements of all market areas with engineering options available.

Items such as Ringing Generators and LCMs in the CLCE have become provisionable so that one functional block can serve all intended market areas.

Cabinetized LCE (CLCE)

There is now one CLCE functional block:

- Cabinetized LCE (Model B) for North America and International applications.

The ringing generators are provisionable to permit the selection of ringing of ringing generators to be compatible with the country of application.

The CLCE functional block contains an EMI filter adapter to filter lines at the EMI bulkhead. Line connectors 78 pin D-sub at the bulkhead, interface with 64 pin Key Telephone connectors on the customer distributing frame. A total of 40 tip and ring connector interfaces are available on the CLCE, each corresponding to one Line Subgroup of 32 lines.

An MSP provides 3 Circuit Breaker Modules (six total breakers), 2 Fuse Modules, 2 Talk Battery Modules and an Alarm Module. This MSP provides the normal functions of power distribution and alarms within the cabinet. Low profile duplicated Ringing Generators with ANI Coin are mounted horizontally across the top of the MSP.

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The CLCE functional block contains up to 2 LCMs (Line Concentration Modules). The LCMs are provisionable.

Cabinetized Line Module ISDN (CLMI)

There is one CLMI functional block:

- Cabinetized Line Module ISDN (North America and International)

For the CLMI, the ringing generators are provisionable to permit the selection compatible with the country of application. .

The Model B CLMI functional block contains EMI filter adapters to filter lines at the EMI bulkhead. Line connectors, 78 pin D-sub, at the bulkhead, interface with 64 pin Key Telephone connectors on the customer distributing frame. A total of 32 tip and ring connector interfaces are available on the CLMI, each corresponding to one Line Subgroup of 30 lines.

The MSP has 2 Talk Battery Filter Modules, one Alarm Module, one Fuse Module and four circuit breaker modules. The low profile Ringing Generators are used in the CLMI.

Cabinetized Power Distribution Center CPDC

The CPDC functional block is a single block suitable for application in all market areas. The CPDC functional block supports only 'External' power arrangements and supports for 48V power supply systems.

For the External power arrangement, the CPDC and its power distribution cables, do not generate EMI, and are, therefore, not enclosed in a Faraday cage. The cabinets generating EMI are individually supplied with power from the CPDC. EMI is filtered from the power cables at the point of entry to the cabinets. This capability is the most important feature difference between the Model B cabinet system and the Model A system. The capability of centralizing the CPDC enables it to supply more than one cabinet lineup while EMI suppression of the whole system complies with at least EN Class A standards. The capability of centralizing the CPDC enables flexibility of layout similar to that of the DMS-100 Family frame based systems. Safety covers for all points requiring hazard protection and Enhanced Alarm System support are standard features. Secure 2 hole bolted joints are used for all power connections.

The Centralized CPDC supports up to thirty-seven (37) cabinets in four lineups. The CPDC is not an EMI violator and is located outside the Faraday cage formed by the cabinet lineup. Power is provided to each cabinet individually via External Power Filter Modules. The Model B CPDC does not support power distribution internally, within the lineup.

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Single Feed - two (2) -48V inputs (A and B feeds) from the Central Office Power Plant are fed to all installed CB Panels.

In the Single Feed configuration the Power Plant feeds to the CPDC are fused at 600 amps at the Power Plant. Each feed may be loaded to a maximum of 400 amps.

A maximum of 160 circuit breakers may be provided on four panels of 40 breakers each (20 "A" Feed and 20 "B" Feed). Out of the 40 breakers on the first panel, 36 are available for assignment. On additional shelves, 36 breakers are available where individual feeds are provided and 38 are available if single cabinet feed is used. The breakers are equally divided between A and B feeds.

A maximum of four breaker panels may be supplied per CPDC. Any mix of the following may be used:

- NTRX02CA for applications using C28-type cabinets. Always equipped with forty 30 Amp circuit breakers per panel.
- NTRX02CD for applications using C42-type cabinets. Always equipped with thirty-two 30 amp and eight 10 amp Provides thirty-four 30 Amp and six 10 Amp breakers per panel.

For EMI compliance, EMI filters are required on power feeds to C42 cabinets (i.e. LPP, ENET and Supernode) when they are used with a Model B CPDC with an external (vertical) powering arrangement.

Cabinetized TME

There is one Model B CTME functional block. It is configured like the frame-based TME. Due to the limited bulkhead space available for connectors, a maximum of twenty lineups may be configured when using the Model B CTME. This CTME supports the Enhanced Alarm System as an optional provisionable feature. External EMI protection for the service and trunk circuits to the distributing frame is provided via filtered connectors at the rear EMI bulkhead. The MSP is used on the Model B CTME.

Cabinetized IOE (CIOE)

One CIOE functional block is specified for application in all market areas currently identified for Model B applications.

The CIOE houses the following equipment:

- Data Processing Peripheral (DPP) in shelf position 33
- Input/Output Controller (IOC) in shelf position 19
- Mag Tape Drive (MTD) in shelf position 33
- 25"/8" Disk Drive Unit (DDU) in shelf position 05

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- Stratum Clock in shelf position 05

Shielded cables are used for the DS30 connection to SuperNode through the Bulkhead. Either filtered connectors or shielded cables are used for EMI protection on external connections to terminals or other devices. Cable connections between the MTD, DDU or DPP and IOC shelf are made within the EMI envelope formed by the CIOE.

Optimized CMIS

One CMIS functional block is defined for application in all Market areas in which Model B cabinetized systems are required. In some non-North American Markets, however, the CMIS is required to be configured as a non-EMC IDF (Intermediate Distribution Frame) or configured such that no power is required. Special engineering is required for ordering these configurations since the MSP and Bus Bar Assembly are Always Provided in the Building Block. The IDF application requires that the frame be empty. An example of no power requirements is if (4) NTRX34LA 480 Pin Terminal Block Assembly are provisioned. For this purpose 'detailed' engineering information in the Engineering Manual is referenced.

The Model B CMIS serves the same function as the frame-based MIS and accommodates both DMS and outside vendor equipment. The CMIS cabinet may be configured as an EMC compliant (Closed) cabinet which houses NT Supported Equipment or as a Non-EMC (Open) cabinet which primarily houses Customer Preferred Equipment. CMIS interconnections are achieved by using generic fully terminated cables.

The Totally EMI Shielded CMIS provides full EMI containment and contains only Non-EMI compliant provisionable equipment that is supplied and managed by Northern Telecom. Bulkhead personality plates and filters are provisioned to supply the same degree of EMI protection as the other Model B C28-type cabinets.

The Non-Shielded Open CMIS is provided to mount customer-supplied EMI-Compliant equipment, although the option will exist for NT to provide EMI-Compliant equipment in this cabinet, when necessary. However, support is given only for equipment for which rules for provisioning in the non-shielded housing are provided in the Engineering Manual. For this reason, the customer will be considered responsible for overall cabinet and individual equipment EMI if non supported equipment is mounted in the CMIS. No bulkhead personality plates or filters are used on this cabinet version.

To accommodate the variety of equipment needed in a CMIS, the Optimized CMIS is divided into eight, seven inch high, zones, high. Each piece of equipment occupies one or more zones. Ideally, one personality plate is associated with each piece of equipment, however, by grouping functionality in one cabinet, some equipment with a high number of connectors may use the personality plate

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associated with other equipment. Empty space may be provided above and below equipment per the manufacturer's specifications. All CMIS equipment complies with system ISG guidelines.

Cabinetized DSN - Not a Model B Product

Cabinetized CPE

The Model B CCPE is the cabinetized version of both the base Common Peripheral Controller frame and the ISDN CPE frame. This cabinet is both ISDN-ready, using the NT6X0226 backpanel, and fiber-ready as an interface to ENET. All connections to the network and DS-1 links are through the bulkhead for EMI protection. The MSP is mounted in the top of the cabinet and a C-feed module is provisionable for ISDN applications.

Cabinetized SLC - Not a Model B Product

Cabinetized DNI - Not a Model B Product

Cabinetized MSS

The CMSS provides shelves for storage of standard DMS-size circuit packs, SuperNode-size packs and MSP-size packs. In addition to the two shelf-types originally used (DMS and SuperNode size shelves), the MSP card cage is provisioned, when needed. A utility tray for technician tools may be provisioned

Cabinetized International Peripheral Equipment (CIPE)

The CIPE Functional Block is for NTRX46CA Model B Cabinetized International Peripheral Equipment. The CIPE houses two dual shelf peripheral controller modules which may be equipped as either Line Group Controller Offshore ISDN (LGCO) or Digital Trunk Controller Offshore ISDN (DTCO) for international applications with 48VDC power, to meet EN Class A EMI requirements. The CIPE may connect to the network via either metallic or fiber optic cable.

Cabinetized ISM Equipment (CISM)

The Cabinetized ISM Equipment houses four ISM shelves or three ISM shelves and one AXU, an MSP shelf and a cooling unit in a Model B Cabinet.

Cabinetized Metallic Test Access (CMTA)

The Cabinetized Metallic Test Access is an EMI compliant cabinet enclosing equipment which provides metallic test access for subscriber lines including ISDN and Datapath lines. The CMTA comprises a Model B Cabinet with Cooling Unit and Modular Supervisory

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Panel. The Cabinet also contains a Wideband Test Access (WTA) panel.

Global Peripheral Platform (GPP)

The NTMX90AB Global Peripheral Platform is a host cabinet based on the Compact Peripheral Module (CPM) shelf and is being introduced to handle a PCM-30 switching requirement for the cable television market in the United Kingdom. A single GPP cabinet can provide termination's for up to 3600 lines.

8.2.3.3 C42-TYPE CABINETS

EMI Filtering Requirements

For EMI compliance, EMI filters are required on power feeds to C42 cabinets (i.e. LPP, ENET and Supernode) when they are used with a Model B CPDC with an external (vertical) powering arrangement.

Dual Plane Combined Cabinet (DPCC)

The DPCC NT9X01JB provides the same functionality as the DPCC NT9X01JA (MD). The NT9X01JB supports both horizontal and external power cabling and is EMI compliant. The DPCC provides two Message Switch shelves, one Computing Module shelf, one System Load Module, a cooling unit and an FSP, all in a standard C42 cabinet.

Enhanced Network (ENET)

Two packages of the ENET are contained in a standard C42 cabinet. The NT9X05AC is a 128K channel network duplex contained in two cabinets. Plane 0 is mounted in one cabinet and Plane 1 in the other. The network can grow from 2K to 128K channels. This is equivalent to 64 Double Shelf Networks. The NT9X05AD is a 64K channel duplex in one cabinet (both planes in the same cabinet), with half the capacity of the NT9X05AC.

Each cabinet has four identical shelves, each shelf having 2 to 16 crosspoint cards, equivalent to 16 Double Shelf Networks. The cabinet has a cooling unit and FSP, supports both horizontal and external power feed and is EMC protected.

Link Peripheral Processor (LPP)

The Model B LPP is packaged in the C42 cabinet and retains the same functionality as the LPP NT9X70BA. The benefits provided by the Model B power arrangement are the only significant improvement. The Model B LPP is backward compatible and can now be installed in a cabinetized lineup, allowing the use of non-filtered power cabling.

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SuperNode Service Enhanced (SNSE)

The SNSE is intended for small Class 5 offices and remote applications and provides the functionality of a SuperNode, ENET and LPP in a single cabinet. The single C42 cabinet contains a Compute/SLM shelf, a 16K ENET shelf, a Link Interface Shelf and a Message Switch shelf. The ENET can be expanded in increments of 2K up to the 16K maximum and can accommodate both fiber and metallic inputs from the associated peripherals.

Single Shelf LPP C42 Cabinet

Single Shelf LPP C42 Cabinet (NTEX01AB) provides a housing, for a SuperNode office, requiring only a relatively small number of Link Interface Units (LIUs). Up to two 'Fiberized' Link Interface Shelves (LISS) may be provisioned. The NTEX01AB contains a maximum of twenty-four LIUs.

The Single Shelf LIS does not require a Local Message Switch for inter LIU and LIU to Message Switch communication as does an LIS mounted in an LPP. A special FBUS controller and associated fiber interface paddleboard enable direct connection between the containing LIS and the SuperNode Message Switch.

8.2.3.4 Extensions

Equipment enclosed in Model B cabinets may be used for extending existing Model A Streamline offices.

Because Model A offices use the horizontal power arrangement there are some restrictions when extending using Model B cabinets which use the 'external power' or external power arrangement. The Model A CPDC has the capability of powering 1 to 3 standard, i.e. external power, Model B cabinets in addition to the 'horizontal power' or internal power cabinets in the associated Model A cabinet lineup. This means that a Model A lineup can be extended by a maximum of 3 powered Model B cabinets, on condition that the power rating of the CPDC at the end of the lineup is not exceeded.

The 'Horizontal' power option may be used in Model B cabinet extensions to a Model A lineups if the required lineup extension exceeds three cabinets. However, to exploit the layout flexibility of the Model B Cabinets, for extensions in which new Model B lineups comprising Model B cabinets only, the 'External' the power arrangement should be used.

For extensions using Model B cabinets, color options may be selected to match the existing office equipment. Also door latch arrangement, either center or top latch, may be selected to match existing equipment.

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In instances where an extension to either a Model A or Model B office contain CMIS or CIOE which include modems, special core cluster grounding arrangements are required. For details refer to ECM 289.

8.2.4 Office Layout Information

The central capability provided by the Model B versions of cabinetized equipment is functionally equivalent to the frame based product in terms of office layout. Using the Model B Centralized CPDC, the previous limit of eleven cabinets per lineup is removed. The term "Centralized CPDC" does not mean that it must be positioned in the center of a lineup, but rather that it is able to distribute power to more than one lineup. A single Model B CPDC can power up to thirty-seven frames/cabinets in up to four lineups. Power supplies are routed outside the EMI shields formed by the cabinet lineups. Filter modules are used to allow connections to penetrate the EMI barriers of each cabinet while retaining EMI compliance. Alarm and frame/logic ground cabling can be routed either inside or outside the EMI shield. When routed outside, e.g. between cabinet lineups, EMI filters are used at exit and entry points.

Model B cabinets are backward compatible with the original C28 cabinet and will allow extension of existing Model A Cabinetized offices. The External Power Filter Module extends the capability to use existing RMEs or CPDCs to derive power and alarms.

- All CLCE and CLMI cabinets must be powered by the same CPDC that powers the associated CCPE. The cabinets no longer need to be in the same lineup as their controllers but must be powered from the same CPDC as their controllers.
- With the introduction of External Power Filter and Alarms, breaks in lineups due to columns or future additions are allowed. This increases flexibility in engineering Hot Slide offices.
- Restrictions in location of NT9X95-style cabinets in a lineup do not apply to Model B Externally Powered offices (external powering scheme).
- In a lineup with no C28 cabinets, the maximum number of C42 (NT9X95) cabinets is five. This limit is imposed by the Centralized CPDC maximum power capacity of 400 Amps.
- Additional cabinets should be added to the growth end of a lineup. Cabinets cannot be added to the non-growth end of a lineup, nor can they be added between the CPDC and the non-growth end of the lineup in instances where the CPDC not located at the non-growth end.

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- Frame ground bus and logic return bus must be extended as the lineup grows.
- When adding cabinets to a DMS-100 frame office, the cabinets must be located in separate lineups.
- If cabinets (which are ISG compliant) are added to a non-ISG frame office, consideration will have to be given to ISG integrity.

The system is free of all commercially-derived sources of AC power. This is accomplished by using low voltage light control for the Center Aisle Lighting and inverter-derived power for the AC convenience outlets on the endguards.

8.2.5 Traffic Tables

Not applicable.

8.3 Product/System Specification

8.3.1 Physical Characteristics

Dimensions and weights of the Model B cabinets are as follows:

1. C 1 Cabinet with cosmetic panel:
2 .7" wide, 28" deep, 72" high; weight 180 lb.
2. C 8 Cabinet with cosmetic panel:
28.5" wide, 28.4" deep, 72" high
weight for major components:
doors.....25 lb. each
bulkheads.....14 lb. each
endpanels.....13 lb. each
loaded shelf.....61 lb. each
empty shelf.....27 lb. each
cooling unit.....20 lb.
MSP.....15 lb.
Overhead cable trough...30 lb.
C 8 Cabinet Assy.....250 lb.
3. C42 Cabinet (dimensions & weights approximate)
4 .9" wide, 28" deep, 72" high
SuperNode Shelf: 12.9" high
36.13" wide
2 .26" deep
Cooling Unit: 9.62" high
36.13" wide
2 .26" deep
FSP: 4.9" high
36.13" wide
2 .26" deep

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C42 with four empty shelves, FSP, cooling unit bulkheads and bulkhead PCs, shelf cable trays, logic return bars and power cabling: 800 lb.

Same as above with complete set of circuit packs and a set of four doors: 1400 lb.

weight for major components:

doors.....40 lb. each

bulkheads.....23 lb. each

endpanels.....25 lb. each

loaded shelf.....180 lb. each

empty shelf.....70 lb. each

cooling unit.....65 lb.

FSP.....21 lb.

Overhead cable trough...51 lb.

Cabling Cabinet 180 lb. (complete)

8.3.2 EMI/Earthquake Information

All Model B cabinets provide both primary and secondary holes for anchoring the cabinets to the floor during installation. The cabinets use 12mm anchors in all seismic (earthquake) zones. The cabinets use leveling feet in all non-seismic zones.

Model B cabinets are EMI compliant.

8.3.3 Sparing Information

Not applicable.

8.3.4 ISG REQUIREMENTS

Isolated System Grounding (ISG) for Cabinetization Model B is outlined in this section. Refer to ECM-289, Isolated System Grounding (ISG), for a detailed description of ISG. As with a frame office, the various grounds (frame, logic, battery return) in a Cabinetization office are also kept separate until the Central Office (CO) Ground Window. Only the additional requirements and differences for Cabinetization Model B are outlined in this section. For any items not mentioned in this section, the same ISG rules as stated in ECM-289 and other individual documents apply (e.g. DDU, inverters, modems, etc.).

The CPDC in a Model B Cabinetization office is provisioned in the Centralized Power mode. The ISG requirements for the Centralized Power mode is outlined in the following sections. In a Cabinetization Model A office only the Integrated Power scenario is available (CPDC at the end of each lineup). Extensions to Model A Model A lineup using Model B cabinets are restricted to a maximum of three (3) cabinets owing to restrictions inherent in the CPDC when used in the horizontal configuration. In the horizontal configuration, the CPDC can supply a maximum of three externally

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powered cabinets on condition that the total number of cabinets supplied by the CPDC is within the capacity of the CPDC.

In a Cabinetization Model B office the Centralized Power must be used. An extension to a Model A using Model B cabinets must, therefore, use mixed power modes. The Model A cabinets use the Integrated Power mode.(Horizontal Power arrangement). Model B cabinet extensions use the external power arrangement that is characteristic of the Centralized Power configuration.

8.3.4.1 Integrated Power (Horizontal Power)

The power arrangement referred to as Integrated Power which is used with Model A Cabinets is the arrangement in which each line-up contains a CPDC and Model A equipment cabinets. The CPDC is, preferably, located at the start of the line-up. All the cabinets in each line-up are physically bolted together, to allow power and ground cables to traverse Horizontally within the line-up via a passage-way in the side walls. This arrangement provides an EMI-compliant, self-enclosed cabinet line-up.

Integrated MAP (IMAP) shall be the only topology used for maintenance and administration positions. Refer to ECM-289 for ISG rules on IMAP.

1. Framework Ground (FG)

- A Framework Ground stud or reference point is located at the bottom of each cabinet, so that the cabinets can be bonded to the FG collector. This FG stud or reference point is identified with the international ground symbol.
- A No.0 AWG Framework Ground collector cable shall be run internal to each line-up along the base of the cabinet. A No.6 AWG cable shall be run from each cabinet's FG stud and C-tapped to the FG collector cable. The FG collector cable shall terminate at the ground plate at the bottom of the CPDC EMI bulkhead.
- A No.0 AWG cable shall be run from the CPDC ground plate to the Framework Bonding Equalizer (FBE).
- The cable from the FBE to the CO Ground Window shall be the same as frame ISG rules.
- Two-hole lugs shall be used wherever possible to terminate cables.

2. Logic Ground (LG)

- DPCC, CIOE, and associated dedicated CMIS cabinets must be located in the same line-up. These cabinets are referred to as the Core Cluster.

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- LGE and associated LCE equipment must be located in the same line-up.
- LIU equipment and associated CMIS modems must be located in the same line-up.
- There shall be no dc-coupled signal interconnections between equipment in separate line-ups.
- A No.0 AWG Logic Return collector cable shall be run along the base of the cabinets, and shall terminate at the EMI feed-through filter located on the CPDC bulkhead. For any cabinet requiring a logic return termination, a No.6 AWG cable shall be run from the LR bus of the equipment and C-tapped to this LR collector cable. The cabinets requiring a logic return termination are the same as their functional counterpart in a frame office.
- Core cluster cabinets shall have a No.6 AWG Core Cluster Equalizer cable run along their base, and C-tapped to the LR collector cable. A No.6 AWG cable shall be run from the LR bus of each core cluster cabinet, and C-tapped to this Core Cluster Equalizer cable.
- 0 AWG cable shall be run from the CPDC EMI feed-through filter to the Logic Return Equalizer (LRE).
- The cable from the LRE to the C0 Ground Window shall be the same as frame ISG rules.
- All LR C-taps shall be equipped with a protective cover to insulate the taps from any incidental contact with FG, etc.
- Two-hole lugs shall be used wherever possible to terminate cables.

3. Battery Return (BR)

- Power filter modules for Model B are available to support 16,13,12,9 and 5 power type connections. These include battery, battery return, and logic return connections. The terminals can support up to 6 AWG cable, however, 10 AWG is recommended to facilitate installability. Dedicated tooling is used for the Filtered Terminal Blocks. This tooling is flexible in that filtered terminal blocks of 1 to 13 positions can be produced. Power filter kits designed to fit specific Model A cabinets supply the required number of connection points for each application.

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8.3.4.2 Centralized Power (External Power)

The second scenario is referred to as Centralized Power. Centralized power is used in Model B systems and for Model B extensions to Model A systems. This is when the CPDC is located in one of the line-ups central to the equipment line-ups. The CPDC can power up to 37 cabinets.

Integrated MAP (IMAP) shall be the only topology used for maintenance and administration positions. Refer to ECM-289 for ISG rules on IMAP.

1. Framework Ground (FG)

- A No.0 AWG Framework Ground collector cable shall be run external to each line-up. A No.6 AWG cable shall be run from each cabinet's FG stud and C-tapped to the FG collector cable. The FG collector cable shall terminate at the Framework Bonding Equalizer (FBE).
- A No.0 AWG cable shall be run from the Framework Ground stud of the CPDC to the Framework Bonding Equalizer (FBE).
- The cable from the FBE to the CO Ground Window shall be the same as frame ISG rules.
- Two-hole lugs shall be used wherever possible to terminate cables.

2. Logic Ground (LG)

- DPCC, CIOE, and associated dedicated CMIS cabinets must be located in the same line-up. These cabinets are referred to as the Core Cluster.
- CLCE or CLMI and their associated controllers (either CCPE or CIPE) must be powered from the same CPDC.
- The LPP and associated CMIS modems must be located in the same line-up.
- There shall be no dc-coupled signal interconnections between equipment in separate line-ups.
- A No.0 AWG Logic Return collector cable shall be run external to each line-up. For any cabinet requiring a logic return termination, a No.6 AWG cable shall be run from the LR bus of the equipment and C-tapped to this LR collector cable. The cabinets requiring a logic return termination are the same as their functional counterpart in a frame office. The LR collector cable shall terminate at the system Logic Return Equalizer (LRE).

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- Core cluster cabinets shall have a No.6 AWG cable run from their respective LR bus, and C-tapped to a LR collector spaced at 15cm intervals above CIOE 00.
- The LPP and associated CMIS cabinets shall have a No.6 AWG cable run from their respective LR bus, and C-tapped to a LR collector spaced at 15cm intervals above the LPP.
- 0 AWG cable shall be run from the CPDC Frame Ground (FG) plate to the Logic Return Equalizer (LRE).
- The cable from the LRE to the C0 Ground Window shall be the same as frame ISG rules.
- All LR C-taps shall be equipped with a protective cover to insulate the taps from any incidental contact with FG, etc.
- Two-hole lugs shall be used wherever possible to terminate cables.

3. Battery Return (BR)

- For any cabinet requiring a battery return termination, a No.6 AWG cable shall be run from the LR bus of the equipment to the Battery Return plate of the CPDC. The cabinets requiring a battery return termination are the same as their functional counterpart in a frame office.

8.3.5 Power Feed and Fusing Requirements8.3.6 Current Drain Information

CABINET	DISSIPATION WATTS	CURRENT DRAIN
CLCE	1 50 *	28Amp *
CLMI	1 50 *	28Amp *
CTME	875	18Amp
CIOE	850	18Amp
CCPE	1 03	2 Amp
CMS7	1 25	2 Amp
CIDC	1 50	24Amp
CIPE	1 56	26Amp
CPDC	167	4Amp
CMIS	779	16Amp
Traffic dependent. Value given are based on traffic of 9.6 CCS per line with a 500 ohm average loop resistance.		

8.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

8.4.1 Required Software Packages and Interdependencies

Not applicable.

8.4.2 Software Usage Restrictions

Not applicable.

8.4.3 Memory Provisioning

Not applicable.

8.5 Real Time Impact

Not applicable.

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9.0 ECM718 - MSL-100 Cabinet Re-Utilization

9.1 Overview

This document provides the information needed to upgrade MSL-100 cabinets in the field. The cabinet re-utilization program was setup by PLM to upgrade cabinets in the field. When an existing cabinet in the field can have some of its equipment reused in the upgrade a PC kit has been created that will contain only the additional hardware. Provisionable items such as cabling or circuit packs will need to be referenced back to the ECM that the cabinet is being upgraded to.

9.2 Hardware Provisioning

9.2.1 Hardware Usage Restrictions

See the ECM requirements as shown in the upgrade cabinet.

9.2.2 Hardware Dependencies

See the ECM requirements as shown in the upgrade cabinet.

9.2.2.1 P and C Side Port Requirements

Not applicable

9.2.2.2 DMS BUS Port Requirements

See the ECM requirements as shown in the upgrade cabinet.

9.2.2.3 Circuits Per Card

Not applicable

9.2.2.4 Discrimination Numbering

Not applicable

9.2.3 Provisioning Considerations

Refer to ECM 418 Integrated Services Digital Network (ISDN).

Refer to ECM 616 Integrated Services Digital Network (ISDN).

Refer to the ECM of each upgrade cabinet for more info.

9.2.4 Office Layout Information

Refer to NTP 555-4001-103 Meridian SL100 Cabinetized General Description.

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Refer to NTP 555-4001-120 Meridian SL100 Compact.

9.2.5 Traffic Tables

Refer to ECM 616 Integrated Services Digital Network (ISDN).
ECM 490 ISDN 2B1Q Simplified Traffic
ECM 497 Simplified Traffic Provisioning
SEA 92-09-003 CM Real Time Engineering Adjustments
Associated with S\DMS AccessNode.
SEB 92-09-003 BCS 36 Peripheral Processor Real Time
Occupancy Allocations and Call Timing Tables.

9.3 Product/System Specification

9.3.1 Physical Characteristics

Not applicable.

9.3.2 EMI/Earthquake Information

Refer to NTP 555-4001-103 Meridian SL100 Cabinetized General Description.

Refer to NTP 555-4001-120 Meridian SL100 Compact.

9.3.3 Sparing Information

Reference upgrade ECM for information.

9.3.4 Power Feed and Fusing Requirements

Reference upgrade ECM for information.

The following fuses and feeds are required:

Reference upgrade ECM for information.

9.3.5 Current Drain Information

The current drain per cabinet is as follows:

MCTM-ISDN	NTNX33CA	30.0 AMPS

9.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

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9.4.1 Required Software Packages and Interdependencies

Refer to ECM 616 Integrated Services Digital Network (ISDN).

9.4.2 Software Usage Restrictions

Refer to ECM 616 Integrated Services Digital Network (ISDN)

BRA/PRA software availability is projected for BCS29 (RTM) and BCS30 (IS). Verify availability with BNR or PLM.

9.4.3 Memory Provisioning

Refer to ECM 616 Integrated Services Digital Network (ISDN).

9.5 Real Time Impact

Not applicable.

Chapter 17

MISCELLANEOUS EQUIPMENT

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MISCELLANEOUS EQUIPMENT

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1.0 ECM321 - Modem Equipment Frame (MOE) Canadian Offices Only

1.1 Overview

Modem Equipment Frame (MOE) NT0X43BA

The Modem Equipment Frame (MOE) is provided in host offices equipped with Isolated System Grounding (ISG) for the mounting of modem equipment. All modem shelves mounted on the frame must be isolated from the framework with the chassis tied to the logic return bar. Any customer provided modem shelves must be isolated from the frame and similarly connected to the logic return bar.

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

Not applicable.

1.2.2 Hardware Dependencies

Not applicable.

1.2.2.1 P and C Side Port Requirements

Not applicable.

1.2.2.2 DMS BUS Port Requirements

Not applicable.

1.2.2.3 Circuits Per Card

Not applicable.

1.2.2.4 Discrimination Numbering

Not applicable.

1.2.3 Provisioning Considerations

When more than one (1) NTRX31DH inverter is mounted in the MOE frame, at least two inches of space must be provided between adjacent inverters. Also, between inverters and other equipment. This space is required for proper air circulation between inverters and/or other equipment.

Modem equipment must not be equipped on a Miscellaneous Equipment (MIS) frame.

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Remote offices (RLM,RSC,RLCM and OPMs) do not require the MOE frame. However, all modem equipment and their associated inverters must reside in the same Remote Miscellaneous Frame (RME).

Host office extensions that are upgraded with ISG must relocate all modem equipment to either a MOE frame or an Input Output Equipment (IOE) frame.

Modem equipment may be mounted on an IOE frame in existing offices, however, for all new host offices a MOE frame must be provided.

For mounting modems on IOE frames the following rules apply:

- 1) DC Modem Shelves must be isolated from the equipment frame and modem shelf chassis must be connected to the logic return busbar. One (1) NT4X2591(MD) Data Unit Grounding and Mounting Kit must be provided per DC Modem shelf provisioned to isolate the shelf from the frame and to connect the chassis to the logic return busbar. DC Modem shelves must be powered directly to the Power Distribution Center (PDC).
- 2) All AC Modem Shelves must be powered from an inverter that is mounted on the same frame. The inverter must be isolated from the framework and its chassis must be connected to the logic return busbar.
- 3) Provision one (1) NT0X0009 Cable Assembly for an inverter located in position 4 on the IOE frame to connect the inverter to the logic return busbar.
- 4) Provision one (1) NT0X4309 (MD) Cable Assembly for an inverter located in any other position on the IOE frame.

Only current loops may be connected directly to the IOC modules from devices (i.e. VDU or printers). EIA ports must be connected through modems. No direct connections from from devices (i.e. VDU or printers) to EIA ports are allowed. If a local EIA modem to modem connection is desired, both the DMS modem and the device end modem cannot co-exist in the DMS. The device modem must be located away from any DMS frame.

Reference CA0X04 01 24 and CA0X15 01 14 for switchboard cabling pertaining to the MOE frame.

Modem Pooling Configurations

Three standard configurations have been identified for modem pooling. These configurations are shown in Figure 1 on page 17-3

Modem Equipment Frame Modem Pooling Configuration A
- 1 modem shelf

Modem Equipment Frame Modem Pooling Configuration B
- 2 modem shelves, no redundant power

Modem Equipment Frame Modem Pooling Configuration C
- 2 modem shelves, redundant power

For non modem pooling applications, provision the necessary equipment as required.

MOE Frame		MOE Frame		MOE Frame	
66	NT4X25DH(MD)	66	NT4X25DH(MD)	66	NT4X25DH(MD)
	Data Unit Shelf		Data Unit Shelf		Data Unit Shelf
5	NT5X09AA(MD)	52	NT5X09AA(MD)	52	NT5X09AA(MD)
	Data Set Shelf		Data Set Shelf		Data Set Shelf
	FSP		FSP		FSP
			NT4X25DH(MD)		NT4X25DH(MD)
			Data Unit Shelf		Data Unit Shelf
		32	NT5X09AA(MD)	32	NT5X09AA(MD)
		18	Data Set Shelf	18	Data Set Shelf
		or		or	LaMarche/0X87AA
		20		20	/RX31DH Inv.
		XX		XX	LaMarche/0X87AA
	LaMarche/0X87AA		LaMarche/0X87AA		/RX31DH Inv.
	/RX31DH Inv.		/RX31DH Inv.		/RX31DH Inv.
04		04		04	
Configuration A		Configuration B		Configuration C	

XX = 11 for LaMarche/NT
XX = 12 for NTRX31DH

Figure 1. Standard Modem Pooling Configurations

1.2.4 Office Layout Information

Not applicable.

1.2.5 Traffic Tables

Not applicable.

1.3 Product/System Specification

1.3.1 Physical Characteristics

Not applicable.

1.3.2 EMI/Earthquake Information

Not applicable.

1.3.3 Sparing Information

Standard sparing algorithm shall apply.

1.3.4 Power Feed and Fusing Requirements

Not applicable.

1.3.5 Current Drain Information

Not applicable.

1.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

Not applicable.

1.4.2 Software Usage Restrictions

Not applicable.

1.4.3 Memory Provisioning

Not applicable.

1.5 Real Time Impact

Not applicable.

2.0 ECM343 - Patlon Electro Static Discharge (ESD)

2.1 Overview

Product/System Overview

Charleswater and Patlon ESD products may be used concurrently in a office, however, the ground leads and snaps are not interchangeable. Therefore when extending an office equipped with Charleswater Mats provide Mats and Ground Leads from Patlon as required.

2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

Not Applicable

The information can be found in the DDOC (Functional Description (FN)) or the Product Specification.

2.2.2 Hardware Dependencies

Not Applicable

2.2.2.1 P and C Side Port Requirements

Not Applicable

2.2.2.2 DMS BUS Port Requirements

Not Applicable

2.2.2.3 Circuits Per Card

Not Applicable

2.2.2.4 Discrimination Numbering

Not Applicable

2.2.3 Provisioning Considerations

2.2.3.1 STRAPS AND MISCELLANEOUS HARDWARE

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ESD Protective Wrist Straps, Testers, Footwear, and Misc. Equipment			
The following equipment can be ordered in the 996 specification as required:			
EQUIPMENT	PEC	CPC	NOTES
Wrist Strap and Lead Tester	PA2600-1	A0329976	1 , 2
Conductive Footwear Tester	PA2600-2	A0329982	1 , 3
6' Wrist Strap Assembly	PA0360-6C	A0336175	4
10' Wrist Strap Assembly	PA0360-10C	A0319449	4
15' Wrist Strap Assembly	PA0360-4	A0336176	4
5' Coiled Grd Lead e/w Terminals	PA2464-1	A0336177	5 , 4
10' Coiled Grd Lead e/w Terminals	PA2464-2	A0336178	5 , 4
15' Coiled Grd Lead e/w Terminals	PA2464-3	A0344218	5 , 4
5' Straight Grd Lead e/w Terminals	PA2464-1A	A0336440	5 , 4
10' Straight Grd Lead e/w Terminals	PA0464-10S	A0336441	5 , 4
15' Straight Grd Lead e/w Terminals	PA2464-3A	A0336442	5 , 4
Snap & Eyelet for Series 32 Mats	PA076	A0336185	6
Snap & Eyelet for Series 33 Mats	PA079	A0336446	6
Vice Grip Snap Installation Tool	PA1081	A0302490	7
Conductive Shoe Assembly	PA2460-1-S	R0112368	8

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Conductive Shoe Assembly	PA2460-2-M	R0112369	8
Conductive Shoe Assembly	PA2460-3-L	R0112370	8
Heel Grounding Assembly	PA2470-12R	A0329981	9

2.2.3.2 ESD FLOOR MATS

Patlon ESD Floor Mats are available as discrete units or bundled in Kits.

Discrete ESD Floor Mats			
EQUIPMENT	PEC	CPC	NOTES
3'x 8' Dark Brown Floor Mat Series 32 (1/8 Inch Thick)	PA3238-NT100M	A0329978	10
3'x 40' Dark Brown Floor Mat Series 32 (1/8 Inch Thick)	PA32340-NT100M	A0329977	10
3'x 8' Dark Brown Floor Mat Series 33 (3/8 Inch Thick)	PA33-3-X-8	A0329980	10
3'x 40' Dark Brown Floor Mat Series 33 (3/8 Inch Thick)	PA33-3-X-40	A0329979	10
ESD Mat 2'X 50' Equipped With 15' Ground Cord	PA2X50SH	A0320887	10

ESD FLOOR MAT KITS SERIES 3200 (S32)			
EQUIPMENT	PEC	CPC	NOTES
Static Dissipative Floor Mat Kit	PA-3238-NT	A0336957	10 , 11
Static Dissipative Floor Mat Kit	PA32340-NT100	A0336958	10 , 12

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ESD FLOOR MAT KITS SERIES 3200 (S33)			
EQUIPMENT	PEC	CPC	NOTES
Anti Fatigue/Static Dissapating Floor Mat Kit	PA-3338-NT100	A0336959	10 , 13
Anti Fatigue/Static Dissapating Floor Mat Kit	PA-33340-NT100	A0336960	10 , 14

UC PATLON FIELD SERVICE KITS			
EQUIPMENT	PEC	CPC	NOTES
Field Service Kit	PA7110	A0329984	15
Universal Hard- ware Kit	PA075	A0329983	16

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UC CHARLESWATER TO PATLON CONVERSION CHART			
CHARLESWATER PARTS		PATLON REPLACEMENTS	
CP407/5	ST.FR. WRIST STRAP 5'CORD	PA0360	5' WRIST STRAP ASSY
CP407/C6	ST.FR. WRIST STRAP 6'CORD		
CP407/C10	WRIST STRAP 10'CORD	PA0360-1	WR.STRAP E/W 10' CD
CP402K-2	STATFR.15'GRD CD SNAP&CLIP	PA0360-4	GRD STRAP E/W 15'CD
CP421	SNAP FASTNER MALE (CP501)	PA075	UNIVERSAL HW KIT
CP422	GROUNDING CON-NECTOR	PA076	SNAP & EYELET FOR S32 MATS
		PA079	SNAP & EYELET FOR S33 MATS
CP402A	CORD 6 FT.	PA2464-1A	GRD LEAD 5' LONG
CP402B	CORD 8 FT.	PA2464-2A	GRD LEAD 10' LONG
CP402C	CORD 10 FT.		
CP402D	CORD 15 FT.	PA2464-3A	GRD LEAD 15' LONG
CP501G-1	STATFREE FLR ROLL 2X40FT	PA32-3_X_40	40' BRN FLR MAT (S32)
		PA33-3_X_40	40' BRN FLR MAT (S33)
CP501	ESD FLOOR MAT 8 FT	PA32-3_X_8	8' BRN FLR MAT (S32)
CP501E	ESD FLOOR MAT	PA33-3_X_8	8' BRN FLR MAT (S33)
CP502C	2X8' ESD MAT		

2.2.4 EQUIPMENT NOTES

Note 1

GENERAL & TECHNICAL DATA FOR PATLON TESTERS:

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1. General
Tests all types of of wrist strap assemblies, ground leads, and conductive footwear.
2. Technical
Housing Material: High density ABS Plastic
Resistive Elements: Carbon fiber (1% tolerance)
Printed Circuit: Glass fiber epoxy
Switch Contacts: Gold plated
Battery: 9V alkaline (industrial grade)
Test Leads: 18/1 AWG 65/35 Tin, black rubber jacket to MIL W 13169 B
NOMINAL RESISTANCE VALUES - Range Selected

<u>Indication</u>	<u>Lead Test</u>	<u>Assembly Test</u>
"SAFE"	0.9 to 1.1 megohms	0.9 to 10 megohms
"HIGH"	More than 1.1 megohms	More than 10 megohms
"LOW"	More than 1.1 megohms	More than 10 megohms

Note 2

Wrist Strap and Lead Tester unit complete with two test leads terminated with alligator clips, one alkaline battery, instruction sheet, and one-year warranty card, provide per customer requirements.

Note 3

Conductive Footwear Tester complete with two test leads, (one 6 inch and one 5 1/2-foot), one Conductive Floor Mat 12 inches sq., all required connections and terminations, Velcro wall mount, and instruction sheet, provide per customer requirements.

Note 4

GENERAL & TECHNICAL DATA FOR PATLON WRIST STRAP ASSEMBLIES:

1. General:
Adjustable elastic and Velcro wrist bands.
Snap fastener designed for electrical applications.
Completely washable, one-size-fits-all.
3 0 degree non-particulating, conductive interior on wrist bands.
All assemblies, leads and molded strain reliefs at both ends are unconditionally warranted for one year.
Meets EOS/ESD Society specifications.
2. Technical:
Protective Resistor: 1-megohm 1/4 watt +/- 5% carbonfilm

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Lead Conductor Material: 6 strand tinsel wound around polyester coil

Lead Diameter: nominal 0.090 inches +/- 0.005 inches

Insulation: Polyurethane nominal wall thickness 0.032 inches

Coil, Outside Diameter: 0.450 inches +/- 0.005 inches

Lead Tensile Strength: 22 lbs

Velcro band, (used on Wrist Straps & Heel Grounding Units only), incorporates a 100 Clean Room approved conductive interior fabric (non-sloughing).

3. Provide Wrist Strap Assemblies as per customer length requirements, for the following:
Always provide four (4) Spare Wrist Straps assemblies of the provisioned length.
When providing discrete Mats as opposed to Mat Kits

Note 5

GENERAL DATA FOR PATLON GROUND LEADS:

1. General:
All assemblies, leads and molded strain reliefs at both ends are unconditionally warranted for one year.
Meets EOS/ESD Society specifications.
2. Provide Ground Leads as per customer length requirements for:
 - spare equipment or
 - when providing discrete floor mats, one per linear foot of Mat, or
 - when customer request additional ground leads for Patlon ESD equipment only.

Note 6

Provide one Snaps & Eyelets per eight (8) linear feet of Mat, or as Spare Equipment. When providing spare Snaps & Eyelets indicate quantity to be installed and quantity for spares via a note in the M.E.L.

Note 7

Equipment always required when extra Snaps & Eyelets are provided for Series 32 Mats/KITS or provide as per customer specifications.

Note 8

Provide as per customer specifications for ESD protective Footwear for mobile personnel.

1. General:
Conductive Shoe Assembly three sizes available for perfect fit
 - a) PA2460-1-S Small
 - b) PA2460-2-M Medium
 - c) PA2460-3-L Large

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Rubber material is fabric-reinforced and insulated on the shoe side to prevent electrical shock and carbon sloughing. Assemblies feature a plastic D-Ring/Velcro adjustment for easy and comfortable assembly.

2. Technical:

Lead Protective Resistor: 1-megohm 1/4 watt +/- 5% carbonfilm
Lead Conductor Material: 6 strand tinsel wound around polyester coil
Lead Diameter: Nominal 0.090" +/- 0.005"
Insulation: Polyurethane nominal wall thickness 0.032"
Coil, Outside Diameter: 0.450" +/- 0.005"
Lead Tensile Strength: 22 lbs
Conductive Sole Material: Long lasting, durable and non-scuffing material 100,000 ohms/square
Conductive Shoe Assembly Sizes:
- Small shoe sizes 4 1/2 to 7 1/2 (Green Heel Elastic)
- Med. shoe sizes 8 to 10 1/2 (Blue Heel Elastic)
- Large shoe sizes 11+ (Black Heel Elastic)

Note 9

Provide as per customer specifications for ESD protective Footwear for mobile personnel.

- One size fits all
- Equipped with 1-megohm resistor and Snap on conductive ribbon.

Note 10

GENERAL & TECHNICAL DATA FOR PATLON MATS AND MAT KITS

1. Provide Series 32 Mats as per customer requirements.
2. Provide Series 33 Mats as per customer requirements. This Mat has an anti-fatigue feature suitable for high traffic areas.
 - Discrete Mats require a minimum of one Snap per eight linear feet.
 - Series 3200 (S32) and Series 3300 Mats are available in Dark Brown only and a max width of 3 feet.
 - Refer to NOTES '5 & 4' for Ground Leads and NOTE '6' for Snaps & Eyelets.

3. Technical:

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	SERIES 3200 Patlon PVC Soft Floor Mats	SERIES 3300 Patlon Anti-Fatigue Floor Mats
Material:	Homogeneous PVC (Solid)	Homogeneous PVC (Foamed)
Color:	Dark Brown	Dark Brown
Thickness:	0.125"	0.375"
Volume Resistivity:	10,000,000,000 ohms max	10,000,000,000 ohms max
Available Sizes:	3' X 8' 3' X 40'	3' X 8' 3' X 40'

Note 11

Stock List For PA-3238-NT: A0336957			
QTY	PEC	CPC	DESCRIPTION
1	PA3238-NT100M	A0329978	3'x 8' Dark Brown Floor Mat Series 3200 (S32) (1/8" Thick)
1	PA076	A0336185	Snap And Eyelet
1	PA2464-3A	A0336442	15' Ground Lead And Terminals
1	PA2460-1-S	R0112368	Conductive Shoe Assem- bly
1	PA2470-12R	A0329981	Heel Grounding Device

Note 12

Stock List For PA-32340-NT100: A0336958			
QTY	PEC	CPC	DESCRIPTION
1	PA32340-NT100M	A0329977	3'x 40' Dark Brown Floor Mat Series 3200 (S32) (1/8" Thick)
5	PA076	A0336185	Snap And Eyelet
5	PA2464-3A	A0336442	15' Ground Lead And Terminals
1	PA2460-3-L	R0112370	Conductive Shoe Assembly, Large
1	PA2470-1	A0329981	Heel Grounding Device

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Note 13

Stock List For PA-3338-NT100: A0336959			
QTY	PEC	CPC	DESCRIPTION
1	PA33-3-X-8	A0329980	3'X 8' Dark Brown Floor Mat Series 3300 (S33) (3/8" Thick)
1	PA079	A0336446	Snap And Eyelet
1	PA2464-3A	A0336442	15' Ground Lead And Terminals
1	PA2460-2-M	R0112369	Conductive Shoe Assembly, Medium
1	PA2470-1	A0329981	Heel Grounding Device

Note 14

Stock List For PA-33340-NT100: A0336960			
QTY	PEC	CPC	DESCRIPTION
1	PA33-3-X-40	A0329979	3'x 40' Dark Brown Floor Mat Series 3300 (S33) (3/8" Thick)
5	PA079	A0336446	Snap And Eyelet
5	PA0464-15S-0705-071		15' Molded Straight GRD Leads
1	PA2460-2-M	R0112369	Conductive Shoe Assembly, Medium
1	PA2470-1	A0329981	Heel Grounding Device

Note 15

GENERAL & TECHNICAL DATA FOR PATLON FIELD SERVICE KIT:

1. General:

The Kit, when unfolded, doubles as a work surface and is made of rugged, double-thick vinyl material, which is static-dissipative on the work surface.

Compact roll-up design with a Velcro closing device for easy transportation

Patlon electrically conductive fabrics have been tested by Underwriters Laboratories, Inc, and are on the approval list for conductive sheeting.

2. Technical:

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FABRIC:

Electrical: Meets National Fire Prevention Association (NFPA) Standard 56A-73 Paragraph 4631

Surface Resistivity: 3.0×10^{E08}

Biological: Bacterial, Fungal, and Mildew Resistance Primary Skin Irritation Index -- Meets Draize Dermal Toxicity Tests

Physical: Wt oz per sq. yd = 10.0

Lead Protective Resistor: 1-megohm 1/4 watt +/- 5% carbonfilm

Lead Conductor Material: 6 strand tinsel wound around polyester coil

Lead Diameter: Nominal 0.090" +/- 0.005"

Insulation: Polyurethane nominal wall thickness 0.032"

Coil, Outside Diameter: 0.450" +/- 0.005"

Lead Tensile Strength: 22 lbs

3. Always provide one (1) Field Service Kit PA2500-3 for handling circuit packs at the customer site, to provide easy-to use ESD protection for electronic equipment at the customer site.

4. Stock List For PA7110:

QTY	PEC	DESCRIPTION
1	PA0360-10C	10' Wrist Strap Assembly
1	PA0362	Adjustable Wrist Band
1	PA2464-3A	15' Ground Lead & Terminals
1	PA2559-2	Black Conductive Foam
2	PA2559-3	Black Conductive Shunt
1	PA4200-2	Static Shielded Bag
1	PA7111	26" X 24" Work Surface

Note 16**PATLON UNIVERSAL HARDWARE KIT PA075:**

1. Always provide one (1) Universal Hardware Kit PA075 to provide maintenance spares for Patlon Wrist Straps and Mats.
2. Stock List For PA075:

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QTY	PEC	DESCRIPTION
1	PA0745	Alligator Clip
1	PA070	#10 Lug
1	PA071	Single Snap
1	PA0711	3M Snap
1	PA072	Piggyback Snap
1	PA073	Swivel Connector For Table And Floor Mats
1	PA074	Mueller Clamp

2.2.5 Office Layout Information

Not Applicable

2.2.6 Traffic Tables

Not Applicable

2.3 Product/System Specification

2.3.1 Physical Characteristics

Not Applicable

2.3.2 EMI/Earthquake Information

Not Applicable

2.3.3 Sparing Information

Standard Sparing algorithms apply.

2.3.4 Power Feed and Fusing Requirements

Not Applicable

2.3.5 Current Drain Information

Not Applicable

2.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

2.4.1 Required Software Packages and Interdependencies

Not Applicable

2.4.2 Software Usage Restrictions

Not Applicable

2.4.3 Memory Provisioning

Not Applicable

2.5 Real Time Impact

Not Applicable

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3.0 ECM406 - Miscellaneous Hardware Kits

3.1 Overview

Product/System Overview

This Engineering Change Memorandum (ECM) contains engineering ordering information for Miscellaneous Hardware Kits. These kits provide the miscellaneous hardware required to install DMS-100 frames, cabinets, modules, and shelves and are used by Installation. They are not to be ordered when extending an office by adding just piece parts, CPs, etc. This ECM does include several Field Upgrade kits for JNET to ENET.

- Table 1 - Kits Introduced for U.S. Applications Only
- Table 2 - Model A Hardware Kits Kits
- Table 3 - Model B Hardware Kits
- Table 4 - JNET to ENET Up-grade Kits

TABLE 1 - KITS INTRODUCED FOR U.S. APPLICATIONS ONLY		
Rating	PEC	Application/Title
STD	NT0X58AE	25 Frame Hardware Kit
STD	NT0X58AF	50 Frame Hardware Kit
STD	NT0X58AG	75 Frame Hardware Kit
STD	NT0X58AH	100 Frame Hardware Kit
STD	NT0X58AJ	10 Frame EXT. Hardware Kit
STD	NT0X58AK	10 Frame Remote Hardware Kit
STD	NT0X58AL	0-2 Frame EXT. Hardware Kit
STD	NT0X58AM	3-5 Frame EXT. Hardware Kit
STD	NT0X58AN	5 Frame Remote Hardware Kit
STD	NT0X58AP	1 Frame RLCM Hardware Kit
STD	A0383689	Shipping Crate Assembly DMS-100.

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TABLE 2 - MODEL A HARDWARE KITS		
Rating	PEC	Application/Title
MD	NT0X58BA	Domestic 25 Initial Model A Hardware Kit
MD	NT0X58BB	Domestic 50 Initial Model A Hardware Kit
MD	NT0X58BC	Domestic 75 Initial Model A Hardware Kit
MD	NT0X58BD	Domestic 100 Initial Model A Hardware Kit
MD	NT0X58BE	Domestic 150 Initial Model A Hardware Kit
STD	NT0X58BK	Domestic RSCS Model A Hardware Kit
STD	NT0X58BJ	Domestic 11-15 Extensions Model A Hardware Kit
STD	NT0X58BH	Domestic 06-10 Extensions Model A Hardware Kit
STD	NT0X58BG	Domestic 03-05 Extensions Model A Hardware Kit
STD	NT0X58BF	Domestic 00-02 Extensions Model A Hardware Kit

Table 3 - MODEL B HARDWARE KITS			
Rat- ing	PEC	CPC	Application/Title
STD	NT0X58BL	B0241646	RSCS Model B Hardware Kit (all Jobs)
STD	NT0X58BM	B0241664	150 Initial Model B Hardware Kit
STD	NT0X58BN	B0241665	100 Initial Model B Hardware Kit
STD	NT0X58BP	B0241666	75 Initial Model B Hardware Kit
STD	NT0X58BQ	B0241667	50 Initial Model B Hardware Kit
STD	NT0X58BR	B0241668	25 Initial Model B Hardware Kit
STD	NT0X58BS	B0241669	11-15 Extensions Model B Hardware Kit
STD	NT0X58BT	B0241670	06-10 Extensions Model B Hardware Kit
STD	NT0X58BU	B0241671	03-05 Extensions Model B Hardware Kit
STD	NT0X58BV	B0241672	00-02 Extensions Model B Hardware Kit

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JNET TO ENET FIELD UPGRADE KITS			
PEC	Kit	CPC	Title
STD	NTY601AA	B0249956	00-75 Frame ENET Retrofit Kit
STD	NTY602AA	B0249955	75+ Frame ENET Retrofit Kit

3.2 Hardware Provisioning

3.2.1 Hardware Usage Restrictions

3.2.2 Hardware Dependencies

Not applicable.

3.2.2.1 P and C Side Port Requirements

Not applicable

3.2.2.2 DMS BUS Port Requirements

Not applicable

3.2.2.3 Circuits Per Card

Not applicable

3.2.2.4 Discrimination Numbering

Not applicable

3.2.3 Provisioning Considerations

1. The 0-2 Extension Kits are to be provisioned only when a frame, cabinet, module or shelf is being added, not just piece parts, Cps, etc.
2. All FSP Labels except Frame Row and Position are now being affected by Manufacturing. Equipment Applicatiuon Engineering should provide PDC designation labels for any frame type (e.g. peripheral) not covered by these kits. Refer to ES-10153-RTP Issue 08 or later.
3. Only Frame Row, Position, and some PDC Shelf Name labels are included in NT0X58AL-AP kits.
4. The A0383689 Shipping Crate Assembly is used when re-deploying the DMS-100 Frames from one sit to another. One (1) Shipping Crate Assembly is required per frame for re-deployment. The shipping crates are not to be used to ship frames back to NT.

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5. Hardware Kits for Model A cabinetized applications are to be ordered based on the number of cabinets ordered for the initial or extension order or for RSC-SONET installations.
6. Hardware kits for Model A cabinetized Initial applications (NT0X58BA/BB/BC/BD/BE) have been rated "Manufacture Discontinued". There are no replacements.
7. The Model B Kits have Domestic as part of their name in PAS. They are not restricted to Domestic use and may be used in all markets.
8. The NT0X58-series kits differ from QKM kits in that the designation labels have been omitted, except for the following:
 - ES-10153 G01 & G02 remain in kits NT0X58AE-AJ
 - ES-10153 G14, G15, G17 & G18 remain in NT0X58AK
9. Hardware kits for Model B cabinetized applications are to be ordered based on the number of cabinets ordered for the initial or extension order or for RSC-SONET installations. Check tables for available kits.

3.2.4 Office Layout Information

Not applicable.

3.2.5 Traffic Tables

Not applicable.

3.3 Product/System Specification

3.3.1 Physical Characteristics

Not applicable.

3.3.2 EMI/Earthquake Information

Not applicable.

3.3.3 Sparing Information

Not applicable.

3.3.4 Power Feed and Fusing Requirements

Not applicable.

3.3.5 Current Drain Information

Not applicable

3.3.6 Software Provisioning

Not applicable

3.3.7 Required Software Packages and Interdependencies

Not applicable.

3.3.8 Software Usage Restrictions

Not applicable.

3.3.9 Memory Provisioning

Not applicable.

3.4 Real Time Impact

Not applicable.

This ECM references the following Engineering Manual Sections:

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4.0 ECM451 - Tellabs CNA Loudspeaker Provisioning

4.1 Overview

Product/System Overview

The Calling Number Announcement (CNA) feature, NTX196AA, provides the ability to automatically verify service orders and line transfer cross-connections, or identify pairs in the event of a cable cut.

The maintenance person, using the subscriber pair in question, dials a special number, and the CNA feature, in conjunction with a DRAM, automatically announces the telephone number associated with the pair being used.

The announcement can be broadcast in one of three ways, as determined by the parameter of the S/W field "ANTYPE" in the TABLE ANNS:

- Over the Line Pair being verified
- Over a Loudspeaker and the Line or Pair being verified
- Over a Loudspeaker Only.

Figure 1. PRE-BCS27 CNA LOUDSPEAKER CONFIGURATION

Figure 2. PRE-BCS27 CNA LOUDSPEAKER CONFIGURATION

Figure 2. BCS27 & Later ONE (1) CNA LOUDSPEAKER CONFIGURATION

Figure 3. BCS27 & LATER ONE (1) CNA LOUDSPEAKER CONFIGURATION

4.2 Hardware Provisioning

4.2.1 Hardware Usage Restrictions

Not Applicable

4.2.2 Hardware Dependencies

For Pre-BCS27 and earlier applications the CNA Loudspeaker configuration requires a NT2X83 (Trunk Pack) to interface the DMS-100F.

For BCS27 and later applications the CNA Loudspeaker configuration requires a NT2X81 (Trunk Pack) to interface the DMS-100F.

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4.2.2.1 P and C Side Port Requirements

Not Applicable

4.2.2.2 DMS BUS Port Requirements

Not Applicable

4.2.2.3 Circuits Per Card

Not Applicable

4.2.2.4 Discrimination Numbering

Not Applicable

4.2.3 Provisioning Considerations

Provide the Tellabs Loudspeaker (9791) as per Telco specification up to a maximum of ten (10) speakers. For each Loudspeaker provisioned also provision (1) Mounting Bracket, P0666110. To mount the 9791 Speaker to the P0666110 Mounting Bracket provision (4) #12 Pan Head Machine Screws, P0160021, (4) #12 Lock Washers (outside tooth), P0423636, and (4) #12 Hex Nuts, P0125953.

Note: Speaker rubber "feet" must be removed to insert mounting hardware.

To mount the P0666110 Mounting Bracket provision: (2) Self Tapping Mounting Bracket Screws, P097F813.

Provide this H/W in conjunction with S/W as defined in section 15 to enable Telco Maintenance personnel to have aural communication of the Directory Number for the subscriber pair under test at the distributing frame.

4.2.4 Office Layout Information

Not Applicable

4.2.5 Traffic Tables

Refer to ECM-497 for Traffic Tables and Traffic provisioning considerations.

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4.3 Product/System Specification

4.3.1 Physical Characteristics

4.3.2 EMI/Earthquake Information

Refer to EMA15-03-000 in the Engineering Manual for EMI requirements.

4.3.3 Sparing Information

Standard sparing algorithms apply.

4.3.4 Power Feed and Fusing Requirements

The first loudspeaker shall be fused at 1 1/3 amps from an FSP. The power is to be multiplied to each speaker - up to a maximum of ten (10) speakers.

4.3.5 Current Drain Information

Not Applicable

4.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

4.4.1 Required Software Packages and Interdependencies

The CNA Loudspeaker H/W configuration requires the NTX196AA Calling Number Announcement S/W Package in order to function. The NTX196AA Pkg Needs:

NTX000AA - BILGE
NTX001AA - Common Basic
NTX901AA - Local Features I

4.4.2 Software Usage Restrictions

Not Applicable

4.4.3 Memory Provisioning

Not Applicable

4.5 Real Time Impact

Not Applicable

5.0 ECM469 - Maintenance and Administration Position (MAP)

5.1 Overview

The Maintenance and Administration Position (MAP) provides an interface between the DMS-100 Family system and operating company personnel. Task performed at the MAP include general maintenance functions for error detection and diagnosis; administration functions for network management, customer data modifications, trunk and line testing functions.

The basic components of the MAP include a Visual Display Unit (VDU) with keyboard, a voice communication module (Logic 30 Key Telephone Set), system test interface and optional position furniture. Other devices such as printers are used in conjunction with the VDU depending upon operating company procedures.

The optional MAP furniture is a modular system providing table surfaces which are positioned for either standing or sitting use. The furniture, consisting of tables and shelf units, is assembled in various configurations to provide work space and documentation storage for administration or maintenance functions, and to mount the VDU, jack field, and communications module. s.*

5.2 Hardware Provisioning

5.2.1 Hardware Usage Restrictions

Not applicable.

5.2.2 Hardware Dependencies

Not applicable.

5.2.2.1 P and C Side Port Requirements

Not applicable

5.2.2.2 DMS BUS Port Requirements

Not applicable

5.2.2.3 Circuits Per Card

Not applicable.

5.2.2.4 Discrimination Numbering

5.2.3 Provisioning Considerations

Provide one (1) A0500 (MAP support leg) per NT0X57AD/AC for stand alone applications in which MAP Center Section NT0X57AA/AB is not provided.

5.2.4 Office Layout Information

Not applicable.

5.2.5 Traffic Tables

Standard LCM Carried Traffic Capacity tables are used. Refer to ECM350.

5.3 Product/System Specification

5.3.1 Physical Characteristics

The MAP furniture configurations are based on three principal support sections (panels):

- (a) A corner panel supporting a corner work surface on which the VDU and keyboard are located.
- (b) A 62 in. (1.55 m) high modular panel that carries storage shelves, work surface with storage drawers, and tackboard.
- (c) A 48 in. (1.2 m) high module panel that carries a work surface and counterpane (interaction panel).

5.3.2 EMI/Earthquake Information

Not applicable.

5.3.3 Sparing Information

5.3.4 Power Feed and Fusing Requirements

Not applicable.

5.3.5 Current Drain Information

Not applicable.

5.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

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5.4.1 Required Software Packages and Interdependencies

Not applicable

5.4.2 Software Usage Restrictions

Not applicable.

5.4.3 Memory Provisioning

Not applicable.

5.5 Real Time Impact

Not applicable.

6.0 ECM479 - Digital Test Head (DTH) - ROTL/DTT Provisioning

6.1 Overview

The DTH requires five (5) inches of vertical space above and below the unit for cooling purposes. All adapters/installation hardware required to install the unit in a MIS frame is included with the unit.

These systems are controlled from the Switching Control Center (SCC) as follows:

SYSTEM SCC CONTROL SYSTEM

DTH-ROTL This system is located in the Central Office and accessed from the SCC via Two dial-up access ports (these lines are served alternately). These ports connect to the CAROT system located at the SCC. The test ports and the 105-Test Line connect the DTH-ROTL to trunks terminating and the switch for the purpose of performing routine systematic testing of Inter-Central Office (ICO) analog trunks.

DTH-DTT This system is located at the Central Office and accessed from the SCC via two dial-up access ports. These ports connect to the Network Test System Controller (NTSC) through the X.25 Packet Switched Data Network.

This system is used to test:

1. Interoffice Trunks between two End Offices
2. Tandem Trunks between an End Offices and Intermediate or Tandem Office.
3. Toll Trunks between an End Office and a Toll Office.
4. Also, OP, T0, T2, and IBNT0, and IBNT2 trunk circuits may be tested via the DTH-DTT.

The Digital Test Head is a modular programmable system based on Digital Signal Processing (DSP) technology, which meets the needs of existing transmission testing requirements. Refer to Figure 4 on page 17-30 for a conceptual diagram of the CAROT-ROTL configuration, Figure 5 on page 17-30 for a conceptual diagram of the NTSC-DTT configuration and Figure 6 on page 17-31 for a conceptual diagram of the CAROT-ROTL and NTSC-DTT configuration.

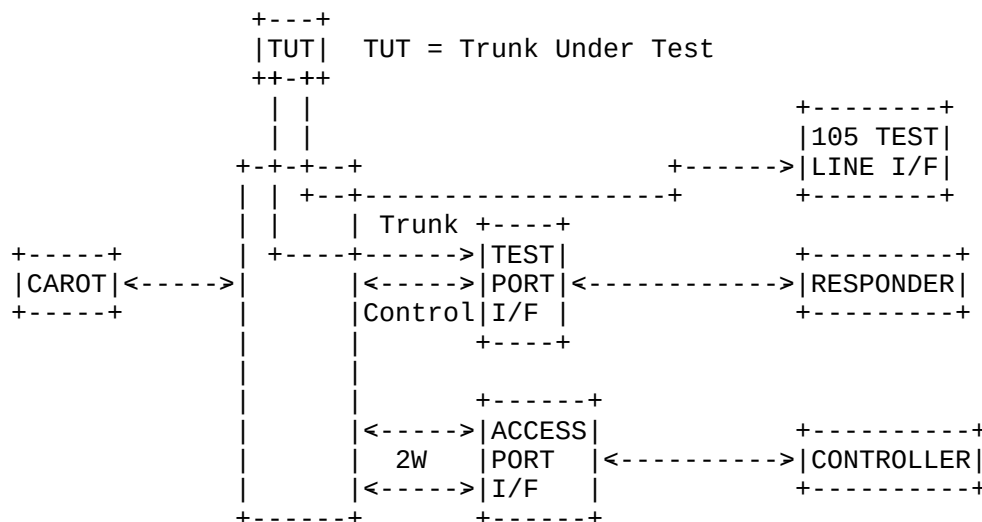


Figure 4. CAROT-DTH-ROTL Test Configuration

Figure 1 depicts a ROTL system consisting of two access ports, two test ports, and one 105-Test Line interfaced to a CAROT system and inter-office trunks via a switch.

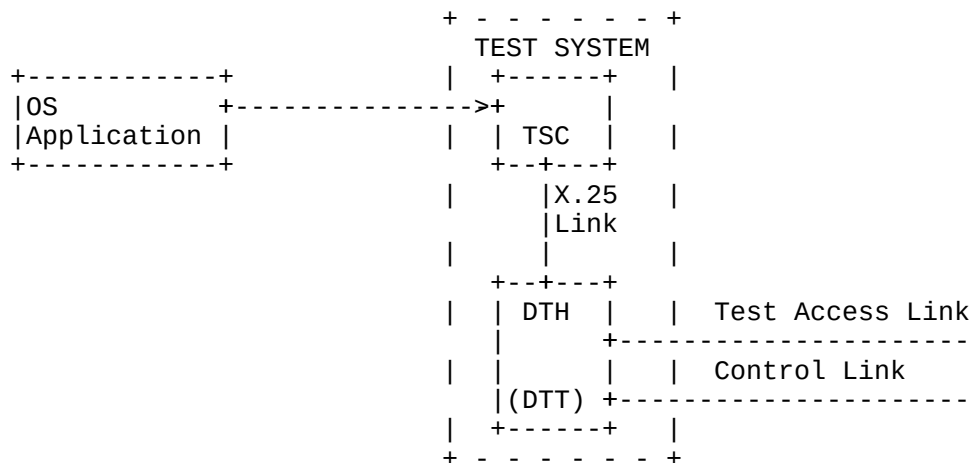


Figure 5. DTH-DTT Conceptual Block Diagram

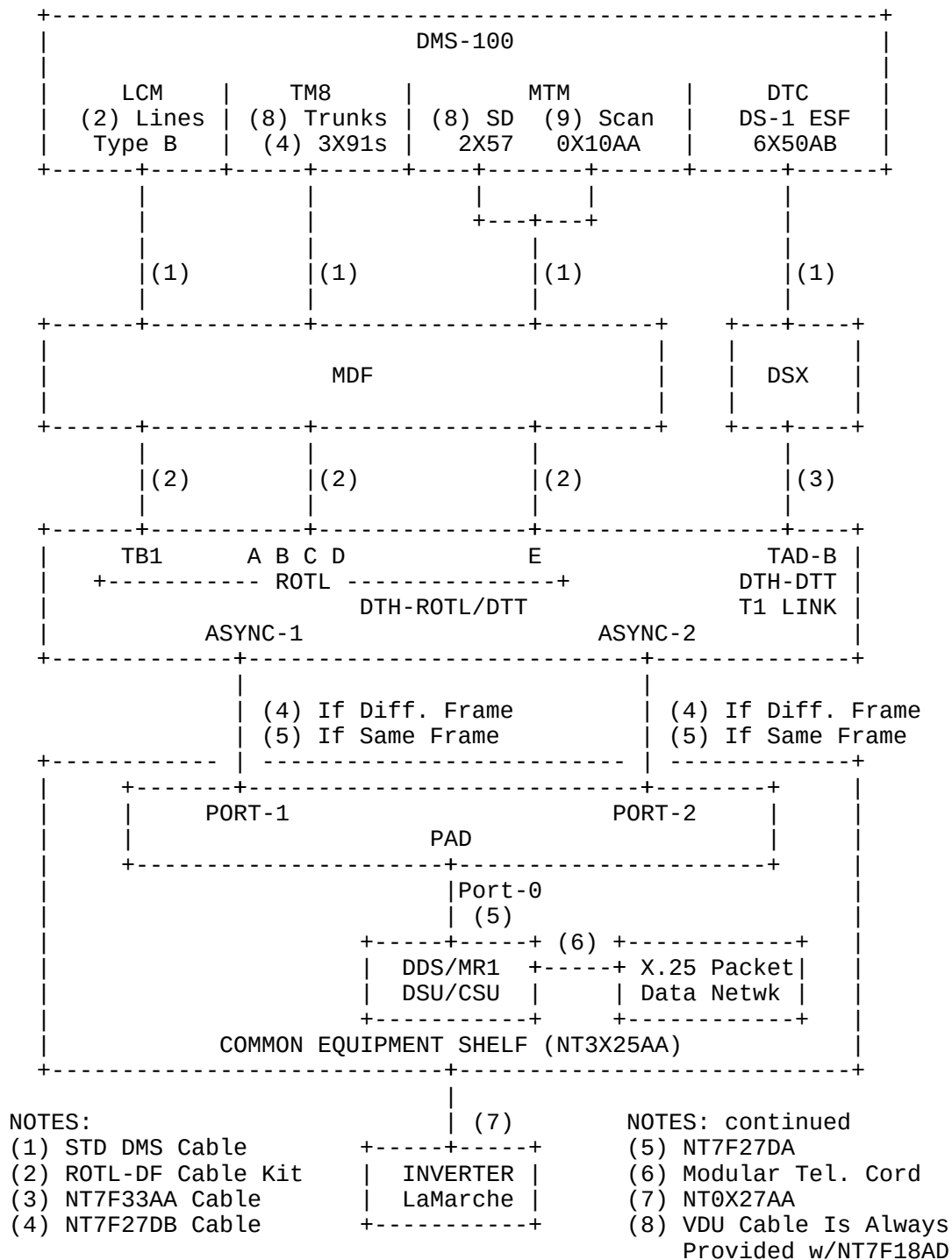


Figure 6. DTH-ROTL/DTT CONNECTIVITY DIAGRAM

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6.2 Hardware Provisioning

6.2.1 Hardware Usage Restrictions

The following restrictions apply to the DTH-ROTL, DTH-DTT, DTH-ROTL/DTT configurations of the Digital Test Head (DTH) shelf:

1. This hardware is not to be provisioned for Remote Offices (e.g. RSC, RSCS, RSCI, RLCM, RLCC, OPM(256/640), RLM, etc).

6.2.2 Hardware Dependencies

See "Provisioning Considerations" .

6.2.2.1 P and C Side Port Requirements

Not Applicable.

6.2.2.2 DMS BUS Port Requirements

Not Applicable.

6.2.2.3 Circuits Per Card

Not Applicable.

6.2.2.4 Discrimination Numbering

Not Applicable.

6.2.3 Provisioning Considerations

Provisioning the DTH for a specific Telco site is dependent on the following parameters:

1. Installation category (initial or upgrade)
2. Number and location of affected bays
3. Type of bay (frame or cabinet)
4. Type of installed applications (DTT, ROTL, or both)
5. Number of required DTT test access paths (TAP's) and 108-type test lines1 (TL's)
6. Type of X.25 circuit serving the DTH installation.

Note:

The equipment is to be installed only in standard frames, not in cabinets designed for RFI suppression. Hence, these provisioning guidelines cover items 1), 2), 4), 5) and 6).

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7. Protect AC for the Packet Assembler Disassembler (PAD) and Modem

6.2.3.1 DTH Provisioning Overview

In general, the DTH is provisioned in one of three configurations (1) DTH-ROTL, (2) DTH-DTT, or (3) DTH-ROTL/DTT (i.e. both functions on a single shelf). MIS Frame Mounting Space, for either of the above configurations requires 14-inches plus 5-inches above and below the unit for cooling for a total of 24-inches of vertical MIS frame mounting space.

Each DTH application is equipped with both near-end and far-end functions. Following are the high-level considerations that determine each configuration:

1. DTH-ROTL Configuration

- a. The ROTL application is always configured with one combined set of near-end and far-end functions. The near-end functions include the ROTL control interface and the near-end responder. The far-end functions include the type 105 far-end responder.
- b. All functions are firmware based. The firmware resides on a ROM Pack card, and the required functions are downloaded to DS0 Handler Card which has four DSP (Digital Signal Processor) circuits referred to as "test engines".
- c. One test engine serves as ROTL control interface, one as the near-end responder, and two serve as the far-end responders, totaling one DS0 cp.
- d. A VF interface card provides the required analog-digital conversion for the ROTL functions.
- e. The DTH-ROTL application requires:
 - 1) one DS0 Handler card
 - 2) one VF Interface card
 - 3) Type B Voice Line Card (VLC)

Provide two Type B VLCs with the Ground Start Option per DTH-ROTL provisioned.

- 4) ROTL Test Trunks (Two 4-wire E&M trunks)

Trunk Cards, usually type 3X91AA, configured for Type II E&M signalling. Two trunks are used as test trunks and six are used as type 1 5 test lines. Hence, four 3X91AA cards are used, each supporting two trunk circuits.

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5) Sense and Control Leads (augmenting the test trunk signaling capability (i.e.:

a) two sets of four plus one SCAN Point

Four (4) Scan Points NT0X10 For each ROTL test trunk, four sense points are connected to the scan card. An additional sense point is used for the DTH shelf alarm. Hence, a total of nine sense points are used. These points should be spread across multiple CPs to increase reliability.

b) two sets of four SD Points (NT2X57)

For each ROTL test trunk, four control points are connected to the SD card. Hence, a total of eight control points are used. These points are spread across multiple CPs to increase reliability.

Note:

Scan (SC)/Signal Distribution (SD) Points are provisioned as follows:

- i. The control interface between each ROTL and DMS is via four (4) SC and four (4) SD points.
- ii. These SC and SD points are assigned to the same (dedicated) scan group (i.e. the same circuit on the same card) and SD group respectively.
- iii. The remaining SC/SD points in each of these groups are not assigned.
- iv. Additionally, one SC point on a different card in a different scan group may be assigned/provided for the ROTL failure alarm detection.

f. ROTL Type 105 Test Lines (Six 4-wire E&M trunks)

g. ROTL cabling to support the above interfaces.

Note:

There is no choice with respect to the number of trunks, lines, etc. per DTH-ROTL. DTH-ROTL shelf to the MDF (Main Distribution Frame) cables are contained in CA0X04. The ROTL cabling supports the Access Line To DF, Test Trunk to DF, and Alarm to DF connections only.

2. DTH-DTT Configuration

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- a. When the DTH is equipped with the Digital Trunk Testing (DTT) application, each site is configured with at least two Test Access Paths (TAP) for call origination and Bit Error Rate Testing (BERT) and at least two 108-type test lines (TL) to provide digital loopback for bit error rate testing.
- b. One test engine is required for each TAP and for each TL. Therefore, a minimum DTH-DTT configuration is supported by one DS0 Handler card having four test engines. DS0 Handler CPs are provisioned in proportion to the number of TAP's or TL's are required.
- c. TAP's and TL's are transported on a DS1 link. These links are referred to as a " Test Access Digroup (TAD) ". There is one TAD between the DTH and the given switching system.
- d. DTH-DTT Cabling
 - 1) The TAD interface requires a cable with length no greater than 655 feet.
 - 2) DTT control and interface cabling requirements for the Network Test System Controller (NTSC) are as follows:
 - a) One Data Service Unit (DSU) providing an interface to the telephone company's packet network.
 - b) One Packet Assembler/Disassembler (PAD)
 - c) RS232 cables interconnecting the DSU, the PAD, and the DTH.
 - d) DC power cable
 - e) Video Display Terminal (VT100 equivalent) for local craft interface

Note:

VT220 Compatibility is required to make use of the Function Keys F6 thru F14.

- f) RS-232 cable for the DTH/VDU interface

3. DTH-ROTL/DTT Configuration

The DTH-ROTL/DTT configuration is simply combining the components of the above provisioning considerations together. The following considerations should be taken into account when provisioning a multifunction DTH.

- a. The DS0 Handler in DTH Card Slot #2 will automatically assume the ROTL functions.

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- b. If the DTT function is being added to an existing ROTL an upgrade kit is required and additional DS0 Handler CPs must be provisioned.

6.2.3.2 DTH-DTT hardware Provisioning Considerations

A typical Digital Test Head equipment configuration is shown in Figure 2. The DTH-DTT is shown with the digital switch which controls the trunks to be tested. Refer to the next section for a detail list of DTH equipment:

1. The DTH-DTT and the switch are connected using a Test Access Digroup (TAD 2).

A TAD is a DS1 link consisting of a transmit pair and a receive pair. At the DTH, this link terminates on connector TAD-B. The link is routed via a jackfield (DSX) to the switch. At the switch, the link terminates on a DS1 interface card. The recommended card is the 6X50AB, which handles two DS1 links. The 6X50AB card is installed in a DMS-100 peripheral, usually the Digital Trunk Controller (DTC).

The TAD cable is included in cable kit NT7F33AA. The maximum length from the DTH to the DSX is 655 feet.

2. TAD 1 may be used in the FUTURE for testing Special Services Circuits via a digitally cross-connected facility.

Provisioning Rules for the TAD 1 link have not been developed for this application. Hence the TAD 1 is not connected.

Note that when the DTH is equipped with ROTL functionality, TAD 1 is not usable.

3. The DTH is connected to the packet network using a Packet Assembler/Disassembler (PAD). The PAD must support at least two 9600 baud RS232 ports allowing packet network access to two DTH ports:
 - a. Asynchronous communications port 1, used for TSC/DTH communications. The messaging protocol is Network Operations Protocol (NOP).
 - b. Asynchronous communications port 2, used for accessing the DTH through its local terminal interface. By extending this interface through the packet network, the TSC can provide a window which serves as a DTH local craft interface.
 - 1) X.3, which defines the PAD operating characteristics, operating speed, character echo, flow control, etc. These are collectively referred to as "PAD Parameters" defined in the PAD's profile.

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- 2) X.28, which defines the procedure for character exchange between a terminal and the PAD. X.28 encompasses both PAD command signals (terminal user's instructions to the PAD) and PAD services signals (responses to the terminal). X.28 is used to set up the PAD upon installation.
 - 3) X.29 is concerned with the exchange of control information across the PSN between the PAD and the TSC workstation. This recommendation gives the TSC the ability to read and/or change the PAD parameters.
 - c. A Data Service Unit (DSU) is required for the interface between the telephone company's packet network and the PAD.
 - d. A VT220-equivalent Video Display Unit (VDU) may be connected directly to the DTH for use as a local terminal interface. During installation, the VDU may also be connected to the PAD in order to program the PAD settings. The VDU may be connected to the DTH in one of two ways:
 - 1) via asynchronous communications port 2, or
 - 2) by configuring the dip switches on the Control Processor CP and connecting the RS232 Cable directly to the asynchronous port on the front panel of the control processor cp
4. DTH-ROTL to DTH-ROTL/DTT Upgrade Kit
- An upgrade kit is available to convert DTH-ROTL to the DTH-ROTL/DTT application. The kit includes:
- a. one DS0 Handler Card, so that an upgrade will have at least two DS0 Handler Cards; more may be required.
 - b. One Control Processor Cp to replacing the existing one. Furthermore, if the existing ROTL-only application is equipped with the NT7F25AA card, order an additional NT7F25AB card. The NT7F25AA card must be replaced with the newer version in order to support Digital Trunk Testing.
 - c. One DS-1 Card to replace a filler face plate
 - d. One new ROM Card to replace the existing one
 - e. and a DTT Cable Kit.

6.2.3.3 DTH-ROTL/DTT Provisioning Questionnaire

The following questions are required to drive hardware provisioning:

1. DTH-ROTL Required (y/n)

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2. DTH-DTT Required (y/n)
3. DTH-ROTL/DTT Required (y/n)
4. Select DTH-ROTL vintage to be upgraded to ROTL/DTT:
 - a. NT7F20AA (enter Y/N) ____
 - b. NT7F18AA (enter Y/N) ____
 - c. NT7F18AB (enter Y/N) ____
 - d. NT7F18AD (enter Y/N) ____
5. How many outgoing trunks are to be tested Nightly (N_OG)
6. How many Incoming Trunks are to be tested Nightly (N_IT)
7. How many Incoming trunk Routes are to be tested on Nightly (N_IR)
8. How many hours per night will routining be run (H)
9. Provide 1 VDU Dedicated to the DTH Shelf (enter Y/N)
10. Protected AC Required For Modem And PAD Units (enter Y/N)

The following parameters are used in the calculations below:

PARAMETER DESCRIPTION

H	The length of time in hours that the DTH is to perform routine trunk testing on a nightly basis.
N_DS0	The Number of DS-0 Handler Circuit Packs
N_DS1	The Number of DS-1 Circuit Packs
N_FF	The Number of single slot Filler Face Plates
N_IT	The Number of Incoming Trunks on the switch where the DTH-DTT is located.
N_IR	The Number of Incoming Routes on the switch where the DTH-DTT is located.
N_OG	The Number of OutGoing trunks on the switch where the DTH-DTT is located.
N_TAP	The Number of Test Access Paths (TAP) on the switch where the DTH-DTT is located.
N_TL	The Number of 108 Test Lines on the switch where the DTH-DTT is located required to support the number of Incoming and Outgoing trunks to be routined.
N_VF	The Number of VF interface CPs required.

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6.2.3.4 DTH-ROTL/DTT Provisioning Calculations

The formulae below is based on the following assumptions:

- All interoffice trunks are tested over 24 nights per month.
- Individual BERTs are equal to or less than 5 minutes.
- For switches not conforming to the above assumption contact Systems Engineering for provisioning requirements.

The naming convention of calculations variables expressed in this section are derived as follows:

If Quantity of 2.4.3.Q1 = Y, THEN ROTL = NT7F18AD Where 2.4.3. = section number, Q of Q1 = Question, and 1 = of Q1 = the first question in the section (1.).

The following calculations are required to provision the DTH-ROTL, DTH-DTT, or DTH-ROTL/DTT:

1. Calculate the number of Test Access Paths (TAP) required, using the formula: $N\_TAP = N\_OG / (192 * H)$, as follows:

$$N\_TAP = 2.4.3.Q5 / (192 * 2.4.3.Q8)$$

2. Calculate the number of 108 Test Lines (TL) required, using the formula - $N\_TL = N\_IT / (83.5 * H)$ or N_IR . Select the greater of: the number of Incoming Trunks or the number of Incoming Routes.

$$N\_TL = 2.4.3.Q6 / (83.5 * 2.4.3.Q8) \text{ or}$$

$$N\_TL = 2.4.3.Q7$$

Always round up to the next higher integer value.

3. Calculate the number of DS-0 CPs required.

- a. If 2.4.3.Q2 = Y; Then:

$$N\_DS0 = ((N\_TAP + N\_TL) / 4 \text{ (round up)}) - 1$$

** Note: One DS0 is always provided w/NT7F18BA **

- b. If 2.4.3.Q3 = Y; Then:

$$N\_DS0 = ((N\_TAP + N\_TL) / 4 \text{ (round up)}) - 2$$

** Note: Two DS0s are always provided w/NT7F18CA **

- c. If 2.4.3.Q4a, b, or c = Y; Then:

$$N\_DS0 = ((N\_TAP + N\_TL) / 4 \text{ (round up)}) - 2; \text{ the QTY Up-grade Kits } NT7F38AB = QTY\_EXISTING\_NT7F20AA/18AA, \text{ OR } 18AB$$

** Note: One DS0 is AP in NT7F38AB; Plus 1 in NT7F18AA/AB/20AA **

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- d. If 2.4.3.Q4d = Y; Then:

$$N\_DS0 = ((N\_TAP + N\_TL) / 4 \text{ (round up)}) - 2;$$
the QTY OF Upgrade Kits NT7F38BA = QTY_OF_NT7F18AD

** Note: One DS0 is AP in NT7F38BA; Plus 1 in NT7F18AD **
4. Calculate the quantity of DTH shelves required.
 - a. If 2.4.3.Q2 = Y; THEN NT7F18BA = 2.4.4.3a / 5 (Round Up),
or
 - b. If 2.4.3.Q3 = Y: THEN NT7F18CA = 2.4.4.3b / 4 (Round Up),
or
 - c. If 2.4.3.Q4a, b, or c = Y; THEN NT7F18CA = 2.4.4.3c / 4
(Round Up) Minus (QTY_OF_EXISTING NT7F20AA, NT7F18AA, OR
NT7F18AB)
 - d. If 2.4.3.Q4d = Y; THEN NT7F18CA = 2.4.4.3c / 4 (Round Up)
Minus (QTY_OF_EXISTING NT7F18AD)
5. Calculate the number of single slot filler face plates re-
quired
 - a. NT7F30AA = (5 * 2.4.4.4a) - 2.4.4.3a) OR
 - b. NT7F30AA = (4 * 2.4.4.4b) - 2.4.4.3b) OR
 - c. NT7F30AA = (4 * 2.4.4.4c) - 2.4.4.3c) OR
 - d. NT7F30AA = (4 * 2.4.4.4d) - 2.4.4.3d)
6. Calculate The ROTL Required.

If Q2.4.3.Q1 = Y; Provide 1 NT7F18AD, and 1 NT7F19AC
7. Calculate The VDU Required.

If Q2.4.3.Q9 = Y; Provide 1 one VDU from the list below:

 - a. C1007A - Amber Video Display Unit
 - b. C1007G - Green Video Display Unit
 - c. C1007W - White Video Display Unit
8. Calculate Protected AC Required.

If Q2.4.3.Q10 = Y; Provide 1 LaMarche Inverter
9. Calculate Always Required DTT or ROTL/DTT Equipment.

If Q2.4.3.Q2, Q3, or Q4a, b, c, or d = Y; THEN one each of the
following PECs are required per the Calculation 2.4.4.4a, b,
c, or d:

 - a. NT3X25AA (CES)
 - b. 64565074 (modem)
 - c. DTT Cabling Required in the Quantities Specified below per
DTH Shelf; Where the DTH Shelf quantity is specified in
Calculation 2.4.4.d1, 2, 3 or 4:

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- 1) 1 NT7F33AA (DS-1 Cable) - Note: NT7F33AA Replaces NT7F27AA.
- 2) 2 NT7F27DB Cables if DTT mounted in frame different from Modem, or
- 3) 1 NT7F27DA if DTT mounted in same frame.

d. DTH SPARES KITs Provide 1 per office as follows:

- 1) NT7F19AC - 1 per Office Equipped With NT7F18BA
- 2) NT7F19AC - 1 per Office Equipped With NT7F18CA
- 3) NT7F19AC - 1 per Office Equipped With NT7F38AB

6.2.4 Office Layout Information

Not Applicable

6.2.5 Traffic Tables

Not Applicable

6.3 Product/System Specification

6.3.1 Physical Characteristics

6.3.1.1 Digital Test Head (DTH) ROTL

Input Voltage.....-43 To 56VDC
Power Consumption.....215 To 280 watts
Current Drain.....5 Amps
Fusing Requirements.....10A Fuse At PDC or FSP

MECHANICAL DIMENSIONS

Height	14"	Width	23"
Weight	50lbs	Depth	13"

6.3.2 EMI/Earthquake Information

Not Applicable

6.3.3 Sparing Information

Provide the Digital Test Head (DTH) with the following spares as follows:

PEC SPARES KIT REQUIRED

NT7F20AA NT7F19AA - DTH-ROTL SPARES KIT

NT7F18AA NT7F19AA - DTH-ROTL SPARES KIT

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NT7F18AB NT7F19AB - DTH-ROTL SPARES KIT

NT7F18AD NT7F19AC - DTH-ROTL SPARES KIT

NT7F18BA NT7F19BA - DTH-ROTL SPARES KIT

NT7F18CA NT7F19CA - DTH-ROTL SPARES KIT

6.3.4 Power Feed and Fusing Requirements

When the DTH is mounted in the MIS frame, the DTH is fused from the MIS FSP or PDC at 10 amps. When the DTH is mounted in the CMIS cabinet, the DTH is fused at the CMIS FSP at 10 amps.

6.3.5 Current Drain Information

The DTH shelf configurations NT7F18AA/AB/AD/BA/CA utilizes 5 amps.

6.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

6.4.1 Required Software Packages and Interdependencies

The NTX052AB (Remote Office Test Line) software feature is always required to support the ROTL/105TL function. This feature requires the following features as a prerequisite:

NTX000AA - BILGE
NTX001AA - Common Basic
NTX143AA - DS-1 ESF

6.4.2 Software Usage Restrictions

Not Applicable

6.4.3 Memory Provisioning

Not Applicable

6.5 Real Time Impact

Not Applicable

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7.0 ECM522 - DMS-100 Standard DF Terminal Blocks

7.1 Overview

This document defines the Distributing Frame Terminal Blocks (DFTB) provisionable from the RTP approved sources (i.e. Northern Telecom Outside Plant Division (OPD) and Telzon) and relates those products to specific applications.

7.2 Hardware Provisioning

7.2.1 Hardware Usage Restrictions

A Connectorized Terminal Block (CTB) 8X32 can only be used for Line and Trunk Module 8-Wire (TM8) applications. Non-connectorized Terminal Block 8x32 can be used for Line, Trunk Module 8-Wire (TM8) and Miscellaneous applications.

NOTE: The QBB66QP096SG336 and QBB66QP8X32G437 are provisionable in the Canadian market only and their wiring patterns are incompatible with the US wiring patterns for lines.

7.2.2 Hardware Dependencies

Not Applicable

7.2.2.1 P and C Side Port Requirements

Not Applicable

7.2.2.2 DMS BUS Port Requirements

Not Applicable

7.2.2.3 Circuits Per Card

Not Applicable

7.2.2.4 Discrimination Numbering

Not Applicable

7.2.3 Provisioning Considerations

Distribution frame terminal blocks are intended for use as a terminating device on Central Office or PBX distributing frames. A Terminal Block (TB) has two terminating sides, the Equipment Side (Termination of DMS-100 equipment) and the Cross Connect Side (Termination of incoming lines, trunks and miscellaneous circuits).

7.2.3.1 EQUIPMENT SIDE TERMINATION TYPE

Terminations on the Equipment Side can be made by using terminal pins (NON-CONNECTORIZED) or interlocking connectors (CONNECTORIZED). Connectorized Terminal Blocks (CTB) can be used with Northern Telecom's DMS-100 connectorized cables for quick installation. Customers have realized a full 75 to 95% reduction in installation labor costs. It should be noted CTB's are used for lines and trunks (TM8) applications only.

7.2.3.2 CROSS CONNECT TERMINATION TYPE

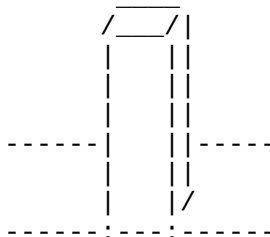
Terminations on the Cross Connect Side are made by using only terminal pins.

7.2.3.3 TERMINAL PIN TYPE

There are (3) terminal pin types : Single Post Wire-Wrap (SP), Bifurcated Wire-Wrap (BIF) and Insulation Displacement Bifurcated (IDV) also called Quick Connect (QC).

SINGLE POST WIRE-WRAP terminal pin is rectangular in shape and extends from the face of the terminal field for connection of 22 to 26 AWG wire.

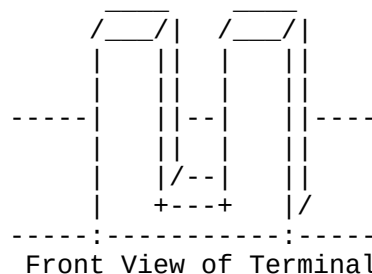
Single Post Wire-Wrap



Front View of Terminal

BIFURCATED WIRE-WRAP terminal pin is "U" in shape and extends from the face of the terminal field for convenient connection of 22 to 26 AWG wire.

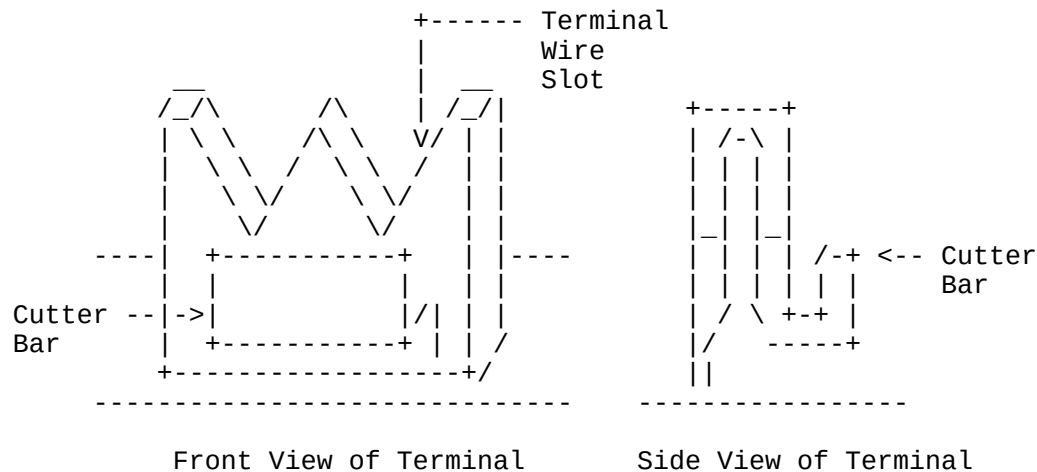
Bifurcated Wire-Wrap



INSULATION DISPLACEMENT BIFURCATED (IDV) OR QUICK CONNECT

(QC) terminal pin is "W" in shape. Although this terminal is ordered less than 6% of the time it automatically strips, terminates, and cuts to length the wire applied to it. When a wire is inserted into the termination slot, the insulation is displaced and the exposed conductor is wedged into an electrical connection with the terminal. Simultaneously, the strain relief connection is made and the cutter bar shears the wire to the correct length. IDV or QC terminals can be used with 22 or 24 AWG wire.

QUICK CONNECT



7.2.3.4 CONNECTOR TYPE

Up to four interlocking 32 pair TRW or AMP male (plug) ribbon connectors are telephone industry standard offerings on both OPD and TELZON 8X32

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CTB's. The male (plug) connectors are designed to engage spring clips on female (receptacle) connectors (standard on Northern Telecom's connectorized line cables). These connectors may be disconnected by using a pointed object and depressing the metal spring of the connector and pulling them apart on at least one end. This latching arrangement eliminates the need for additional locking hardware and safeguards against accidental uncoupling.

Each connector is wired for 32 circuits. When used with Line equipment, one connector represents one Line Sub Group (LSG) or one half of a Line Drawer. A standard CTB with four (4) connectors will then terminate four (4) LSG's or two (2) Line Drawers.

For Trunk Module 8-Wire (TM8) equipment, one connector represents 4 of 16 wires required for each card slot on a TM8 shelf. A standard CTB with four connectors will then terminate all 16 wires required for each card slot for a total of 240 wires for 15 slots per shelf.

7.2.3.5 QUANTITY OF TERMINAL BLOCKS

The quantity of Terminal Blocks (TB) for an office (D) is determined by the sum of blocks required for Trunk Cards (A), Lines (B) and Miscellaneous (C): $(A + B + C) = (D)$.

7.2.3.6 QUANTITY OF TERMINAL BLOCKS FOR TRUNK CARDS

An estimate of required terminal blocks for Trunk Cards mounted in Maintenance Trunk Module (MTM) Shelves and/or Remote Maintenance Module (RMM) can be made by using the TRUNK CARD PIN ROW REQUIREMENT CALCULATION TABLES.

Enter the Quantity of Trunk Cards mounted in MTM and/or RMM shelves which require MDF terminations in column (A).

Select the Block Type Ordered in column (B) (6X, 8X, or 1 X .etc). The numbers in the columns represent the Pin Rows required for each card type per the Contract Drafting Department 3424.

Determine the Total Number of Pin Rows Required for Cards and/or Modules in column (C) by multiplying the Quantity of Trunk Cards and/or Modules in column (A) by the number of Pin Rows required in column (B): $(A \times B) = C$.

Determine the Total Number of Pin Rows Required for all Trunk Cards and/or Modules (D) by adding the Total Number of Pin Rows Required for each card type and/or Modules together in column (C).

TRUNK CARD	(A) QTY OF CARDS	(B) NUMBER OF PIN ROWS REQUIRED FOR EACH CARD BASED ON BLOCK TYPE			(C) (A)X(B)= (C) TOTAL NUMBER OF PIN ROWS REQUIRED
		6X	8X	10X	
NT0X10AA		5	4	4	
NT1X54AA		2	1	1	
NT2X01AA		4	4	4	
NT2X10AB		1	1	1	
NT2X10AC		1	1	1	
NT2X10BA		1	1	1	
NT2X57AA		5	4	4	
NT2X57AB		5	4	4	
NT2X66AA		1	1	1	
NT2X67AA		1	1	1	
NT2X72AA		2	2	2	
NT2X72AB		3	2	2	
NT2X81AA		2	2	2	
NT2X81AB		2	2	2	
NT2X82AA		1	1	1	
NT2X83AA		1	1	1	
NT2X88AA		4	2	2	
NT2X90AD		2	2	2	
NT2X92AA		1	1	1	
NT2X98AA		2	1	1	
NT2X98AB		1	1	1	
NT3X05AA		1	1	1	
NT3X09AA		13	12	12	SEE NOTE
NT3X09BA		13	12	12	SEE NOTE
NT5X03AA		3	2	2	
NT5X04AA		2	2	2	
NT5X06AA		2	2	2	
NT5X30AA		1	1	1	
TOTAL NUMBER OF PIN ROWS REQUIRED FOR CARDS (D) -----					

NOTE : Provide at least 1 Dedicated Block for NT3X09AA/BA cards.
The result should be rounded up to the next whole number.

Figure 7. Trunk Card Pin Row Requirement Calculation Table for Detail Engineering

(A)		(B)			(C)
TRUNK CARDS OR MODULAR	QTY OF UNITS	NUMBER OF PIN ROWS REQUIRED FOR EACH			(A)X(B)= (C) TOTAL NUMBER OF PIN ROWS REQUIRED
		CARD BASED ON			
		BLOCK TYPE			
		6X	8X	10X	
ST PAGE TOTALS					
NTZZ12BA		29	25	25	SEE NOTE
NTZZ12FA		36	31	31	SEE NOTE
NTZZ16AA		20	17	17	SEE NOTE
NTZZ16AB		20	17	17	SEE NOTE
NTZZ16BA		39	33	33	SEE NOTE
NTZZ06DA		1	1	1	
NTZZ06EA		1	1	1	

TOTAL NUMBER OF PIN
ROWS REQUIRED FOR
ALL ITEMS (D)

NOTE Provide at least 1 Dedicated Block for NT3X09AA/BA cards which are part of the stock list for these part numbers. The result should be rounded up to the next whole number.

Figure 8. Trunk Card Pin Row Requirement Calculation Table for Building Block Engineering

Determine the Number of Pin Rows on the Type of Block Ordered
(E) (See Example below)

Example:

Terminal Block

Number of Pin
Rows on Block

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8 X 32	32
10 X 30	30

Terminal Blocks for Trunk Cards and Modules (F) can be determined by using the formula below:

Total Number of Pin Rows Required for Trunk Cards and/or Modules (D)	Terminal Blocks for Trunk Cards and/or Modules (F)
-----	====
Number of Pin Rows on the Type of Block Ordered (E)	

The result of the formula should be rounded up to the next whole number.

7.2.3.7 QUANTITY OF TERMINAL BLOCKS FOR LINES

An estimate of required terminal blocks for Lines (LSG'S) can be made by using the Line Sub Group Per Block Calculation Table on Figure 9.

	(A) TERMINAL BLOCK TYPE			
	8X24	8X30	8X32	10X30
QUANTITY OF LSG'S PER BLOCK TYPE	3	3	4	4

Figure 9. Line Sub Group Per Block Calculation Table

--- Select the Block Type Ordered in column (A). The numbers in the columns represent the quantity of LSG'S which can be terminated on one block per the Contract Drafting Department 3424.

--- Determine the Total Number of Line Sub Groups required for a Detail Engineered office by multiplying the Total Number of Line Draws (NT6X05AA or NTB32BA) ordered by (2):

+	+	
Required number of		
NT6X05AA or NTB32BA	X 2	==== Total Number of
+	+	Line Sub Groups

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--- Determine the Total Number of Line Sub Groups required for a Building Block Engineered office by the following table:

BUILDING BLOCK PART NUMBER		NUMBER OF LSG'S
LCM NTZZ08BA		20
ISDN 2B1Q LCM NTZZ17HA		16

Figure 10. Number of Line Sub Groups for Building Block PECs

--- Terminal Blocks for Lines can be determined by using the formulas below:

$$\frac{\text{Total Number of Line Sub Group requirement for office}}{\text{Number of Line Sub Groups per Block Type Ordered}} = \text{Terminal Blocks For Lines}$$

The result of the formula should be rounded up to the next whole number.

7.2.3.8 QUANTITY OF TERMINAL BLOCKS FOR MISCELLANEOUS

An estimate of required terminal blocks for Miscellaneous items can be made by using the MISCELLANEOUS PIN ROW REQUIREMENT CALCULATION TABLES.

--- Enter the Quantity of Miscellaneous items which require MDF terminations in column (A).

--- Select the Block Type Ordered in column (B) (6X, 8X, or 1 X .etc). The numbers in the columns represent the Pin Rows required for each item type per the Contract Drafting Department 3424.

--- Determine the Total Number of Pin Rows Required for each item type in column (C) by multiplying the Quantity of Items in column (A) by the number of Pin Rows required in column (B): $(A \times B) = C$.

--- Determine the Total Number of Pin Rows Required for all Miscellaneous Items (D) by adding the Total Number of Pin Rows Required for each item type together in column (C).

MISCELLANEOUS ITEM	(A) QTY OF ITEMS	(B) NUMBER OF PIN ROWS REQUIRED FOR EACH ITEM BASED ON BLOCK TYPE			(C) (A)X(B)= (C) TOTAL NUMBER OF PIN ROWS REQUIRED
		6X	8X	10X	
TM8 SH. NT2X52AK	1	-	30	30	SEE NOTE BELOW
NTZZ06RB	1	-	30	30	SEE NOTE BELOW
EXIT ALARM PANEL NT0X64AA		-	5	5	
AXU ALARM NT3X89AA		-	15	15	
DATA SHELF NT4X25BH		-	12	12	
NT4X25DH		-	12	12	
NTZZ24BA		-	12	12	
BSAC NT4X09BA		6	5	5	
HIGH TONE GEN. NT5X52AA		1	1	1	
BD TO BD TEST UNIT NT5X73AA		-	8	6	
NT5X73AB		-	8	6	
UNIV. CAMA CKT. NT5X74AA		2	1	1	
AUX CAMA CKT. NT5X75AA		2	2	2	
NT5X75AB		2	2	2	
BOARD TO BOARD TEST NT5X79AA		2	2	2	
ABBT APPLIQUE SP1 NT5X88AA		1	1	1	
COM AUDIBLE ALARM PANEL NT5X92AA		1	1	1	
ALARM EXTENSION PANEL NT5X92AB		9	7	7	
COIN STATION LINE APPLIQUE NT5X93AA		2	2	2	
DTH ROTL NT7F18AB		-	15	15	

TOTAL NUMBER OF PIN ROWS
REQUIRED FOR ITEMS
PAGE TOTALS (D)

Continued.....

--- Note: Provide at least (1) Dedicated Block for Trunk Modules. The result should be rounded up to the next whole number.

MISCELLANEOUS PIN ROW REQUIREMENT CALCULATION TABLE (Continued)

MISCELLANEOUS ITEM	(A) QTY OF ITEMS	(B) NUMBER OF PIN ROWS REQUIRED FOR EACH ITEM BASED ON BLOCK TYPE			(C) (A)X(B)= (C) TOTAL NUMBER OF PIN ROWS REQUIRED
		6X	8X	10X	
ST PAGE TOTALS					
COOK DRA					
-CH. NT7M00CC		2	2	2	
NT7M00CR		2	2	2	
NT7M00DB		2	2	2	
NT7M00DC		2	2	2	
COOK DRA					
4-CH. NT7M25CV		5	5	5	
NT7M25DG		5	5	5	
NT7M25DH		5	5	5	
NT7M25DN		5	5	5	
NT7M25DP		5	5	5	
NT7M25EA		5	5	5	
NT7M25EB		5	5	5	
NT7M25FM		5	5	5	
COOK DPP UNIT					
NT8X48AD		1	1	1	
NTZZ09LA		1	1	1	
NTZZ32CA		1	1	1	
NTZZ32DA		1	1	1	
COOK BMC					
REDUNDANT UNIT					
NT8M04AA		1	1	1	
NT8M04BA		1	1	1	
NT8M04CA		1	1	1	
NT8M04AC		1	1	1	
NT8M04BC		1	1	1	
NT8M04CC		1	1	1	
NT8M04AD		1	1	1	
NT8M04BD		1	1	1	
NT8M04CD		1	1	1	

TOTAL NUMBER OF PIN ROWS
REQUIRED FOR ITEMS
PAGE TOTALS (D)

Continued.....

MISCELLANEOUS PIN ROW REQUIREMENT CALCULATION TABLE (Continued)

MISCELLANEOUS ITEM	(A) QTY OF ITEMS	(B) NUMBER OF PIN ROWS REQUIRED FOR EACH ITEM BASED ON BLOCK TYPE			(C) (A)X(B)= (C) TOTAL NUMBER OF PIN ROWS REQUIRED
		6X	8X	10X	
ST PAGE TOTALS					
COOK BMC REDUNDANT UNIT					
NT8M04AE		1	1	1	
NT8M04BE		1	1	1	
NT8M04CE		1	1	1	
NT8M04DE		1	1	1	
NT8M04AF		1	1	1	
NT8M04BF		1	1	1	
REDUNDANT UNIT					
COOK DRA					
NT8M04CF		1	1	1	
NT8M04AJ		1	1	1	
NT8M04BJ		1	1	1	
NT8M04CJ		1	1	1	
COOK BMC DEUCE					
NT8M04AG		3	2	2	
NT8M04BG		3	2	2	
LIU DS0A NT9X78AA		2	1	1	9X78AA is MD, use BA
LIU DS0A NT9X78BA		2	1	1	
NTZZ11BA		2	1	1	
NTZZ30BA		2	1	1	
NTZZ11DA		2	1	1	
NTZZ30DA		2	1	1	
LIU V.35 NT9X77AA		3	2	2	
NTZZ11DA		3	2	2	
NTZZ30DA		3	2	2	
DIX ETHERNET					
NT9X85AA		2	1	1	
AT&T DAS UNIT					
TELCO PROVIDED					
1-J1P056A-1_l3		10	7	7	
TOTAL NUMBER OF PIN ROWS REQUIRED FOR ALL ITEMS (D)					

Continued.....

MISCELLANEOUS PIN ROW REQUIREMENT CALCULATION TABLE (Continued)

MISCELLANEOUS ITEM	(A) QTY OF ITEMS	(B) NUMBER OF PIN ROWS REQUIRED FOR EACH ITEM BASED ON BLOCK TYPE			(C) (A)X(B)= (C) TOTAL NUMBER OF PIN ROWS REQUIRED
		6X	8X	10X	
RD PAGE TOTALS					
UDS RM16M SHELF					
62005220	1	-	30	30	SEE NOTE BELOW
UDS STANDALONE					
08 61035119		1	1	1	
01BC/AS 62015186		1	1	1	
02S/D 62025199		1	1	1	
02S/T 62025201		1	1	1	
02T/R 62025232		1	1	1	
08A/B 62085064		1	1	1	
12 62245030		1	1	1	
12A 62125069		1	1	1	
T212AL1A/2					
62125068		1	1	1	
9.2K 64565005		1	1	1	
56K 61035119		1	1	1	
CASE/DATATEL 4200					
MODEM SHELF					
DC 905-5222-003	1	-	32	32	SEE NOTE BELOW
AC 905-5222-001	1	-	32	32	SEE NOTE BELOW
CASE STANDALONE					
4201 905-5220-001		1	1	1	
4202 905-5185-001		1	1	1	
4208 905-5227-001		1	1	1	
4212 905-5223-001		1	1	1	
4222 905-5230-011		1	1	1	
4229 905-5224-001		2	2	2	
4296 905-5191-001		1	1	1	
TOTAL NUMBER OF PIN ROWS REQUIRED FOR ALL ITEMS (D)					

--- Note: Provide (1) Dedicated Block for each
modem shelf.

Continued.....

MISCELLANEOUS PIN ROW REQUIREMENT CALCULATION TABLE (Continued)

MISCELLANEOUS ITEM	(A) QTY OF ITEMS	(B) NUMBER OF PIN ROWS REQUIRED FOR EACH ITEM BASED ON BLOCK TYPE			(C) (A)X(B)= (C) TOTAL NUMBER OF PIN ROWS REQUIRED
		6X	8X	10X	
4TH PAGE TOTALS					
703-03 LOCAL TEST CABINET					
4-TRK NT0J62BA		4	3	3	
4-TRK NT0J63BA		4	3	3	
6-TRK NT0J64BA		16	8	8	
DRTU I/F NT0J04ED		2	1	1	
DRTU NT0J04EA		2	1	1	
NT0J04EB		2	1	1	
MLT NT3J00BA		-	20	20	
TOPS MP NTNX57AC	1	-	32	32	SEE NOTE BELOW
TOPS MP NTNX60AA	1	-	32	32	SEE NOTE BELOW
FR RELAY T1 NTEX30AA		4	4	4	
LIU ALARM NT4G46BK		6	5	5	
LIU 4110 NT4G46CA		1	1	1	
TOPS MPX NTNX5103	1	-	30	30	SEE NOTE BELOW
VSN MODEMS NT1M41BA		-	9	9	
NORSTAR KEY SYS. NTZX18AB	1	-	32	32	SEE NOTE BELOW
TELLABS 292 SYS. 292BR-1		-	20	20	
NTZZ18FA		-	20	20	
292DR		-	12	12	
NTZX18GA		-	12	12	
8108		1	1	1	
TOTAL NUMBER OF PIN ROWS REQUIRED FOR ALL ITEMS (D)					

--- Note: Provide (1) Dedicated Block for each
unit.

Continued...

MISCELLANEOUS PIN ROW REQUIREMENT CALCULATION TABLE (Continued)

MISCELLANEOUS ITEM	(A) QTY OF ITEMS	(B) NUMBER OF PIN ROWS REQUIRED FOR EACH ITEM BASED ON BLOCK TYPE			(C) (A)X(B)= (C) TOTAL NUMBER OF PIN ROWS REQUIRED
		6X	8X	10X	
5TH PAGE TOTALS					
A2 KEY SYSTEM					
TCS1800AA-1L1		-	12	12	
NTZZ14GA		-	12	12	
TELTREND SHELF					
TELCO PROVIDE					
USD23-120		-	12	12	
IAU EMULATOR					
TELCO PROVIDE					
2216		4	6	6	
MINI-RESPONDER					
1056A		2	1	1	
4-WIRE MINI-					
RESPONDER 1056B		2	2	2	
UNIV. DATA CON-					
VERTER 8448		1	1	1	
TERMINAL BLOCK					
NT3X25BA	1	-	32	32	SEE NOTE BELOW
TOTAL NUMBER OF PIN ROWS REQUIRED FOR ALL ITEMS (D)					

--- Note: Provide (1) Dedicated Block for each unit.

Figure 11. Miscellaneous Pin Row Requirement Calculation Table for Detail and Building Block Engineering

--- Determine the Number of Pin Rows on the Type of Block Ordered (E) (See example in "QUANTITY OF TERMINAL BLOCKS FOR TRUNK CARDS" on page 17-46).

--- Terminal Blocks for Miscellaneous Items (F) can be determined by using the formula below:

Total Number of Pin Rows Required for all Miscellaneous Items (D)	Terminal Blocks for Miscellaneous
-----	====

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Number of Pin Rows on the Type of Items (F)
Block Ordered (E)

The result of the formula should be rounded up to the next whole number.

7.2.3.9 QTY. OF TERMINAL BLOCKS FOR PRISM SYSTEMS RTU/DRTU

The Prism Systems RTU/DRTU are used with CALRS (Centralized Automated Loop Reporting System). For each RTU (4- or 16-trunk) or DRTU, provide one NE66QC100 Terminal Block (RTUs are located at the Host Switch; DRTUs are located at the Remote).

7.2.4 PIN CONFIGURATION FOR CONNECTORIZED TERMINAL BLOCKS

Approved sources for connectorized terminal blocks offer four (4) standard telephone pin configurations. Each pin configuration has a specific application for Trunks (TM8) and or Line circuits only.

Figure 12 on page 17-58 thru Figure 17 on page 17-64 show each configuration's unique pin layout, circuit and connector number growth patterns. Figure 12 on page 17-58 thru Figure 17 on page 17-64 can be used for line circuit applications and Figure 16 on page 17-63 and Figure 17 on page 17-64 are only to be used for Trunk (TM8) applications.

7.2.4.1 LINE CIRCUIT APPLICATIONS

For line application the circuits for each connector are numbered (00)-(31) representing 32 line circuits. Circuit number growth patterns can be Top to Bottom (See Figure 12 on page 17-58) or Bottom to Top (See Figure 13 on page 17-59) with all patterns growing Left to Right (See Figure 12 on page 17-58 to Figure 15 on page 17-61).

Connectors and Line Sub Groups (LSG) can be grouped horizontally in rows (See Figure 14 on page 17-60 & Figure 15 on page 17-61), with a growth pattern Bottom to Top (See Figure 14 on page 17-60) or Top to Bottom (See Figure 15 on page 17-61). Also, they can be grouped vertically in columns, with a growth pattern Left to Right (See Figure 12 on page 17-58 and Figure 13 on page 17-59).

The Ring and Tip configuration for each CTB is unique to the internal wiring and can not be changed. Configurations can be Ring below Tip (See Figure 12 on page 17-58 and Figure 15 on page 17-61) or Ring above Tip (See Figure 13 on page 17-59 and Figure 14 on page 17-60).

LINE APPLICATION (LSG) BLOCK LAYOUT A

Provision OPD or Telzon CTBs with a block layout as per Figure 12 for Lines. Note: Ring below Tip pin pattern, with Line Sub Group (LSG) growth is form Left to Right and Top to Bottom Circuit number growth.

Block Pin Row numbers for 8X32 CTB											
1	-	8	9	-	16	17	-	24	25	-	32
T 0			T 00			T 00			T 00		
R			R			R			R		
T 1			T 01			T 01			T 01		
R			R			R			R		
T 2			T 02			T 02			T 02		
R			R			R			R		
T 3		T 31	T 03		T 31	T 03		T 31	T 03		T 31
R		R	R		R	R		R	R		R
CONNECTOR A LSG AA			CONNECTOR B LSG BB			CONNECTOR C LSG CC			CONNECTOR D LSG DD		

Figure 12. Line Application (LSG) - Block Layout A

LINE APPLICATION BLOCK LAYOUT B

Provision OPD or Telzon CTBs with a block layout as per Figure 13 for Lines. Note: Ring above Tip pin pattern, with Line Sub Group (LSG) growth is form Left to Right and Bottom to Top Circuit number growth.

Block Pin Row numbers for 8X32 CTB											
1	-	8	9	-	16	17	-	24	25	-	32
R		R	R		R	R		R	R		R
T		T	T		T	T		T	T		T
3		31	03		31	03		31	03		31
R			R			R			R		
T			T			T			T		
2			02			02			02		
R			R			R			R		
T			T			T			T		
1			01			01			01		
R			R			R			R		
T			T			T			T		
0			00			00			00		
CONNECTOR			CONNECTOR			CONNECTOR			CONNECTOR		
A			B			C			D		
LSG AA			LSG BB			LSG CC			LSG DD		

Figure 13. Line Application (LSG) - Block Layout B

LINE APPLICATION BLOCK LAYOUT C

Provision OPD or Telzon CTBs with a block layout as per Figure 14 for Lines. Note: Ring above Tip pin pattern, with Line Sub Group (LSG) growth is form Bottom to Top and Left to Right Circuit number growth.

		Block Pin Row numbers for 8X32 CTB											
		1	-	-	-	-	16	-	-	-	-	-	32
CONNECTOR D		R					R						R
	LSG DD	T 00					T 15						T 31
CONNECTOR C		R					R						R
	LSG CC	T 00					T 15						T 31
CONNECTOR B		R					R						R
	LSG BB	T 00					T 15						T 31
CONNECTOR A		R					R						R
	LSG AA	T 00					T 15						T 31

Figure 14. Line Application (LSG)-Block Layout C

LINE APPLICATION BLOCK LAYOUT D

Provision OPD or Telzon CTBs with a block layout as per Figure 15 for Lines. Note: Ring below Tip pin pattern, with Line Sub Group (LSG) growth is form Top to Bottom and Left to Right Circuit number growth.

		Block Pin Row numbers for 8X32 CTB											
		1	-	-	-	-	16	-	-	-	-	-	32
CONNECTOR A	T						T						T
	00						15						31
LSG AA	R						R						R
CONNECTOR B	T						T						T
	00						15						31
LSG BB	R						R						R
CONNECTOR C	T						T						T
	00						15						31
LSG CC	R						R						R
CONNECTOR D	T						T						T
	00						15						31
LSG DD	R						R						R

Figure 15. Line Application (LSG) - Block Layout D

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7.2.4.2 TRUNK (TM8) APPLICATIONS

For Trunk application the circuits for each connector are number (00)-(29) representing 30 circuits. Circuit number growth pattern will always be Left to Right.

Connectors for Trunks are grouped horizontally in rows, with a growth pattern Top to Bottom (See Figure 17 on page 17-64) or Bottom to Top (See Figure 16 on page 17-63).

The Ring and Tip Configuration for Trunks can be Ring below Tip (See Figure 17 on page 17-64) or Ring above Tip (See Figure 16 on page 17-63).

TRUNK (TM8) APPLICATION - (GROWTH BOTTOM TO TOP)

Provision OPD or Telzon CTBs with a block layout as per Figure 16 on page 17-63 for TME's. Note: Ring above Tip pin pattern, with Connector number growth is from Bottom to Top and Left to Right Circuit number growth.

		Block Pin Row numbers for 8X32 CTB											
		1	-	-	-	-	-	-	-	-	30	31	32
CONNECTOR D		-/ MB									-/ MB		
		-/ MA									-/ MA		
CONNECTOR C		M/ EB									M/ EB		
		E/ EA									E/ EA		
CONNECTOR B		R1									R1		
		T1									T1		
CONNECTOR A		R									R		
		T 00									T 29		

Figure 16. Trunk TM8 Application -(Bottom to Top Growth)

TRUNK (TM8) APPLICATION (GROWTH TOP TO BOTTOM)

Provision OPD or Telzon CTBs with a block layout as per Figure 17 for TM8'S. Note: Ring below Tip pin pattern, with Connector number growth is from Top to Bottom and Left to Right Circuit number growth.

		Block Pin Row numbers for 8X32 CTB												
		1	-	-	-	-	-	-	-	-	30	31	32	
CONNECTOR A	T										T			
	00										29			
	R										R			
CONNECTOR B	T1										T1			
	R1										R1			
CONNECTOR C	E/ EA										E/ EA			
	M/ EB										M/ EB			
CONNECTOR D	-/ MA										-/ MA			
	-/ MB										-/ MB			

Figure 17. Trunk TM8 Application (Top to Bottom Growth)

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7.2.5 PIN CONFIGURATION FOR NON-CONNECTORIZED TERMINAL BLOCKS

Approved sources for Non-Connectorized Terminal Blocks (Non-CTB'S) offer many standard terminal pair configurations. A Non-CTB has no pin configuration restrictions like the CTB.

These blocks are generally used for terminating miscellaneous circuits; however, the connectorized 8X32 layout (Figure 11 on page 17-56 thru Figure 17 on page 17-64). Lines and Trunks may be provisioned in conjunction with this block.

7.2.6 ORDERING TABLE FOR APPROVED BLOCKS

The following tables have been designed to define block ordering options for each vendor's blocks.

<i>COLUMN HEADING</i>	<i>DESCRIPTION</i>
PEC	Vendors manufacturers part number.
BLOCK SIZE	Terminal pin field array.
EQT. SIDE	Equipment Side, Block side which DMS-100 Equipment is terminated. Terminations can be made by 32 pair male connectors (CONN), Bifurcated Wire Wrap pins (BIF) or Single Post Wire Wrap pins (SP).
X-CON SIDE	Cross Connect Side, Block side which incoming circuits to the office are terminated. Terminations can be made by Bifurcated Wire Wrap pins (BIF), Single Post Wire Wrap pins (SP) or Quick Connect Wire Wrap pins (QC) only applicable for Telzon Blocks.
FUNCTION	Block application termination functions. Line Sub Group terminations (LINES), Trunk Module terminations (TRUNKS) and Miscellaneous terminations (MISC).

<i>COLUMN HEADING</i>	<i>DESCRIPTION</i>
TERMINAL PATTERN	Four factors define a unique terminal pattern: Frame mount (Horizontal or Vertical), Ring to Tip relationship, LSG or connector growth, and circuit number growth. Each terminal pattern is identified by the letter P followed by a number from 1 to 10. All of the terminal patterns (P1 thru P10) are described below. For NON-CTB's (N/A).

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.....**P1** Horizontal Mount.....
Ring Below Tip.....
LSG growth Left to Right.....
Circuit growth Top to Bottom.....

.....**P2** Horizontal Mount.....
Ring Below Tip.....
LSG growth Top to Bottom.....
Circuit growth Left to Right.....

.....**P3** Horizontal Mount.....
Ring Above Tip.....
LSG growth Bottom to Top.....
Circuit growth Left to Right.....

.....**P4** Horizontal Mount.....
Ring Above Tip.....
LSG growth Left to Right.....
Circuit growth Bottom to Top.....

.....**P5** Vertical mount.....
Ring Left of Tip.....
LSG growth Top to Bottom.....
Circuit growth Right to Left.....

.....**P6** Vertical mount.....
Ring Left of Tip.....
LSG growth Right to Left.....
Circuit growth Top to Bottom.....

.....**P7** Vertical mount.....
Ring Right of Tip.....
LSG growth Left to Right.....
Circuit growth Top to Bottom.....

.....**P8** Vertical mount.....
Ring Right of Tip.....
LSG growth Top to Bottom.....
Circuit growth Left to Right.....

.....**P9** Canadian applications only.....
Vertical mount.....
Ring Above Tip.....
LSG growth Bottom to Top.....
Circuit growth Left to Right.....

.....**P10** Canadian applications only.....
Horizontal mount.....
Ring Above Tip.....
LSG growth Bottom to Top.....
Circuit growth Left to Right.....

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HOUSING SIZE	Telzon blocks are made with a 6.0 inch (6.0) or 4.3/4 inch (4.75) housing. OPD blocks only have one housing size (N/A).
FANNING STRIP	Telzon blocks can be order with Fanning Strip numbering 00-31 (0) or 01-32 (1). OPD blocks can not be ordered with Fanning Strip numbering (N/A).
FRAME MOUNT	How the block is mounted on the MDF Frame Horizontal (HOR) or Vertical (VERT).

7.2.6.1 OPD VERSABLOCK APPROVED PARTS LIST

The HOUSING SIZE and FANNING STRIP Terminal Block Attributes are not applicable to the OPD VERSABLOCKS.

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PEC	BLOCK	EQT.	X-CON	FUNCTION	TERMINAL	FRAME
	SIDE	SIDE	SIDE		PATTERN	MOUNT
130-A4128L001	08X32	CONN	BIF	LINES	P1	HOR
130-A4128W001	08X32	CONN	SP	LINES	P1	HOR
130-A4128L001	08X32	CONN	BIF	LINES	P5	VERT
130-A4128W001	08X32	CONN	SP	LINES	P5	VERT
130-A4128L002	08X32	CONN	BIF	LINES	P2	HOR
130-A4128L002	08X32	CONN	BIF	TRUNKS	P2	HOR
130-A4128W002	08X32	CONN	SP	LINES	P2	HOR
130-A4128W002	08X32	CONN	SP	TRUNKS	P2	HOR
130-A4128L002	08X32	CONN	BIF	LINES	P6	VERT
130-A4128L002	08X32	CONN	BIF	TRUNKS	P6	VERT
130-A4128W002	08X32	CONN	SP	LINES	P6	VERT
130-A4128W002	08X32	CONN	SP	TRUNKS	P6	VERT
130-A4128L003	08X32	CONN	BIF	LINES	P3	HOR
130-A4128L003	08X32	CONN	BIF	TRUNKS	P3	HOR
130-A4128W003	08X32	CONN	SP	LINES	P3	HOR
130-A4128W003	08X32	CONN	SP	TRUNKS	P3	HOR
130-A4128L003	08X32	CONN	BIF	LINES	P7	VERT
130-A4128L003	08X32	CONN	BIF	TRUNKS	P7	VERT
130-A4128W003	08X32	CONN	SP	LINES	P7	VERT
130-A4128W003	08X32	CONN	SP	TRUNKS	P7	VERT
130-A4128L011	08X32	CONN	BIF	LINES	P4	HOR
130-A4128W011	08X32	CONN	SP	LINES	P4	HOR
130-A4128L011	08X32	CONN	BIF	LINES	P8	VERT
130-A4128W011	08X32	CONN	SP	LINES	P8	VERT
QBB66QP096SG336	08X24	CONN	BIF	LINES	P9	VERT
QBB66QP096SG336	08X24	CONN	BIF	LINES	P10	HOR
QBB66QP8X32G437	08X32	CONN	BIF	LINES	P9	VERT
QBB66QP8X32G437	08X32	CONN	BIF	LINES	P10	HOR
130-N0128L001	08X32	BIF	BIF	MISC	N/A	HOR
130-N0128W001	08X32	BIF	SP	MISC	N/A	HOR
130-N0128L001	08X32	BIF	BIF	MISC	N/A	VERT
130-N0128W001	08X32	BIF	SP	MISC	N/A	VERT
130-N0100L012	08X25	BIF	BIF	MISC	N/A	HOR
130-N0100W012	08X25	BIF	SP	MISC	N/A	HOR
130-N0100L012	08X25	BIF	BIF	MISC	N/A	VERT
130-N0100W012	08X25	BIF	SP	MISC	N/A	VERT
130-N0120W020	08X30	BIF	SP	MISC	N/A	HOR
130-N0120W020	08X30	BIF	SP	MISC	N/A	VERT
130-N0120L005	08X30	BIF	BIF	MISC	N/A	HOR
130-N0120L005	08X30	BIF	BIF	MISC	N/A	VERT

NOTE: The QBB66QP096SG336 and QBB66QP8X32G437 are provisionable in the Canadian market only and their wiring patterns are incompatible with the US wiring patterns for lines.

7.2.6.2 OPD ROTATING APPROVED PARTS LIST

NOTE: The TERMINAL PATTERN, HOUSING SIZE, and FANNING STRIP Terminal Block Attributes are not applicable to the OPD Rotating Terminal Blocks.

PEC	BLOCK SIDE	EQT. SIDE	X-CON SIDE	FUNCTION	FRAME MOUNT
130-4030	10X30	SP	SP	MISC	HOR
130-4030	10X30	SP	SP	MISC	VERT
130-4620	06X20	SP	SP	MISC	HOR
130-4620	06X20	SP	SP	MISC	VERT
130-4630	06X30	SP	SP	MISC	HOR
130-4630	06X30	SP	SP	MISC	VERT
130-4820	08X20	SP	SP	MISC	HOR
130-4820	08X20	SP	SP	MISC	VERT
130-4824	08X24	SP	SP	MISC	HOR
130-4824	08X24	SP	SP	MISC	VERT
30-N0096W014	08X24	SP	SP	MISC	HOR
30-N0096W014	08X24	SP	SP	MISC	VERT
130-4830	08X30	SP	SP	MISC	HOR
130-4830	08X30	SP	SP	MISC	VERT

7.2.7 Office Layout Information

Not Applicable

7.2.8 Traffic Tables

Not Applicable

7.3 Product/System Specification7.3.1 Physical Characteristics

7.3.1.1 OPD VERSABLOCK

MECHANICAL DIMENSIONS

Height..... 3 7/8" (98.4mm)
 Width..... 7 7/8" (200mm)
 Depth..... 4 3/4" (121mm)
 Weight..... 3.0 lbs

TECHNICAL SPECIFICATIONS

Plastic Materials..... Noryl and Polycarbonate
 Colors Available..... Beige and White.
 Dielectric Strength..... 2,000 Vdc

Insulation Resistance..... > 500 Megohms

TEMPERATURE CHARACTERISTICS

SAE Measurements..... - 4 to + 113 degrees Fahrenheit
Metric Measurements..... - 20 to + 45 degrees Celsius

7.3.1.2 OPD ROTATING BLOCK

MECHANICAL DIMENSIONS

Height..... 3 7/8" (98.4mm)
Width..... 7 7/8" (200mm)
Depth..... 3 5/8" (92mm)
Weight..... 1.0 lb 12 oz.

TECHNICAL SPECIFICATIONS

Plastic Materials..... Polycarbonate
Color Available..... White.
Dielectric Strength..... 1500 Vdc and 100 Vac at 50-60 hz
for 2 minutes
Insulation Resistance..... > 30 Megohms at 1000 Vdc

TEMPERATURE CHARACTERISTICS

SAE Measurements..... 32 to 122 degrees Fahrenheit
Metric Measurements..... 0 to 50 degrees Celsius

7.3.1.3 TELZON TERMINAL BLOCK

MECHANICAL DIMENSIONS FOR STANDARD BLOCK

Height..... 3.99" (101.3mm)
Width..... 7.95" (201.9mm)
Depth..... 5.96" (151.4mm)
Weight..... 4.0 lbs

MECHANICAL DIMENSIONS FOR COMPACT BLOCK

Height..... 3.99" (101.3mm)
Width..... 7.95" (201.9mm)
Depth..... 4.71" (119.6mm)
Weight..... 3.5 lbs

TECHNICAL SPECIFICATIONS

Plastic Materials..... Polycarbonate

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Colors Available..... Gray and White.
Dielectric Strength..... 85,000 Vdc Minimum
Insulation Resistance..... > 10,000 Megohms Minimum (500 Vdc)

TEMPERATURE CHARACTERISTICS

SAE Measurements..... 32 to 122 degrees Fahrenheit
Metric Measurements..... 0 to 50 degrees Celsius

7.3.2 EMI/Earthquake Information

Not Applicable

7.3.3 Sparing Information

Not Applicable

7.3.4 Power Feed and Fusing Requirements

Not Applicable

7.3.5 Current Drain Information

Not Applicable

7.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

7.4.1 Required Software Packages and Interdependencies

Not Applicable

7.4.2 Software Usage Restrictions

Not Applicable

7.4.3 Memory Provisioning

Not Applicable

7.5 Real Time Impact

Not Applicable

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8.0 ECM543 - Cook Digital Announcer

8.1 Overview

The Cook Division Digital Announcer (CDA) is available in two basic configurations Ring Trip Access (RTA) and Trunk Access (TRK) which are used within the DMS-100F as follows:

- The Ring Trip Access CDA is used in the Remote Office environment and interfaces the remote via voice line cards type A or B (Tip/Ring Pairs). It provides announcements instead of re-order tone for Non-Resident Codes and Prefixes (i.e. 0-, 0+, and 1+) when the Remote Office is operating in the Emergency Stand Alone (ESA) mode.
- The new Trunk Access CDA is offered for use in Automatic Call Distribution (ACD) environments in which several subscribers may be grouped together on one 4-Wire E & M Trunk, then attached to the CDA for message output.

Voice Messages are recorded on both the Ring Trip and Trunk Access CDAs via a Type "G" Handset. The Handset interfaces the CDA via a modular jack on the front panel. The analog voice messages are stored digitally in solid state (DRAM) memory. When the appropriate signals are received from the interface circuits (Trunk or Line), the message is converted to analog for output to the requestor.

8.2 Hardware Provisioning

8.2.1 Hardware Usage Restrictions

CDA's are not designed for applications where a user response is expected or required. CDAs are an announce only device. There is no limitation to the number of CDAs that can be provisioned in an office. Physical space in a frame/cabinet will limit the number of CDA's that can go into a frame/cabinet. Refer to the MIS/RSE/RME and CMIS Engineering Manual sections for the valid mounting locations of the CDA.

8.2.2 Hardware Dependencies

The Ring Trip Access CDA is compatible with a DMS100F Remote Office via a Type A or B Voice Line card per channel provisioned.

The Trunk Access CDA is compatible with a DMS100F Host Office via a 4-Wire E & M Trunk per channel provisioned.

When the Remote Record feature is specified by the Telco for either the Trunk Access or Ring Trip Access CDA - then a Type A or B Voice Line Card must be provisioned and cabled to enable this feature.

8.2.2.1 P and C Side Port Requirements

Not applicable

8.2.2.2 DMS BUS Port Requirements

Not applicable

8.2.2.3 Circuits Per Card

The CDA can have from 2 to 8 channels/ports in increments of 2. Also, for the NT7M00-Series one channel/port can be provisioned for remote recording, and for the NT5M0n-Series the one channel/port for remote recording is always provided.

8.2.2.4 Discrimination Numbering

Not applicable

8.2.3 Provisioning Considerations

The Cook Announcers may be housed in the MIS frame or CMIS Cabinet Model A. For assistance in determining the number of CDA's required, call the Technical Service Center at 1-800-758-4827.

There are two approved versions of the Cook Division Digital Announcer (CDA) which are:

1. NT7M00-Series - Single Channel/Port version

- a. The Single Channel unit provides one message output to the connected line.
- b. Information stated below is for record purposes only as the LEC has been Manufacture Discontinued effective on NTP 420 Issue 01.
- c. The maximum number of lines which may be connected to the single channel CDA depends on the resistance of the lines. For example: A maximum of 150, 600-ohm lines may be connected to a single CDA using several Line Expansion Chassis (LECs)

2. NT5M0n-Series - 'n' Channel/Port versions

- a. The NT5M0n-Series CDA may be equipped with 2/4/6/8 Channel for message traffic. The number of messages outputted per channel depends on the Firmware Option selected.
- b. The NT5M-Series CDA is available in several configurations with standard features to include:
 - 1) Number of channels (2, 4, 6, or 8)

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- 2) Channel interface types (Ring Trip (Line) Access or Trunk Access)
 - 3) Message lengths up to 8 minutes (480 seconds) for standard CDAs,
 - 4) LED display for operational status, security access, and diagnostics
- c. Other available options include features such as: battery backup, remote record, and A.C. Adapter.
 - d. Line Expansion Chassis (LEC) do not apply to the new NT5M CDA's. These CDA's do not support Line Expansion Chassis (LEC).

8.2.3.1 CDA System Configuration

DMS-100 Marketing approved units are defined in -- Heading id 'HARE543' unknown -- Telco requested options which do not appear in -- Heading id 'HARE543' unknown -- must be qualified per the Vendor Equipment Qualification Process, or ordered directly from the Cook Division Customer Service for immediate requirements.

The CDA may be mounted in the MIS/RSE/RME frames and CMIS cabinet.

The NT7M00-Series CDA is composed of a Control Processor Unit (CPU) only. The following hardware is provisionable single channel CDA units:

- Battery Pack Replacement (NT7M03BA)
- Hand Set w/Cassett Jack and Cord (213360)

The NT5M Series Mult-channel CDA is composed of a CPU chassis which may be purchased with 2, 4, 6, or 8 audio channels. The NT5M Series CDA interfaces the network via either Ring Trip Access (RTA) or Trunk Access (TRK).

The Cook Division Digital Announcer (CDA) is available in two basic versions Ring Trip Access (RTA) and Trunk Access (TRK) which are used within the DMS-100F as follows:

- The Ring Trip Access CDA is used in the Remote Office environment and interfaces the remote via voice line cards Type A or B (Tip/Ring Pairs). It provides announcements instead of re-order tone for Non-Resident Codes and Prefixes (i.e. 0-, 0+, and 1+) when the Remote Office is operating in the Emergency Stand Alone (ESA) mode.
- The new Trunk Access CDA is offered for use in Automatic Call Distribution (ACD) environments in which several subscribers may be grouped together on one 4-Wire E & M Trunk, then attached to the CDA for message output.

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Voice Messages are recorded on both the Ring Trip and Trunk Access CDAs via a Type "G" Handset. The Handset interfaces the CDA via a modular jack on the front panel. The analog voice messages are stored digitally in solid state (DRAM) memory. When the appropriate signals are received from the interface circuits (Trunk or Line), the message is converted to analog for output to the line requesting.

The following hardware is provisionable in addition to the base NT5M CDA unit per telco spec:

- Hand Set w/Cassette Jack and Cord (213360),
- 19" Meridian Mounting Bracket Kit (213281-101),
- AC Converter (for NT5M Series CDA's), (NT5M45EA),
- Battery Pack Replacement, (All CDA's) (NT7M03BA),
- Memory Expansion Kit (1 minute) (NT5M45AA),
- 2 Channel Ring Trip Access Kit (NT5M45BB),
- 2 Channel Trunk Access Kit (NT5M45CB),
- 4 Channel Ring Trip Access Kit* (NT5M45BC),
- 4 Channel Trunk Access Kit* (NT5M45CC),
- Wire Wrap Adapter Kit* (NT5M45DA),
- Power Connector Kit (Spare) (NT5M45EB),
- Basic Firmware (NT5M50AA),
- Multi-channel Demand Phased Firmware (NT5M50AE),
- Multi-channel Fixed Length Firmware (NT5M50AG),
- Multi-channel Split Memory Demand Phased Firmware (NT5M50AJ),
- Multi-channel Multi-User Firmware (NT5M50BE).
- * Each 4 Channel application requires one kit. Order two kits for 8 Channel applications.

8.2.3.2 Expanding The NT7M Single Channel CDAs Capabilities

The NT7M-Series CDA expansion hardware is MD'd. NT7M00-Series CDA's is still manufactured, however, expansion is no longer available.

8.2.3.3 Expanding the NT5M Series CDAs Capabilities

NT5M Series CDA's can be upgraded in the field by applying a variety of Channel Adder Kits, (NT5M45xx) and/or Firmware Change Kits, (NT5M50xx). Refer to attached NT5M0n__ Engineering Manual Section for details.

8.2.4 Office Layout Information

Not applicable

8.2.5 Traffic Tables

Not applicable

8.3 Product/System Specification

8.3.1 Physical Characteristics

NT7M00__ Single Channel Series CDA

Height	1.75"(44.45mm)	Width	17.50"(444.5mm)
Depth	12.0"(304.8mm)		

NT7M25__ Four Channel Series CDA (MD-ed)

Height	3.50"(88.90mm)	Width	17.5"(444.5mm)
Depth	12.0"(304.8mm)		

NT5M0n__ 2/4/6/8 Channel Series CDA

Height	1.75"(44.45mm)	Width	17.5"(444.5mm)
Depth	12.0"(304.8mm)		

8.3.2 EMI/Earthquake Information

Not applicable

8.3.3 Sparing Information

For any CDA, provide one Battery Pack Replacement Kit, (NT7M03BA A0327558) as a spare unless otherwise directed. MTBF for the circuit pack in this kit is 303,000 hours.

8.3.4 Power Feed and Fusing Requirements

8.3.4.1 NT7M00__ Single Channel Series CDA

Input Voltage -48VDC
Power Consumption 12.5 watts Fully loaded
Fusing Requirements One (1) 2 Amp Fuses
Capacity 1 Channel Non-Expandable
Connections Wire Wrap Pins On Rear of Unit
Subscriber Line Interface: Wire Wrap Pins

8.3.4.2 NT7M25__ Four Channel Series CDA (MD-ed)

Input Voltage -48VDC
Power Consumption 25 watts Fully loaded
Fusing Requirements One (1) 4 Amp Fuses
Capacity 4 Channels Expandable To 8
Connections Wire Wrap Pins On Rear of Unit
Subscriber Line Interface: Wire Wrap Pins

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8.3.4.3 NT5M0n__ 2/4/6/8 Channel Series CDA

Input Voltage -48VDC

Power Consumption 18.75 watts Fully loaded

Fusing Requirements One (1) 1 1/3 Amp Fuses

Capacity Minimum 2, Max of 8 Channels / Unit

Connections RTA Unit = 1 RJ11 jack per channel, +1 RJ11 jack for the Remote Record option.

Trunk Unit = 1 telco type 25 pair connector for ch's 1-4, +1 telco type 25 pair connector for ch's 5-8, if equipped. +1 RJ11 jack for the Remote Record option.

8.3.5 Current Drain Information

NT7M00__ Single Channel Series CDA

Current Drain is 250 mA

NT7M25__ Four Channel Series CDA (MD-ed)

Current Drain is 500 mA

NT5M0n__ 2/4/6/8 Channel Series CDA

Current Drain is 375 mA

8.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

8.4.1 Required Software Packages and Interdependencies

One of the software packages listed here is required in the host offices to provide Emergency Stand Alone (ESA) capabilities in the corresponding remote office:

- NTX149AA - RSC ESA Operation Lines Only, or
- NTX149AB - RSC ESA Operation Lines & Trunks
- NTX154AA - RLCM ESA Operation
- NTX025AA - RLM ESA Operation

8.4.2 Software Usage Restrictions

This CDA is available in Remote Office Application during ESA operation only. In ACD applications the unit is always available.

8.4.3 Memory Provisioning

Not applicable

8.5 Real Time Impact

Not applicable

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9.0 ECM576 - Multi-Vendor Interface Cabinet and Frame

9.1 Overview

The ESCM-100A product is based on a Subscriber Carrier Module (SCM) that provides Multi-Vendor Interface (MVI), supports up to 28 DS-1 per Remote Digital Terminal (RDT), uses Common Peripheral Module (CPM) architecture and is compliant with TR-303 standards. TR-303 refers to the Bellcore Standard TR-TSY-000303 which sets industry standards for multi-vendor interface, allowing telephone exchanges (IDT) from one vendor to connect up to remote line equipment (RDT) from another vendor.

The new peripheral module is named ESCM-100A or SMA2. For the cabinet/frame product, one ESCM-100A/SMA2 module is defined as one CPM2 Shelf and one-half of one EXT Shelf. This CPM based product is replacing the SMA XPM based shelf which is only partially compliant to TR-303 specifications. The development is split into various phases and will eventually support electrical and fiber interfaces. The ESCM-100A supports multi-vendor RDTs and connection to Access Node.

This product, which resides in the host office, provides remote multi-vendor interface to a DMS SuperNode. The present requirement is for DS-1 P-Side connectivity to the host. In order to meet the requirement of 28 DS-1s from a remote to a host it is necessary to move to a variant of the CPM platform. The CPM platform was introduced with the RSC Sonet product and is enhanced to support TR303. The MVI cabinet/frame operates in a DMS-100 SuperNode environment only, with ENET and JNET interface being supported.

The MVI Cabinet/Frame uses existing Northern Telecom mechanical packaging technology to provide a product consistent in appearance and mechanical functionality to the latest Central Office and Remote products.

For the Cabinet product, the ESCM-100A (SMA2) module is housed in a C 8 Model B Cabinet which provides restricted equipment access and EMI compliance. Refer to Figure 18 on page 17-80 for the Cabinetized version.

For the Frame product, the ESCM-100A (SMA2) module is housed in a standard DMS-100 Equipment Frame. Refer to Figure 19 on page 17-80.

Two shelf types mount on the two MVI versions. The CPM2 Main Shelf is referred to as 'Main' or 'CPM2' throughout this document. The Extension Shelf is referred to as 'EXT' or 'Extension'. Refer to Figure 20 on page 17-81 and Figure 21 on page 17-81 for layout of shelves. See individual cabinet and frame Engineering Manual Sections for specifics of CP slot assignments.

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+-----+ Modular Supervisory Panel		-----> Always Provided
+-----+ Full Shelf Filler		- 61 -----> Always Provided
+-----+ CPM2 Main Shelf		- 47 -----> Always Provided (Packs Provisionable)
+-----+ EXT Half Shelf EXT Half Shelf		- 34 -----> Always Provided (Packs Provisionable)
+-----+ CPM2 Main Shelf		- 20 -----> Always Provided (Packs Provisionable)
+-----+ Cooling Unit		- 06 -----> Always Provided
+-----+		- 00

Figure 18. Cabinetized Multi-Vendor Interface (CMVI)

+-----+ Modular Supervisory Panel		-----> Always Provided
+-----+ Full Shelf Filler		- 71 -----> Always Provided
+-----+ CPM2 Main Shelf		- 57 -----> Always Provided (Packs Provisionable)
+-----+ EXT Half Shelf EXT Half Shelf		- 44 -----> Always Provided (Packs Provisionable)
+-----+ CPM2 Main Shelf		- 30 -----> Always Provided (Packs Provisionable)
+-----+ Cooling Unit		- 16 -----> Always Provided
+-----+		- 10

Figure 19. Multi-Vendor Interface Equipment (MVIE)

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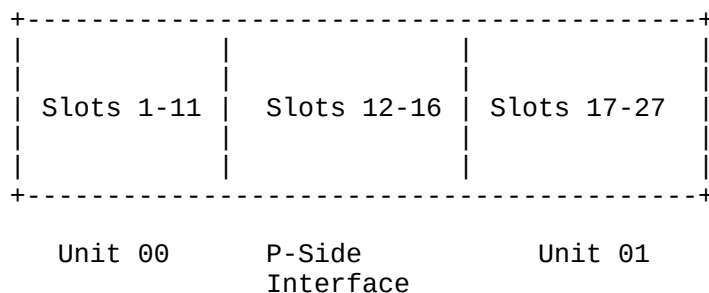
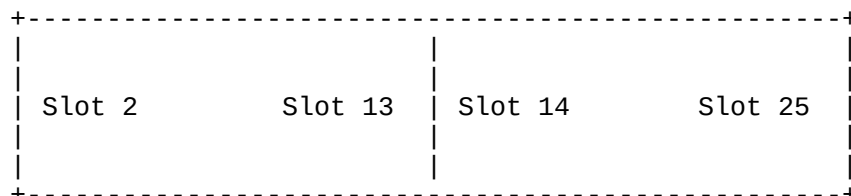


Figure 20. CPM2 Main Shelf



---- First ESCM-100A --- ---- Second ESCM-100A ---
(Slots 3-12 P-Side I/F) (Slots 15-24 P-Side I/F)

Figure 21. EXT Shelf

9.2 Hardware Provisioning

9.2.1 Hardware Usage Restrictions

The ESCM-100A or SMA2 module is limited to supporting no more than 248 lines per RDT.

The SMA2 module is not capable of supporting connections to access vehicles other than S/DMS AccessNode and RDTs that conform to the TR-303 standard.

The number of access vehicles supported from one SMA2 module is defined in the table below:

Do any of the access vehicles supported have ISDN lines?	Software Release	Maximum number of Access Vehicles Supported:

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No	N/A	8
Yes	NA007 or lower	5
Yes	NA008 (XPM081) or higher	7

The SMA2 module is limited to no more than 24 DS-1 connections in the CPM2 Shelf, and 24 DS-1 connections in the EXT Shelf (maximum of 48 links).

The SMA2 module is not capable of supporting digital trunks including Primary Rate Access (PRA). Transparent hairpinning of these facilities is supported until the applications group provides this functionality.

There is a current base limitation by the ISDN base group that limits the number of ISDN terminals on a single shelf to 480.

For MSL100 offices, CMVI or SMA2 only configures with ENET.

9.2.2 Hardware Dependencies

DCH CPs are not supported for the ESCM-100A or SMA2 module. Only EDCH CPs are supported.

EDCH CPs are limited to 10 (9 active, 1 spare) per SMA2 module, and are limited by the number of IDTs (as per the table below):

Number of IDTs:	Number of EDCH:
1-5	10
6	8
7	4

9.2.2.1 P and C Side Port Requirements

The MVI Cabinet/Frame configured with two CPM2 Shelves and one EXT Shelf allows 96 P-Side DS-1 links.

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The current ESCM-100A/SMA2 configuration supports EDCH and DS-1 ports only.

When doing CP provisioning, it is important to declare the ports and slots in such a way that future upgrading will not be limited, and to avoid service affecting changes.

In order to help installation groups, the following recommendations are provided. An attempt is made to utilize all the slots that can support a single pack type (either DS-1 or EDCH) before using those slots that support more than one pack type. This prevents reconfiguring the SMA2 during upgrades.

The following are maximum configurations for one SMA2 module;

24 DS-1 ports and 10 EDCH CPs (NA008)

40 DS-1 ports and 8 EDCH CPs (NA007)

40 DS-1 ports and 6 EDCH CPs

48 DS-1 ports and 0 EDCH CPs

48 DS-1 ports and 4 EDCH CPs #

- Support of ISDN lines with 41 or more DS-1 links will only be for new applications. Note that this configuration is only valid for new applications. Upgrades will not be allowed to use this configuration.

CPM2 MAIN SHELF PROVISIONING -- The three CPM2 Shelf P-Side slots (2,14,16) can be used for DS-1 Quad Carrier CPs. Slot 12 is NOT available for EDCH CPs. EDCH CPs can only be assigned to slots 14 and 16. If an EXT Shelf is required at initial installation, it is recommended that slots 14 and 16 in CPM2 Shelf go unused until all slots on the EXT Shelf have been utilized by either DS-1 Quad Carrier CPs or EDCH CPs.

For consistency in provisioning, it is recommended to assign DS-1 ports from 0 to 23 (slots 12,16,14 starting from the top packlet 0 and working downward to packlet 3). The EDCH CPs assign in slot 14 followed by slot 16.

EXT SHELF PROVISIONING -- The DS-1 P-Side Quad Carrier slots in the EXT Shelf should be provisioned in the following order: 4,6,8 for the left EXT half, or 23,21,19 for the right EXT Shelf. It is NOT recommended to use slot 8 or 19 for DS-1 Quad Carrier CPs unless there is an initial requirement for 48 DS-1 ports.

Slots 4,6,21,and 23 are NOT available for EDCH CPs.

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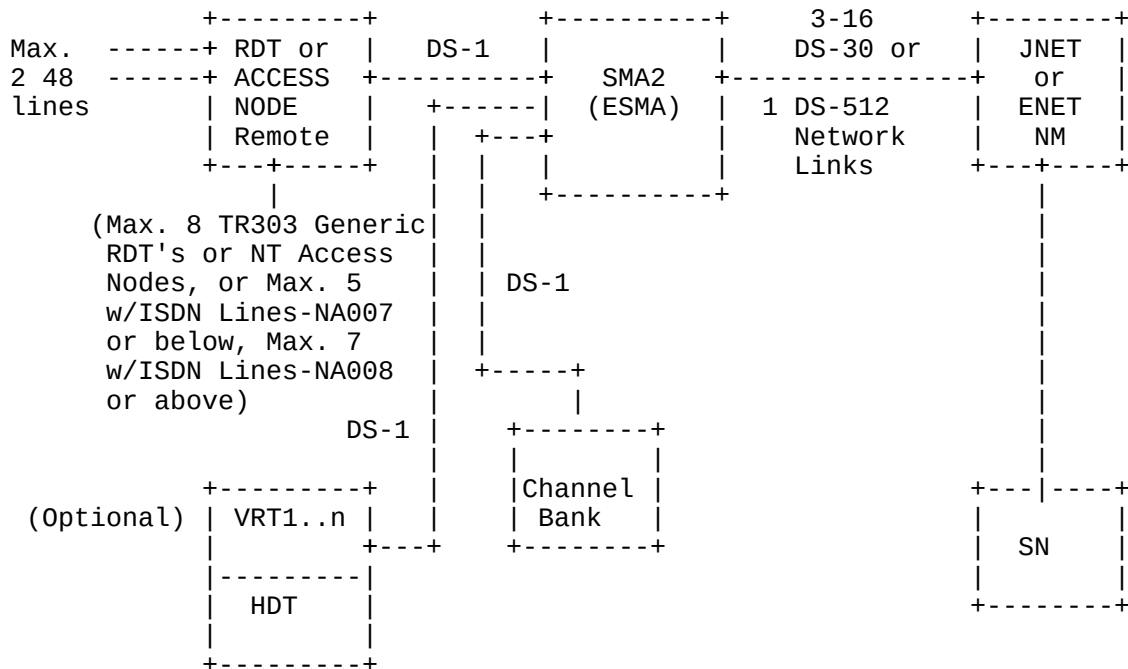
The EDCH CP slots should be provisioned in the following order: 3,5,7,11,9,10,12,8. This pattern is for the first ESCM-100A/SMA2, or left side of the shelf.

The EDCH CP slots should be provisioned in the following order: 24,22,20,16,18,17,15,19 for the second ESCM-100A/SMA2, or the right side of the shelf.

If the main shelf contains 2 EDCH card and 1 DS1 frame (DS1 Qaud Carrier CP), and 3 extra DS1 frames are required, it is recommended to move at least one of the EDCH cards (with declarations) from the main shelf to the extension shelf, and install at least one of the new DS1 frames in the main shelf. This will not cause any loss of service because the new EDCH card(s) on the extension shelf can be installed before removing the existing card(s) on the main shelf.

For C-Side provisioning, provide JNET interface CPs in slots 9,19 of the CPM2 Shelf. If ENET interface is required, provide CPs in slots 9,19 and paddleboards in slots 9R and 19R.

The following diagram summarizes the SMA2 P-Side and C-Side link restrictions:



9.2.2.2 DMS BUS Port Requirements

Not applicable

9.2.2.3 Circuits Per Card

The Dual DS-1 Packlet CP consists of two DS-1 circuits per card.

9.2.2.4 Discrimination Numbering

For the cabinet/frame product, one ESCM-100A/SMA2 module is defined as one CPM2 Shelf and one-half of one EXT Shelf.

Refer to Figure 22 on page 17-86 to see discrimination numbering pattern.

In Figure 5, module SMA2 00 is equal to CPM2 Shelf 00 and one-half of the EXT Shelf (left half front view). An ESCM-100A/SMA2 module can equal a CPM2 Shelf with CPs and one-half of an EXT Shelf without CPs. SMA2 01 uses CPM2 01 and the right half of the EXT Shelf.

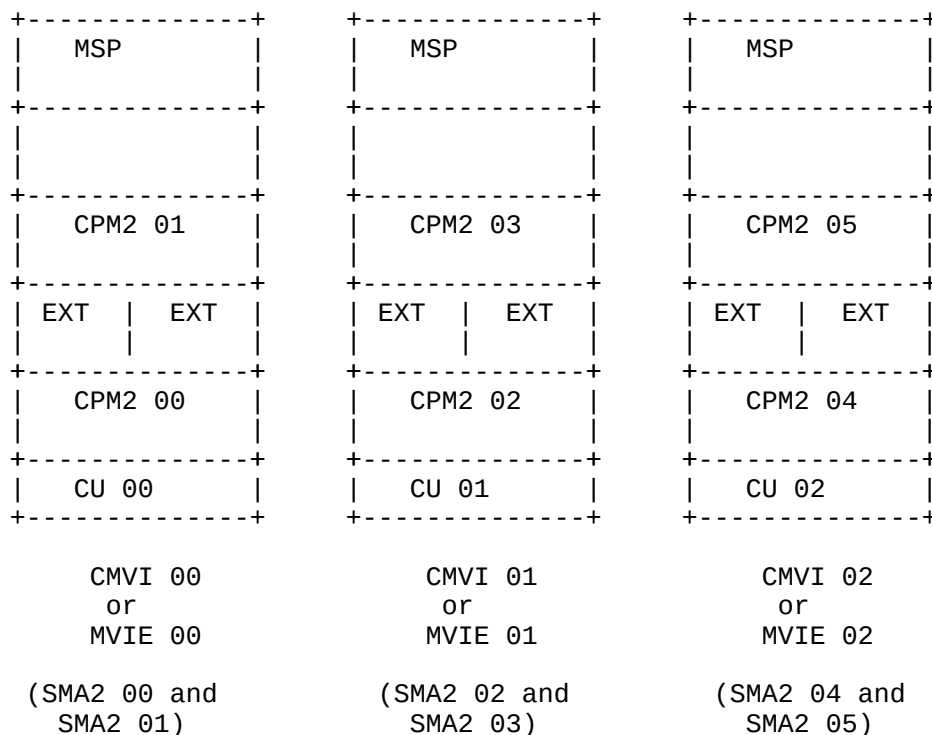


Figure 22. Typical ESCM-100A/SMA2 Module Layout (front view)

9.2.3 Provisioning Considerations

Each cabinet/frame is always provided with shelves and backplanes in all positions. The functionality of each shelf is revealed when CPs are provisioned to fill the shelves.

The building block NTZZ03SY is available to provision common CPs for the CPM2 Shelf which is part of the SMA2 Module. Use this BB for offices requiring ADSI/SCWID functionality as it now includes the NTMX76CA CP. Check RTS date in CADES for availability of this building block (it is pending availability of the NTMX72AB card). Until this building block is available, the NTZZ03SF building block should be ordered (it contains the NTMX72AA card). The NTZZ03SF also provides ADSI/SCWID functionality.

The NTZZ03SZ building block is no longer available, as the NTMX76BA card will no longer be provided for the ESMA.

See the EMSs for NTQX90AA and NTMX90BA for more details.

EDCH CPs are provisioned for ISDN interface. Each EDCH CP can handle 108 ISDN D-channel lines. One more than required EDCH CP must be provisioned as a spare.

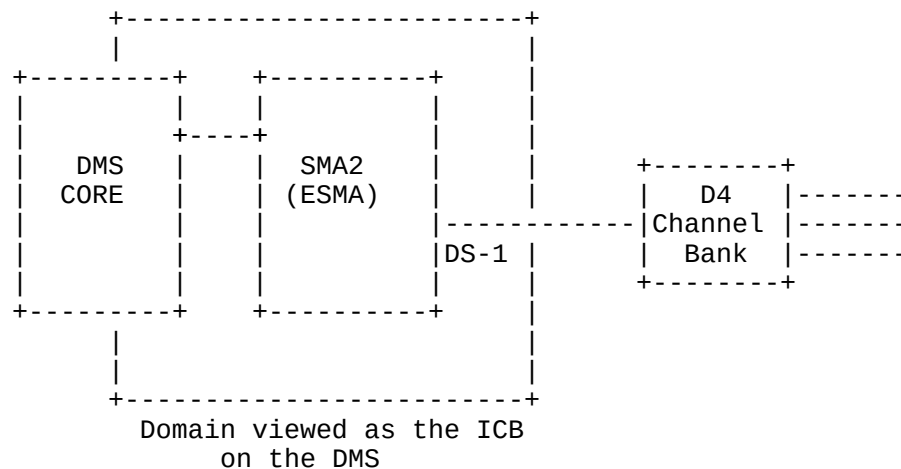
CLASS Modem Resource CPs should be provisioned if CLASS Calling Number/Name Display features are required.

Even though marketing models show that only one UTR CP is required, it is recommended that UTR CP provisioning be performed using the standard methods of calculating the traffic required and deriving the quantity of UTR CPs from this figure.

An optional cable arrangement is offered to terminate P-Side DS-1 cabling at Host Digital Terminals (HDT) instead of a DSX to provide 8-port granularity. The cables will allow DS-1 ports to be distributed to the HDT frame in groups of 8 ports to the Virtual Remote Terminals (VRT). This type of termination is Telco specific, and any provisioning or assignment requirements that are different than what is described herein, will be found in Telco Specific Instruction procedures. These procedures are available to Equipment Application Engineering.

Integrated Channel Bank

An "integrated" channel bank configuration is one where the switch side channel bank is emulated by an existing piece of DS-1 terminating hardware (in this case the SMA2 or ESMA).



No new ESMA hardware is required for the ICB (Integrated Channel Bank) functionality. However, an ICB constitutes a line concentrating device (LCD) and counts towards the LCD limit for the DMS. ICB is available as of NA008, and the number of ICBs per DMS100 is 1000.

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ESMA - MTA X-Connect Information

When a NGDLC (LightSpan or DSC, SLC2000, etc.) is connected via a copper path to an SMA2, there is a requirement that MTA X-Connects be available to support line testing to the RDT. MTA X-Connects will have to be provisioned manually according to the transmission environment. If the SMA2 terminates HFC Loop architecture there is no need for MTA X-Connects since the HFC architecture utilizes alternative line testing methods. Refer to the Line Testing Reference Manual NTP 297-1001-594 for provisioning requirements which should be similar to SMS provisioning (concerning MLT Units/NT3X09/NT2X10/NT2X11/NT2X90 etc.).

The following chart shows the minimum and maximum configuration among some vendors of RDTs, and this chart can be used to determine the number of verticals required on the MTA per ESMA. Note the HDT can not have MTA connections.

LINE TYPE	Non-ISDN				ISDN only			
Vendor	RDT	SL2000	DSC	HDT	RDT	SL2000	DSC	HDT
Min/Max Quantity	8	2-8	2-8	2-8	5	1-5	1-5	1-5
Max Line/Unit	672	672	672	672	324	324	324	324
Min/Max Vertical for each RDT	1-2	1	1	n/a	1-2	1	1	n/a

For example, by using this chart for one ESMA with maximum of 8 RDTs, the maximum verticals required will be $8 \times 2 = 16$.

9.2.4 Office Layout Information

The SMA2 must be physically located such that the length of the DS-30 links (between the SMA2 and the Network Module) is less than 750 feet for a JNET office and the length of the DS-512 links is less than 3280 feet for an ENET office.

The distance between the SMA2 module and RDT is limited to approximately 42 miles for JNET offices, and approximately 60 miles for ENET offices.

9.2.5 Traffic Tables

Not applicable

9.3 Product/System Specification

9.3.1 Physical Characteristics

The ESCM-100A/SMA2 packaged in a Model B C28 cabinet (CMVI) has the following physical characteristics:

Height: 72"
Width : 28.46"
Depth : 28.42"
Weight: TBD

The ESCM-100A/SMA2 packaged in a standard DMS-100 frame (MVIE) has the following physical characteristics:

Height: 84"
Width : 27"
Depth : 18"
Weight: TBD

The cabinet meets FCC Packaging and Bellcore Radio Frequency Susceptibility requirements.

9.3.2 EMI/Earthquake Information

The cabinet complies with FCC and EN Class A Electromagnetic Compatibility requirements. The Earthquake Anchor Kit shall be provided for each cabinet in earthquake applications (refer to NTRX25AA for details)

9.3.3 Sparing Information

Standard sparing algorithms apply.

The NTRX92AA 10" Cooling Unit Kit included the NTRX91AA Cooling Unit uses the A0346832 air filter medium. This air filter may be required for sparing.

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9.3.4 Power Feed and Fusing Requirements

The cabinet/frame is powered by an external -48V power supply which conforms to the following:

Voltage level within -42V to -56V (-48V nominal)
Max current of 5A for each unit (0 & 1) in the CPM2 Shelf

The following circuit breakers and feeds are required for each CMVI:

Qty. (2) 30 Amp "A" Feeds
Qty. (2) 30 Amp "B" Feeds
Qty. (4) Returns

The following fuses and feeds are required for each MVIE:

Qty. (2) 30 Amp "A" Feeds
Qty. (2) 30 Amp "B" Feeds
Qty. (4) Returns

Assuming an input voltage of -48V at the PDC, and allowing 4.25 Amps for the cooling unit and MSP packs, a 29.25 Amp power supply per MVI-28 Cabinet/Frame is required.

9.3.5 Current Drain Information

Circuit pack level current drain is no longer contained in this document.

9.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

9.4.1 Required Software Packages and Interdependencies

This section lists REQUIRED and OPTIONAL software package information. Please read carefully.

The following software packages are required to support SMA2 equipment. Required packages are dependent on customer ordering mode.

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If ordering using NTX..... type code method, order
NTXF46AA SCM-100 Software (for AccessNode)
NTXT23AA TR-303 Generic I/F (to add TR303 feature)

NOTE-NTXF46AA is a prerequisite for NTXT23AA.

NOTE-NTXT23AA is NOT required for AccessNode Only applications

If ordering using DMSE mode, order functional groups
BAS00003 SCM-100 Software (for AccessNode)
SMA00001 (to add TR303 Generic feature)

NOTE-BAS00003 is a prerequisite for SMA00001.

NOTE-SMA00001 is NOT required for AccessNode Only applications

In NA006, a new functional group SMA00007 is introduced titled SMA Platform Enhancements. This FG eventually will contain several platform SW enhancements for both AccessNode and Generic TR-303 customers. In NA006, the EOC Performance Enhancements (SCEPTER) features are packaged in SMA00007. The HW requirement for the NTAX74AA processor is mapped against this FG and is mandatory for all ESMA's loading NA006.

Any ESMA engineered for NA006 requires the SMA00007 FG and the NTAX74AA processor. AccessNode customers also require BAS0003. TR-303 customers also require BAS0003 PLUS SMA00001.

9.4.2 Software Usage Restrictions

Phase 1 of the project incorporates support of the ESCM-100A/SMA2 and is developed in the CSP03 timeframe. CSP03 is the BASE and TL layers of NA003. Phase 1 will be delivered in XPM05 and NA004.

Phase 1A of the project incorporates support of the ESCM-100A/SMA2 and NTAX74AA software development and is delivered in the XPM06 release.

An office using the NTAX74AA CP in a module must have the XPM06 ESMA load.

For MSL100 offices, CMVI or SMA2 is only supported at MSL05 and XPM06 software load.

9.4.3 Memory Provisioning

Not applicable

9.5 Real Time Impact

Not applicable

10.0 ECM602 - Miscellaneous Equipment Frame - MIS/

10.1 Overview

Product/System Overview

This document simplifies the provisioning of miscellaneous equipment on the MIS frame via the development of DMS Building Blocks and Detailed Engineering Manual Sections.

Building Blocks included herein are designed with the assumption that it is an initial MIS installation.

10.2 Hardware Provisioning

10.2.1 Hardware Usage Restrictions

Not applicable

10.2.2 Hardware Dependencies

Not applicable

10.2.2.1 P and C Side Port Requirements

Not applicable

10.2.2.2 DMS BUS Port Requirements

Not applicable

10.2.2.3 Circuits Per Card

Not applicable

10.2.2.4 Discrimination Numbering

Not applicable

10.2.3 Provisioning Considerations

10.2.3.1 Customer Questions

- 1. Quantity of Inverters required?
a) 500VA AC type? ____
- 2. Quantity of Metallic Test Access Units required? ____
- 3. Quantity of Miscellaneous Shelves required? ____
- 4. Is local cross-connect facility required on Miscellaneous

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- equipment bay (Y/N)? ____
- 5. Are there greater than quantity two (2) NT0X66AA Alarm Panels, and/or greater than quantity four (4) NT0X64AA Exit Alarm Panels, in the office (Y/N)? ____
- 6. Is selective audible alarm cutoff control required (Y/N) ____
- 7. Is Remote Office Test Line required (Y/N)? ____
- a) Quantity of optional 105 Test Lines required (0-6)? ____
- 8. Is NT5X72AA Central Alarm Display Panel provided in the Alarm Center (Y/N)? ____
- 9. Is TELLABS Model 292BR-01 Conference/Alerting System required? ____
- a) With manual conference origination (Y/N)? ____
- b) With automatic conference origination (Y/N)? ____
- c) With both automatic and manual conference origination (Y/N)? ____
- d) Quantity of Remote-Answer lines required (0-3)? ____
- e) Is activation of a community siren required (Y/N)? ____
- f) Quantity of emergency conference lines required on station shelf (1-10)? ____
- g) Quantity of emergency conference lines required on expansion shelves (1-50)? ____
- h) Are the emergency lines required to be partitioned into zones (Y/N)? ____
- 1 . (Refer to MAP ECM for 1A2 Key System questions)
- 1 . a) Quantity of applique circuits required (2 circuits per card for Mechanized Loop Testing (MLT) on SMU, SMS and/or SMR? ____
- b) Quantity of Signature Off-hook Routing cards required for Digital Remote Test Unit (DRTU) applications?

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- Note: For Prism Systems DRTU-AMH, Signature Cards
- (and Signature/Applique Shelf) are not required if
- the customer is running CALRS V7.0 or later. ____
- 1 . (NSSD Model NT0J6_BA Local Test Cabinet to be custom
- engineered. Refer to Engineering Manual Inserts.)
- 1 . Is Inactive System Timing Circuit required (Y/N)? ____
- 14. Is TOPS Operator Verification requiring Tone and
- Scrambler Unit required (Y/N) ? ____
- a) If Yes, what is the number of calls requiring
- Operator Verification via the Tone & Scrambler ____
- b) What is the Holding Time/100 of the line
- under verification by the Operator ____
- 15. (Refer to IOE ECM for modem questions)
- 16. Quantity of Misc Frames requiring 19" - 26" Full
- Frame Mounting Adapters ____
- 17. Quantity of Misc Frames requiring 23" - 26" FullFrame
- Mounting Adapters ____

10.2.3.2 Calculations

Numbers preceded by an octothorpe (#) refer to question numbers in "Customer Questions" .

- Quantity NTZZ18CA = #2
- Quantity NT3X25AA = #3
- If #4 = Yes, then Quantity NT3X25BA = one (1)
- If #5 = Yes, then Quantity NTZZ18DA = one (1)
- If #6 = Yes, then Quantity NT5X86AA = one (1)
- If #7 = Yes, then Quantity NT7F18AD = one (1)
- If #8 = Yes, then Quantity NT5X72AB = one (1)
- If #9 = Yes, then Quantity NTZZ18FA = one (1)
- If #9a = Yes, then Quantity 9293 = one (1)
- If #9b = Yes, then Quantity 9296 = two (2)

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- If #9c = Yes, then Quantity 9293 = one (1),
- AND Quantity 9296 = one (1)
- Quantity 9296 = #9d
- If #9e = Yes, then Quantity 9133 = one (1),
- AND Quantity 6073 = one (1)
- Quantity 9291 = #9f + #9g
- Quantity NTZZ18GA = (#9g / 10) {Round up}
- If #9h = Yes, then Quantity 6073 = one (1)
- {Note: May be already provisioned via #9e}
- Quantity NT3J00BB = #11a
- Quantity NT3J00BE = #11b
- If #13 = Yes, then Quantity NT5X69AA = one (1)
- If #14 = Yes, then Quantity NT3J00AA = two (2)
- Tone & Scrambler CCS = #14a X #14b
- Quantity NT3J00AB = Tone & Scrambler CCS at p.001
- (minimum of two (2) CPs)
- Quantity P0706032 = 2 X #16
- Quantity P0706033 = 2 X #17
- Quantity NT0X9594 = 1 X (NTZZ18JA + NTZZ23AA) dedicated to
- modems (U.S. applications only).

10.2.4 Office Layout Information

Not applicable

10.2.5 Traffic Tables

Not applicable

10.3 Product/System Specification

10.3.1 Physical Characteristics

Not applicable

10.3.2 EMI/Earthquake Information

Not applicable

10.3.3 Sparing Information

Not applicable

10.3.4 Power Feed and Fusing Requirements

Not applicable

10.3.5 Current Drain Information

Not applicable

10.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

10.4.1 Required Software Packages and Interdependencies

Not applicable

10.4.2 Software Usage Restrictions

Not applicable

10.4.3 Memory Provisioning

Not applicable

10.5 Real Time Impact

Not applicable

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11.0 ECM614 - DMS Building Block/Detail-MSS Engineering

11.1 Overview

This document simplifies the provisioning of Maintenance Spare Storage equipment via the development of Building Blocks.

There are two components to this ECM:

1. MSS Customer Questions
2. MSS Calculations

MSS Customer Questions:

Worksheet of Telco inputs required at the time of order capture.

MSS Calculations:

Worksheet of provisioning algorithms driven from the results of the Customer Question section.

11.2 Hardware Provisioning

11.2.1 Hardware Usage Restrictions

Not applicable.

11.2.2 Hardware Dependencies

Not applicable.

11.2.2.1 P and C Side Port Requirements

Not applicable.

11.2.2.2 DMS BUS Port Requirements

Not applicable.

11.2.2.3 Circuits Per Card

Not applicable.

11.2.2.4 Discrimination Numbering

Not applicable.

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11.2.3 Provisioning Considerations

Customer Questions.

Note: The quantity of spare circuit packs required in an office can only be determined after an order has been detail engineered. The customer should specify the quantity of spares to be provided for each circuit type.

All questions pertain to SPARE card quantities:

1. Quantity of old peripheral line cards and/or Ringing Bus MUX cards? _____
2. Quantity of old peripheral Bus Interface (NT2X16) cards? _____
3. Quantity of new peripheral single-slot line cards? _____
4. Quantity of new peripheral two-slot line cards? _____
5. Quantity of new peripheral Bus Interface (NT6X54) cards? _____
6. Quantity of DMS circuit packs? _____
7. Quantity of Supernode circuit packs? _____
8. Quantity of Supernode paddle cards? _____
9. Quantity of Supernode power modules? _____
- 1 . Minimum quantity of spares to be provided for each circuit type? _____
- 1 . Enter specific sparing information on blank lines below if required.

CALCULATIONS

Numbers preceded by an octothorpe (#) refer to question numbers in the Customer Questions section. The calculations are designed to spread the spare equipment over the storage bays as efficiently as possible.

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Quantity NT3X55AA:

Calculate A = GREATER of: (#1 / 20) {Rounded up},
OR: (#2 / 4) {Rounded up}

Quantity NT3X55AA = A

Quantity NT3X55BA:

Calculate B = (#4 / 10) {Rounded up}

Calculate C = #3 - (10 * B)

Calculate D = (C / 30) {Rounded up}

Calculate E = GREATER of: (B + D),
OR: #5

Quantity NT3X55BA = E

Quantity NTZZ27BA:

Calculate F = (A / 4) {Rounded up}

Calculate G = (E / 4) {Rounded up}

Calculate H = (#6 - (3 * E))

Calculate J = (H / 20) {Rounded up}

Calculate K = (F + G + J)

Quantity NTZZ27BA = (K / 5) {Rounded up}

Quantity NT0X24BR and NTZZ27CA:

Calculate L = GREATER of: (#7 / 26) {Rounded up},
OR: (#8 / 26) {Rounded up},
OR: (#9 / 4) {Rounded up}

Calculate M = (L / 4) {Rounded up}

Quantity NT0X24BR = (L - M)

Quantity NTZZ27CA = M

Quantity of Maintenance Storage Cabinet (MSC) (Newton)
(Holds single and double slot cards) (150 slots total)
(U.S. applications only) A0300464

Calculate N = (Total spare slots required / 150)

Quantity A0300464 = N

Note: The MSS frame occupies an equipment bay space in the office line-up. The MSC can be placed away from the actual switch. Six (6) NT3X55BA Line Card Storage Chassis may be placed on one (1) MSC shelf.

11.2.4 Office Layout Information

Not applicable.

11.2.5 Traffic Tables

Not applicable.

11.3 Product/System Specification

11.3.1 Physical Characteristics

Not applicable.

11.3.2 EMI/Earthquake Information

Not applicable.

11.3.3 Sparing Information

Not applicable.

11.3.4 Power Feed and Fusing Requirements

Not applicable.

11.3.5 Current Drain Information

Not applicable.

11.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

11.4.1 Required Software Packages and Interdependencies

Not applicable.

11.4.2 Software Usage Restrictions

Not applicable.

11.4.3 Memory Provisioning

Not applicable.

11.5 Real Time Impact

Not applicable.

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12.0 ECM633 - DMS-100 Provisionable Modems For RTP

12.1 Overview

This NTP defines the terms used in Data Communications and defines the provisionable modem products from all RTP approved sources (i.e. Case/Datatel (CASE), Universal Data Systems (UDS), and General DataComm (GDC)) and relates those products to specific applications.

Data Communications is required whenever one has a need to transmit data or information from one location to another. In order to complete this task, three elements are required:

- Terminals / Computers (DTE Equipment)
- Modems / Data Sets (DCE Equipment)
- Transmission Facilities / Lines (Media)

In Voice communications when a telephone call is made, there are again three elements required to make the phone connections to the point where two people can talk to each other. These elements are:

- People (DTE Equipment)
- Telephones (DCE Equipment)
- Transmission Facilities / Lines (Media)

Therefore, Telecommunications and Data Communications are very similar. The Telephones perform the same function as do modems and datasets, namely they convert information from a form created by humans into a signal suitable for transmission over the telephone facility and then converts it back to a form intelligible to humans.

A modem is used whenever transmission of data is required utilizing a telephone line provisioned to carry analog signals. The word modem is actually a contraction for the terms modulator-demodulator. It is used in telephone circuits designed to transmit analog signals which fall within the audio spectrum used in human speech. The terminals/computers produce digital pulses and the modem interfaces these digital pulses with the analog tones carried on the Telephone facilities. Very simply, a modem converts machine output digital signals into an analog wave form and then converts this analog wave form back into digital signals for input into another machine.

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Whenever transmission of data is required utilizing a telephone line provisioned to carry digital pulses only, then a dataset is needed instead of a modem. A dataset is made up two units called a DSU and a CSU. A DSU, or digital service unit, provides a standard interface to a user's terminal and handles the signal translation, regeneration, reformatting, and timing. A CSU, or channel service unit, provides the connection to the digital telephone line and is capable of providing local loop equalization, transient protection, isolation and central office loopback testing capability.

We now know that modems are used on analog facilities and datasets (DSU/CSU's) are used on digital facilities.

In the case of analog facilities there are two types of facilities that can be provisioned; either a dial-up circuit or analog switched facility, and a leased line or private line.

Dial-up circuits permit contact with any terminal/CPU which has access to the telephone network. Whenever an operator wants to transfer data from one location to another, they dial the telephone number of the remotely located terminal/CPU. The telephone central office establishes a connection between the dialing party and the dialed party. Once communication is set up, the terminal/CPU at each end conduct the data transfer. When the data transfer is completed, the connection is broken and the modem/telephone is placed on hook allowing for a call to be made to another location or at another time. With today's technology it is possible to transmit at speeds from 75bps up to 28,800bps utilizing dial-up services.

A leased line is used when two locations have a high volume data transfer requirement and the time required to transfer this data via dial-up facilities is cost prohibitive. A leased line is a circuit which is nailed up or fixed between two locations, and is normally referred to as 3002 type service. A leased line can be conditioned to reduce errors in transmission as well as permit ease in determining the location of error conditions since its routing is known. The transmission speeds available on analog leased lines are from 110bps to 19,200bps. Even though technology permits up to 28,800bps, the modem providers have not developed a leased line modem capable of transmitting at these speeds. This is because fewer and fewer analog leased lines are being provisioned today and the trend is to move into digital services for leased/private line requirements.

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Unlike analog facilities, digital facilities accept and transmit digital pulses, therefore no conversion of the transmitted signal is required. Also, digital facilities are available only in leased/private line services. All of the properties of an analog leased line apply to digital leased lines, except for the transmission speeds available. Common transmission speeds used today are from 2400bps up to 45Mbps. Common Digital Service types available today are DDS (2400bps up to 64Kbps), T1 (1.544Mbps) and T3 (45Mbps).

12.1.1 MODEMS/DATASETS/DSU SELECTION PARAMETERS

When determining which modem or dataset to use in a particular application, the answers to the following characteristics are required. Once each of these parameters are known, the selection of the modem/dataset is an easy task.

Line Type

- Private Line
- Analog Line
- Digital Line
- Switched Network Line

Interface Type

- EIA-RS232
- EIA-RS530 (RS422/423)
- CCITT V.35

Transmission Mode

- Simplex
- Half Duplex
- Full Duplex

Timing

- Asynchronous
- Synchronous

Speed (Data Rate)

Line Configuration

- Point / Point
- Multipoint
- Public Switched Telephone Network (PSTN)

Packaging

- Rackmount
- Standalone

Modem Type Class (Protocol/Modulation)

- Bell - 103, 108, 202, 212, 208 Series
- CCITT - V.21, V.22, V.23, V.26, V.27, V.29, V.32, V.33, V.42, V.FAST

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12.1.2 MODEM SELECTION RULES AND REQUIREMENTS

Line Type - We have addressed the requirements of Line Type previously and a selection can be based on that discussion.

Interface Type - Of the three interface types available, EIA RS232, EIA 530, or CCITT V.35, only one is available when modems are being utilized. Whenever transmission is over analog facilities, which always require the use of modems, the interface of choice is EIA RS232. It employs unbalanced signaling and is usually used with 25-pin D-shaped connectors (DB25) to interconnect data terminal equipment (DTE's) and data communication equipment (DCE's). EIA-RS232 electrical specifications stipulate a maximum distance of 50' between the terminal/CPU device and the modem.

Timing - The selection of a modem requires a knowledge of what type of timing is required in the particular application, either Asynchronous or Synchronous.

Asynchronous transmission requires the use of start/stop bits, which are used to surround each character transmitted in order to differentiate one character from the next character. Virtually all manual entry terminals such as Personal Computers, Video Display Units (VDU's) and CRT's operate in asynchronous mode. Asynchronous transmission is used in the lower speed data rates, normally from 75bps upto the new V.Fast rates of 28.8K.

Synchronous transmission is more efficient since it does not require the overhead of start/stop bits surrounding each character. Instead, in synchronous transmission a block of characters is transmitted with each character being called a byte and each byte being eight bits long. Two or more characters or bytes are added to the beginning of each block and these bytes are known as SYNC bytes, which have a predetermined bit pattern and are recognized by the receiving data terminal. Once recognition of the SYNC byte occurs, every eight bits thereafter is counted as a byte. This requires that the transmitter and receiver of the modems run at the same frequency, i.e. that they be synchronized. The synchronization is accomplished through the use of clock signals, both a transmit and receive clock, and the clock signals operate at the same rate as the data rate selected. Synchronous transmission is used whenever high data rates are required. Data terminals that group together related transactions for transmission utilize timing in the synchronous mode.

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Transmission Mode - When choosing a modem the Transmission Mode must be addressed also. There are three interconnection modes available; simplex, half duplex, and full duplex.

Simplex mode allows transmission of data in one direction only. The most common use of simplex transmission is a broadcast type of transmission, such as radio and television. Simplex transmission is not normally used when transmitting data, because the transmission of data generally requires an acknowledgment that the data was received and correct.

Half Duplex mode allows transmission of data in both directions but only one direction at a time. Half duplex mode requires that the transmitting end tell the receiving end that they have completed their message. After this notice is given the receiving end may then transmit any messages which they have. This "notice" is called line turnaround. Synchronous modems at 2400 bps and above require a half duplex mode of operation on 2-wire dial-up telephone lines.

Full Duplex mode allows transmission of data in both directions at the same time. Since transmission occurs simultaneously in both the transmit and receive directions, the line turnaround as described above is not utilized. Therefore, full duplex transmission is twice as fast as half duplex transmission. Four wire leased lines permit full duplex transmission, since there are two separate wires used for transmitting and two wires used for receiving. Dial-up lines, even though they are only 2-wire, support full duplex transmission through the use of different transmit and receive frequencies.

In deciding which interconnection mode to use in your application, one needs to look at the data terminal equipment (DTE). All DTE's have a specific interconnection mode in which they transmit and the modem chosen must support the required mode.

Data Rate - The data rate required for a given application is a factor of many parameters. Some of the parameters we discussed above, such as whether you are using asynchronous versus synchronous transmission, or the Line Type being used. Many times the DTE device or the application software will dictate a specific data

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rate supported. Here are some guide lines and defacto standards used today.

Dial-up Lines, async or sync - a minimum of 9600bps with the trend moving to faster rates of 14,400bps and 28,800bps.

Analog Leased Lines, async or sync - a minimum of 9600bps with the trend moving to digital facilities at faster rates.

Line Configuration - When a datacommunications analog circuit is provisioned there are three choices of line configurations available to the end user. A Point to Point circuit, a Multipoint circuit or a Public Switched Telephone Network (PSTN) circuit.

In the Point to Point arrangement, a separate line must be specified for each terminal (DTE) to terminal (DTE) connection. Point to Point circuits are also leased (or private) lines, dedicated to the two DTE's. Typically Point to Point circuits utilize two wires to transmit on and two wires to receive on, commonly called a 4-wire circuit. It is possible though to utilize a single wire for transmission and a single wire to receive on and this is commonly called a 2-wire circuit. Example:

Point to Point Circuit

```

+-----+   +-----+   +-----+   +-----+
| DTE +----+ modem +-----+ modem +----+ DTE |
+-----+   +-----+   +-----+   +-----+

```

A multipoint arrangement is also a leased (or private) line but instead of a one DTE to one DTE arrangement, the host modem is 'talking' to multiple far end modems. Therefore, a number of terminals (and the modems) share the same transmission line and as a result they have the potential to interfere with one another unless an operating discipline is established. The most common multipoint discipline used is "polling." In polling, the host DTE addresses (polls) each of its terminals and only the addressed (polled) terminal can communicate (during its turn) over the multipoint line with the host DTE. Multipoint circuits utilize 4-wire circuits exclusively. Example:

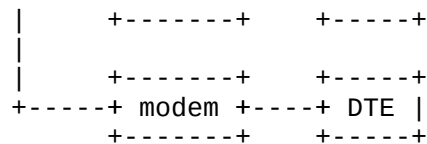
Multipoint Circuit

```

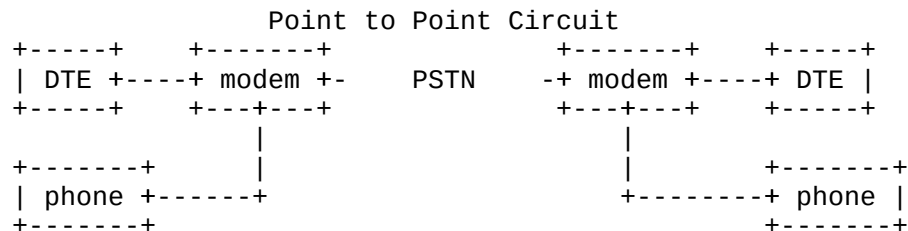
+-----+   +-----+   +-----+   +-----+
| DTE +----+ modem +-----+ modem +----+ DTE |
+-----+   +-----+   +-----+   +-----+
                        |
                        |
                        +-----+   +-----+
                        +-----+ modem +----+ DTE |

```

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When utilizing a Public Switched Telephone Network (PSTN) circuit, the circuit is not permanently connected but dialed up on an as needed basis. PSTN circuits utilize the same telephone network that the common household telephone uses and local loops are provisioned with their associated telephone number. After the connection is completed the communications is handled in the same manner as a point to point circuit. When the transfer of data is completed the connection is broken, the modems reset and then another call may be made. Typically PSTN circuits are 2-Wire circuits. Analog PSTN circuits transmit in the range of 110 Bits/Second upto 28,800 Bits/Second. Example:



Packaging - Two basic types of packaging are available from the modem vendors today, standalone or rackmount. It is relative easy to decide which type to use. If your requirement for modems is greater than one unit, then you should consider the rackmount variety. If your requirement is for one modem only, then choose the standalone unit.

Modem Type Class - Modem Type classes refer to the compatibility with standards used in the industry. These standards generally fall in two classes, Bell compatible or CCITT compatible. Initially the Bell System dictated the line characteristics of modems. Today CCITT is accepted as the body to set and promulgate modem standards. A definition of each of the Bell standards and CCITT standards is provided in Section 1.4. When selecting a modem, the Modem Type Class is generally defined with the application along with the results of determining the Line Type, Data Rate, Transmission Mode, and Interconnection Mode defined above. For instance, a V.32 compatible modem would be used in an application requiring Synchronous or asynchronous data transmission, full-duplex operation over 2-wire/4-wire leased or 2-wire dial-up lines, and a 9600bps data rate with fall back to 4800 bps using a DB25 connector.

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12.1.3 DSU/DATASET SELECTION RULES AND REQUIREMENTS

Line Type - We have addressed the requirements of Line Type previously and a selection can be based on that discussion. Whenever provisioning a digital circuit, a DSU/Dataset is required.

Interface Type - All three interface types, EIA RS232, EIA 530, or CCITT V.35, are available when datasets/DSU's are being utilized. The general rule for selecting which interface to use is to provision whichever interface type is required by the terminal/CPU. The DTE manufacturer are very specific in what interface they require and the dataset/DSU must match the interface type specified.

Whenever transmission at speeds up to 19.2Kbps is required the interface of choice is EIA RS232. It employs unbalanced signaling and is usually used with 25-pin D-shaped connectors (DB25) to interconnect data terminal equipment (DTE's) and data communication equipment (DCE's). EIA-RS232 electrical specifications stipulate a maximum distance of 50' between the terminal/CPU device and the modem.

At speeds greater than 19.2Kbps either the EIA 530 or the CCITT V.35 interface can be utilized. Transmission speeds common to both interfaces are from 38.4Kbps up to 2.048Mbps. Both the EIA 530 and CCITT V.35 interfaces are balanced, i.e. voltage sourced, and have the capability of distances greater than 50', although the actual distances are determined at large by the cable type used. The CCITT V.35 interface has been the most common interface used for speeds of 56Kbps and 64Kbps, while EIA 530 is popular for speeds greater than 64Kbps.

The CCITT V.35 interface utilizes a 34-pin cinch connector.

The EIA 530 interface is based on a 25-pin connection. This interface takes advantage of the higher data rates with the same mechanical connector used for RS-232.

Timing - The timing requirements are the same as for the Modem selection, therefore refer to the timing discussion in Section 1.1.2. As a rule, the synchronous transmission mode is used in all DSU/DATASET applications.

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Transmission Mode - The Transmission mode requirements are the same as for the Modem selection, therefore refer to the Transmission Mode discussion in Section 1.1.2.

Data Rate - The Data Rate requirements are the same as for the Modem selection, therefore refer to the Data Rate discussion in Section 1.1.2. guide lines and defacto standards used today are: 1) Digital Leased Lines, async or sync - a minimum of 9600bps with the trend moving to the faster rate of 56,000bps. 2) Line Configuration - The Line Configuration requirements are virtually the same as for the Modem selection, therefore refer to the Line Configuration discussion in Section 1.1.2. The only differing factor concerns the data rates utilized on PSTN (Dial-up) circuits. Digital dial-up speeds are normally in the 56,000 Bits/Second range, although it is possible to dial-up 384,000 and 1,544,000 Bit/Second speeds with special services such as ISDN.

Packaging - Two basic types of packaging are available from the modem vendors today, standalone or rackmount. It is relative easy to decide which type to use. If your requirement for datasets is greater than one unit, you should consider the rackmount variety. If your requirement is for one dataset only, choose the standalone unit.

Modem Type Class - This parameter applies only to modems, therefore it is not used in the selection of a DSU/DATASET.

12.2 Hardware Provisioning

12.2.1 Hardware Usage Restrictions

See TABLE Z

12.2.2 Hardware Dependencies

See TABLE Z

12.2.2.1 P and C Side Port Requirements

N/A

12.2.2.2 DMS BUS Port Requirements

N/A

12.2.2.3 Circuits Per Card

N/A

12.2.2.4 Discrimination Numbering

N/A

12.2.3 Provisioning Considerations

See Engineering Manual Section Table Z for selecting NT Approved modems for specific applications.

Modems must be matched to the application being provisioned and the existing Far End Modem (if applicable). Modems located at the DMS Site are generally referred to as the Near End Modem.

In cases where the modems are configured in a back to back arrangement - the modem directly connected to the Device/Device controller (1X67/89, DPP, BMC, etc.) is considered the Near End Modem.

When selecting modems for an existing network it is often necessary to mix modems from different suppliers. In these cases it is necessary for the modems to be compatible (be able to talk to each other).

COMPATIBILITY

Compatibility between modems depends greatly on the exactness with which their Modulation Techniques conform to the specification (e.g. AT&T or CCITT) in question. TABLE 1 outlines standard AT&T/CCITT specifications for modems at the various operating speeds.

The term "HANDSHAKING" is all important in determining modem compatibility as it describes the exchange of control signals that establish a connection between two modems. Standards (e.g. BELL 108, 13, 208A/B, etc. or CCITT V.22, 22 bis, 29, etc) govern the signals required to set up, transmit, and terminate calls. For a handshake to occur the two modems must be compatible.

AT&T Compatibility

There are two governing bodies, AT&T and CCITT. Modems built to AT&T (commonly referred to as BELL or WECO) standard are likely to be compatible. However, manufactures of modems to the BELL specifications have added convenience features to the basic specification, such as - Automatic Answer, Automatic Dial, The ability to be controlled from a computer console or AT command set.

However, some manufactures have refined their products to such a degree that they are no longer compatible with the original AT&T product. For

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the most part, manufactures claiming AT&T compability are in fact compatible.

CCITT Compatibility

CCITT V.XX standards are directed primarily at the European Telephone facility. However, North American modem manufactures and Communications Network operators are moving toward the CCITT standards for data communications. This is due in part to AT&T getting out of the business and the need to be compatible with the European Market.

CCITT standards call for newer and faster modems to be backward compatible with their earlier counterparts.

For Example: A 2400bps V.22 bis modem will be compatible with its 1200 bps V.22 counterpart at the V.22 bis fallback operating speed of 1200bps. It will also be compatible with the AT&T 212A modem specification operating at 1200bps since the standards are closely related.

Many Dial-up (DU) or Public Switched Telephone Network (PSTN) and Private Lease Line (PLL) modems conform to CCITT specifications, the most popular being:

- V.22 and V.22 bis for medium speed dial-up modems
- V.32 for 4800 bps and 9600 bps for dial-up modems
- Others in use are V.26, V.27, V.29, V.33, and their alternatives.

Hayes Compatibility

Another type of compability involves the Hayes AT Command Structure. The Hayes AT Structure relates to the modem commands, modem responses, and the ability to provide settings that are compatible with various communications programs.

For Example:

Modems compatible with the Hayes SMARTMODEM 1200 obey the 22 modem commands and 16 register settings stipulated for that device. Hayes compatibility also involves compatibility with the AT&T 103 operating standard at 0 to 300 bps and the AT&T 212 standard at 1200 bps.

Hayes compatible products have speakers for audibly following call progress, front panel status lights on external units, and auto dial, auto answer, manual dial, and manual answer features for asynchronous operation.

TABLE 1: MODEM STANDARDS

SPEED (BPS)	FULL-DUPLEX/ HALF-DUPLEX/ MULTIDROP(2W/4W)	SYNC/ ASYNC	PSTN/ PLL/ DDS	TYPE/SERIES MODEM (STANDARD)
0 TO 300	Full-Duplex (2W)	ASYNC	PSTN	103J (BELL)
	Multidrop (2W/4W)	ASYNC	PLL	108 (BELL)
0 TO 1200	Full-Duplex (2W)	ASYNC/SYNC	PSTN	212 (BELL)
	Half-Duplex (2W)	ASYNC	PSTN	202S (BELL)
		SYNC	PSTN	202S/S (BELL)
0 TO 1800	Half-Duplex (2W)			
	Full-Duplex (4W)			
	Multidrop (4W)	ASYNC	PLL	202T (BELL)
0 TO 2400	Full-Duplex (2W)	ASYNC/SYNC	PSTN	224 (BELL/CCITT)
2400	Half-Duplex (2W)	SYNC	PSTN	201C (BELL)
	Full-Duplex (4W)			
	Multidrop (4W)	SYNC	PLL	201B (BELL)
			DDS	DDS 2.4K (BELL)
4800	Half-Duplex (2W)	SYNC	PSTN	208B (BELL)
	Full-Duplex (4W)			
	Multidrop (4W)	SYNC	PLL	208A (BELL)
			DDS	DDS 4.8K (BELL)
9600	Half-Duplex (2W)	SYNC	PSTN	V.29 (SPECIAL)
	Full-Duplex (2W)	SYNC	PSTN	V.32 (CCITT)
	Full-Duplex (4W)	SYNC	PLL	V.29 (CCITT)
			DDS	Fast Poll V.29 (SPECIAL)
	Multidrop (4W)	SYNC	PLL	Fast Poll V.29 DDS 9.6K (BELL)
14.4K	Full-Duplex (4W)	SYNC	PLL	V.33 (CCITT)
56K	Full-Duplex (4W)	SYNC	DDS	DDS 56K (BELL)

12.2.4 Office Layout Information

12.2.4.1 Office Layout Dual Dial Backup Units

Detailed below in Figures 2 & 3 respectively is a typical conceptual layout of a Dual Dial Backup Unit (DDBU) in a Dedicated and Dial-Up mode. However, this section is for historical purposes only as no DDBU is currently approved for DMS-100F applications.

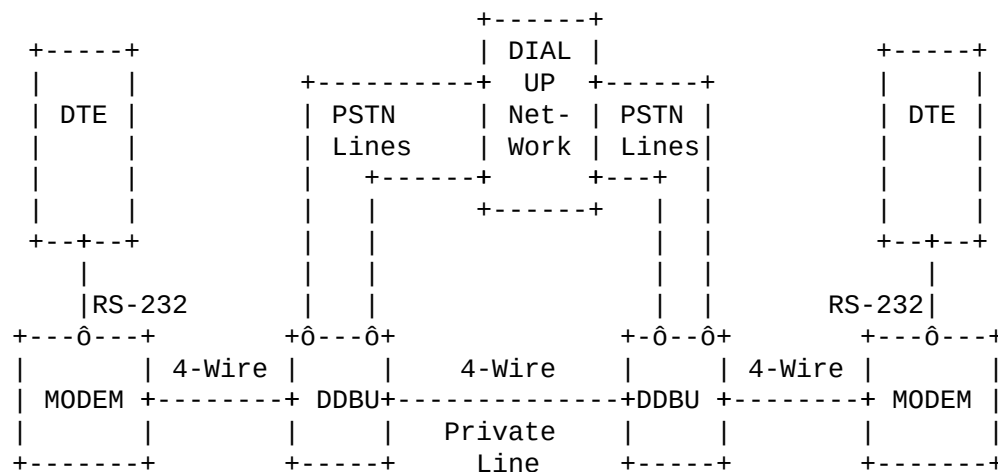


Figure 2: DDBU Dial Backup Configuration

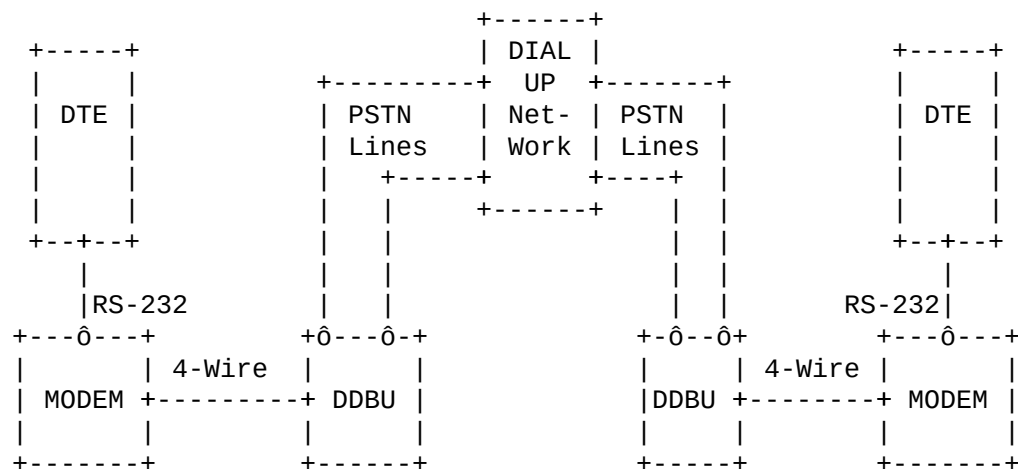


Figure 3: DDBU Dial-Up Configuration

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12.2.5 Traffic Tables

Not Applicable

12.3 Product/System Specification

See Engineering Manual Section

12.3.1 Physical Characteristics

12.3.2 EMI/Earthquake Information

Not Applicable

12.3.3 Sparing Information

The standard sparing algorithms shall apply

12.3.4 Power Feed and Fusing Requirements

12.3.4.1 CASE/DATATEL DCM42000 Modem Shelf (-48VDC)

Input Voltage.....-48VDC
Power Consumption.....134.4 watts Fully loaded
Current Drain.....2.8 Amps
Fusing Requirements.....Two (2) 5 Amp Fuses

Capacity.....1 to 16 DCM4200 Series Modems.

Connections.....DTE interface: Sixteen 25-pin EIA
female connectors

Telephone Line Interface.Four DDD 50-pin male connectors and
two PL 50-pin female connectors

Telephone Interface.....Four 50-pin female connectors, used
for the 4229 DAS unit interface
connection.

MECHANICAL DIMENSIONS

Height 7"(178mm) Width 19"(483mm) Depth 5.4"(392mm)
Weight 33.8lb(15.4Kg) fully Loaded

12.3.4.2 CASE/DATATEL DCM42001 Modem Shelf (-48VDC)

Input Voltage.....115V,RMS at 60Hz
Power Consumption.....207VA Fully loaded
Current Drain.....1.8 AMPS
Fusing Requirements.....Two (2) 5 Amp Fuses

Capacity.....1 to 16 DCM4200 Series Modems.

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Connections.....DTE interface: Sixteen 25-pin EIA
female connectors

Telephone Line Interface.Four DDD 50-pin male connectors and
two PL 50-pin female connectors

Telephone Interface.....Four 50-pin female connectors, used
for the 4229 DAS unit interface
connection.

MECHANICAL DIMENSIONS

Height 7"(178mm) Width 19"(483mm) Depth 5.4"(392mm)
Weight 33.8lb(15.4Kg) fully Loaded

12.3.4.3 UDS RM16M Modem Shelf -48VDC

Input Voltage.....-48Vdc +/- 4V
Power Consumption..... N/A
Current Drain.....3 Amps Max
Fusing Requirements.....Two (2) 3 Amp Fuses

Capacity.....1 to 16 Modems

Connections..... N/A

Telephone Line Interface... N/A

Telephone Interface..... N/A

MECHANICAL DIMENSIONS

Height 7.0" Width 23.0" Depth 10.75"
Weight 50lbs

12.3.4.4 GDC DS-5 / DS-6 -48V Modem Shelf

Input Voltage.....-48Vdc +/- 4V
Power Consumption..... 160 watts
Current Drain.....3.3 Amps Max
Fusing Requirements.....Two (2) 5 Amp Fuses

Capacity.....1 to 16 Modems

Connections..... N/A

Telephone Line Interface... N/A

Telephone Interface..... N/A

MECHANICAL DIMENSIONS

Height 10.50"
Weight 17lbs

Width 23.0"

Depth 13.50"

12.3.5 Current Drain Information

See section 3.4.1 - 3.4.4

12.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

12.4.1 Required Software Packages and Interdependencies

See Table Z.

12.4.2 Software Usage Restrictions

See Table Z.

12.4.3 Memory Provisioning

Not Applicable

12.5 Real Time Impact

Not Applicable

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13.0 ECM706 - MCAM-3, MERIDIAN CABINET AUXILIARY MODULE 3

13.1 Overview

The Meridian Cabinet Auxiliary Module 3 is the latest in the series of cabinet products in the MSL100 product line. MCAM-3 will replace the MCSM and MCAM-2 cabinets. MCAM-3 can be configured with either 3 ISM (Integrate Service Module) shelves or 2 ISM shelves and 1 DIO shelf.

The ISM shelf can be configured with existing and new service circuits like EDRAM and CTM (Conference Trunk Module).

The DIO shelf can be configured with existing I/O cards and the new SCSI DDU, (NT1X55FA) circuit pack.

When the IOM is available it will always be ordered instead of the DIO shelf if I/O is required from the cabinet, and the cabinet will always be equipped with 3 ISM shelves.

	2 inch Filler Plate
Shelf Pos. 66	Modular Supervisory Panel
Shelf Pos. 61	ISM 00 Option <Z> Option <Y>
Shelf Pos. 47	ISM 01 Option <Z> Option <Y>
Shelf Pos. 33	ISM 02 - Option <Z> OR DIO 00 - Option <Y>
Shelf Pos. 19	Cooling Unit
Shelf Pos. 14	
Shelf Pos. 01	P.D.P

Note: Shelf 19 of the MCAM-3 must always be provisioned with either option <Z> or option <Y> for an ISM or DIO shelf respectively. A filler panel for shelf 19 is NOT an option. When the IOM is available option <Z> will always be provisioned.

Figure 23. MCAM-3 Cabinet Front View.

13.2 Hardware Provisioning

13.2.1 Hardware Usage Restrictions

1) Some service circuits currently used in the STM/MTM/TM shelves will not be supported in the ISM shelf. The following table lists those circuit packs and their replacement:

@*****#	*****#
CIRCUIT PACKS]	CIRCUIT PACKS]
NOT SUPPORTED]	REPLACED BY NOT SUPPORTED]
	REPLACED BY

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BY ISM]	BY ISM]
*****	*****
NT1X00AA/AB] NT1X80AA	NT3X05AA-AC] NONE
NT1X00AC/AD]	*****
NT1X75AA/BA/DA]	NT3X08AA] NT3X08AB
NT1X76AA]	*****
NT1X77AA]	NT3X09AA] NT3X09BA
NT1X79AA]	*****
*****	NT3X82AA/AB/AC] NT3X82AJ
NT1X31AA] NT1X81AA	NT3X82AD/AE/AF]
NT3X67AA/BA/BB]	NT3X82AG]
*****	*****
NT1X67DB/FA] NT1X89BB	NT3X83AA] NT3X83AC
NT6X91BB (X.25)]	NT3X83AB]
*****	*****
NT2X10AA-AC/BA] NT2X10BB	NT3X85AA] NT3X85AB
*****	*****
NT2X11AA-AD] NT2X11BA	NT3X98BA/BB] NT3X98BC
*****	*****
NT2X43AB] NONE	NT5X25AA] NONE
*****	\$*****%
NT2X47AA] NONE	

NT2X47AB-AC] NT2X47AD	

NT2X48AA-AB] NONE	

NT2X50AB] NT3X09BA	

NT2X55AA] NONE	

NT2X56AA] NT2X56AB	

NT2X90AA-AC] NT2X90AD	
\$*****%	

2) The maximum number of single PM packs that can be provisioned in an ISM shelf is 15. However, when ISM is packaged in the MCAM-3, each ISM shelf can have up to 7 single PM circuit pack due to the limitation of the number of connectors on the bulkhead. The location of the circuit packs and their network connector are as follows:

@*****#
Network Connector Slot Locations
*****+
CO-0N & CO-1N 6,7,8, & 21
CO-2N & CO-3N 9,10,11, & 12
\$*****%

3) Each network connector has four network ports. First connectors CO-0N and CO-1N provide one network port for the ISM processor, NTFX42AA in slot 21.

13.2.2 Hardware Dependencies

Not applicable.

13.2.2.1 P and C Side Port Requirements

P-Side: The P-Side interface on the ISM shelf is determined by the services circuits.

C-Side:

) A maximum of 8 DS-30 links to network are allowed per ISM shelf. This includes one (1) DS-30 link for the ISM processor and one (1) for each EDRAM or CTM circuit pack.

) Each EDRAM or CTM will have its own DS-30 link to the network.

13.2.2.2 DMS BUS Port Requirements

When the MCAM-3 cabinet is configured with a DIO shelf, it will require DS-30 links to the DMS bus. The DIO will require two (2) DS-30 MS ports per MS plane.

Each ISM shelf (3 shelves) within the MCAM-3 may be provisioned with one IOM Module. Each IOM will require one (1) DS-30 MS port per plane.

Due to a limitation in the number of simultaneous messages that the message Switch (MS) can handle on each port, only three (3) major devices may be installed in any one IOC. For example:

) (1) NT1X55FA and (2) NT1X89BB's V.35"

OR -

) (3) NT1X89BB's V.35"

OR -

) (2) NT1X55FA's and (1) NT1X89BB V.35"

OR -

4) (1) NT1X68BC, (1) NT1X55FA, and (1) NT1X89BB V.35"

This limitation also applies to the IOM smart boxes and Storage Media Card (SMC).

13.2.2.3 Circuits Per Card

Refer to the EMA14-01-000 for the number of circuits supported by each service circuit pack.

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13.2.2.4 Discrimination Numbering

ISM shelf is labeled with the abbreviation TM8, or MTM depending on the shelf function. The TM8 or MTM label will be based on the software load applied.

13.2.3 Provisioning Considerations

The MCAM-3 can be provisioned with either of the two following configurations:

- 1) Three (3) ISM shelves.
- 2) Two (2) ISM shelves and one (1) DIO shelf.

When IOM Modules are available the MCAM-3 will be always ordered with three (3) ISM shelves (OPTION <Z>).

The MCAM-3 can be equipped several different ways by providing different pre-defined options. This allows the cabinet to provide several different functions besides powering the line-up within the office, such as office alarms, line testing, and provide service circuits. The table below is a list of MCAM-3 options:

OPTION	DESCRIPTION
<Z>	Cabinet equipped with 3 ISM shelves
<Y>	Cabinet equipped with 2 ISM's & 1 DIO shelf
<X>	EDRAM/CTM DS30 Wiring at ISM slots 09 to 12
<W>	Office Alarms Wiring
<V>	Metallic Test Access Wiring
<U>	MDF Cables for ISM slots 09 to 12
<T>	MDF Cables for ISM slots 17 to 20
<S>	MDF Cables for ISM slots 13 to 16
<Q>	ISM Shelf Hardware & Cables to provide IOM & SMC Circuit Packs.
<P>	Left Power Bulkhead (Power to external equipment or equipment not on the line-up with this cabinet.

NOTE: The MCAM-3 Cabinet must be equipped with either option <Z> or option <Y>. Other options may be provided as required. Option <Z> will always be ordered when the IOM Module is available.

Figure 24. MCAM-3 PROVISIONABLE HARDWARE OPTIONS

The ISM (NTFX4101) is a standard DMS size shelf. The ISM shelf will house a provisionable single slot ISM processor (NTFX42AA), and a provisionable two slots ISM DC power converter (NTFX43AA). The remaining slots will be used for provisionable service circuits.

ISM shelf common circuit pack descriptions:

1) ISM processor: The ISM processor (NTFX42AA) is a single slot circuit pack that will provide a combined functionality of NT0X70, NT2X45, NT2X53 and NT2X59 or a combined functionality of NT2X59 and NT4X65 currently used in STM/MTM/TM module. The ISM processor is provisionable at slot 21. Provision ISM processor only when there is one or more provisionable NON-PM type service circuits in the ISM shelf.

2) ISM DC converter: The ISM DC converter (NTFX43AA) is a two slots circuit pack. NTFX43AA will provide all DC power required by the ISM shelf. The NTFX43AA is provisionable at slots 01-02.

3) NON-PM Service circuits: NON-PM service circuits are circuit packs that require DC voltage of +5v, +12v, +25v and -15v and control from the ISM Processor CP.

NON-PM Service circuits can be provisioned at any slot from slot 05 through slot 20. Slot 05 can be used for a circuit pack that must work in a pair with another circuit pack.

4) PM Service circuits (EDRAM & CTM): PM Service circuits are circuit packs that DO NOT require DC voltage from the ISM shelf power converter and control from the ISM shelf Processor (NTFX42AA). PM Service circuits (e.g. CTM) get DC power directly from -48v battery.

Provision PM service circuit packs only to slots 03-05 and 09-12 in ISM shelf of the MCAM-3. Each PM Service circuit requires a DS-30 link to the network.

ISM Slot Number As Viewed From The Rear, Shelf 47																								
21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01				
<-Option->									<-Option->				<-Option->			D	D	D				<--->		
N	N	N	N	N	N	N	N	N	EDRAM CP				S	S	S						N			
T	T	T	T	T	T	T	T	T	OR				3	3	3						T			
F	3	3	3	0	2	3	3	3	3	CTM CP				0	0	0					F			
X	X	X	X	X	X	X	X	X	X											X				
4	8	8	1	5	0	0	0	0												4				
2	2	3	0	7	9	9	9	9							EDRAM					3				
<--ALARM->									<--MTA-->				<--DS30-->				EDRAM or CTM					<--->		
D	<W>				<V>				<X>															
S																<-IOM-->								
3																<Q>								
0																								
<-Option-->									<-Option-->				<-Option-->											
<T>									<S>				<U>											
<-----MDF CABLING OPTIONS----->																								

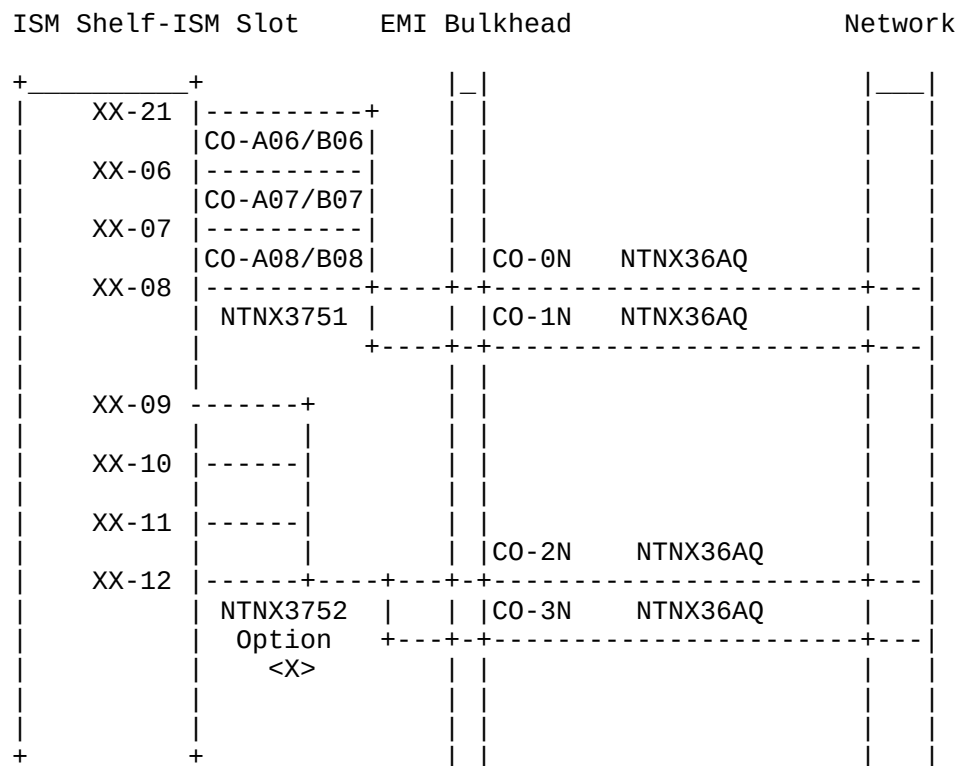
Figure 25. ISM in MCAM-3 cabinet shelf 47.

ISM Slot Number As Viewed From The Rear, Shelf 33.																				
21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01
<-Option->				<-Option->				<-Option->				D	D	D				<--->		
N	N				N	N	N	N	EDRAM CP				S	S	S				N	
T	T				T	T	T	T	OR				3	3	3				T	
F	3				2	2	2	2	CTM CP				0	0	0				F	
X	X				X	X	X	X	<EDRAM->										X	
4	8				9	9	1	1					CTM						4	
2	2				0	0	0	1	<---DS30--->										3	
<---ALARM->				<---MTA--->				<---IOM--->					<--->							
<W>				<V>				<X>					<Q>							
D																				
S																				
3																				
0																				
<-Option-->				<-Option-->				<-Option-->												
<T>				<S>				<U>												
<-----MDF CABLING OPTIONS----->																				

Figure 26. ISM in MCAM-3 cabinet shelf 33.

ISM Slot Number As Viewed From The Rear, Shelf 19.																					
21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	
									<-Option-->			D	D	D				<--->			
N									EDRAM			CP	S	S	S				N		
T									OR				3	3	3				T		
F									CTM			CP	0	0	0				F		
X													<EDRAM-->						X		
4													CTM						4		
2																			3		
									<---DS30-->									<--->			
D									<X>												
S																		<-IOM-->			
3																		<Q>			
0																					
									<-Option-->			<-Option-->			<-Option-->						
									<T>			<S>			<U>						
<-----MDF CABLING OPTIONS----->																					

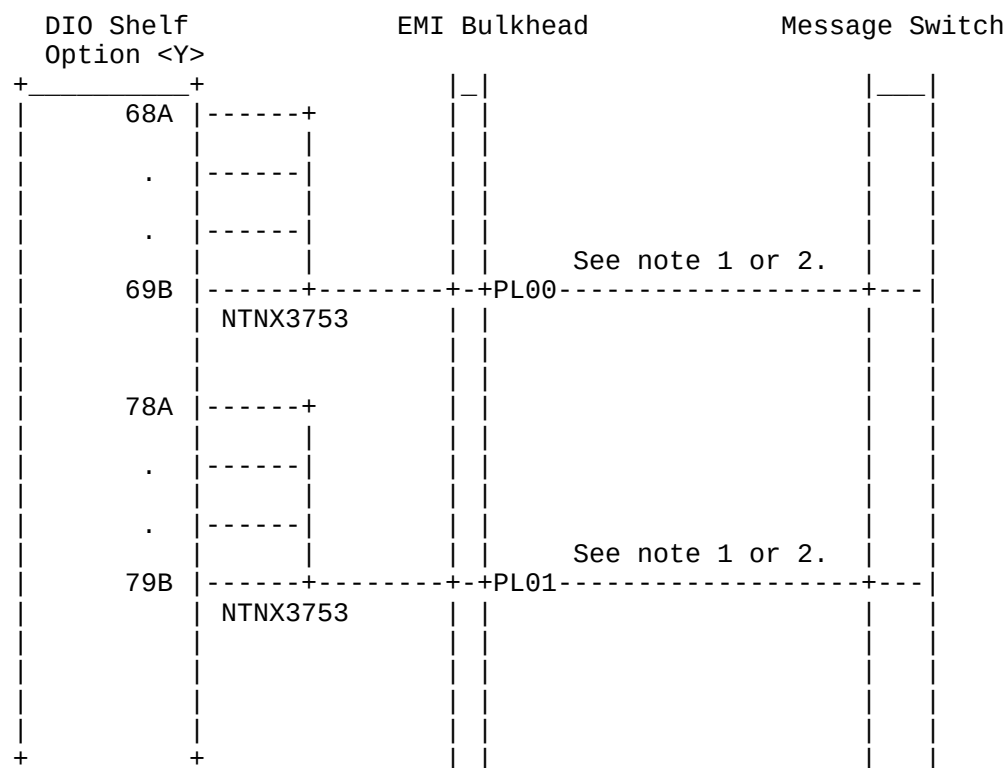
Figure 27. ISM in MCAM-3 cabinet shelf 19.



Notes:

- 1) XX can be shelf 19, 33 and 47.
- 2) NTNX36AQ cable is used only for MCNM or SNSE.
Check CANX11AB if connected to other network cabinet.

Figure 28. DS30 connection to Network.



DIO to Message Switch Connectivity.

Notes:

- 1) Use NTNX36AQ cable for DPCC
- 2) Use NTNX40SM cable for SNSE (W/NT9X69BA PB)
- 3) NTNX3753 cable is included in the NTNX37WG H/W kit

Figure 29. DS30 connection to Message Switch.

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ISM Shelf-ISM Slot	EMI Bulkhead	MDF
+-----+ 47-20	-----+ NTNX3762	NTNX36AT/GD/CW
47-19	-----+ CO-06	-----+ + '
<T> 47-18	-----+ NTNX3761	NTNX36AT/GD/CW
47-17	-----+ CO-05	-----+ + '
47-16	-----+ NTNX3760	NTNX36AT/GD/CW
47-15	-----+ CO-04	-----+ + '
<S> 47-14	-----+ NTNX3759	NTNX36AT/GD/CW
47-13	-----+ CO-03	-----+ + '
47-12	-----+ NTNX3758	NTNX36AT/GD/CW
47-11	-----+ CO-02	-----+ + '
<U> 47-10	-----+ NTNX3757	NTNX36AT/GD/CW
47-09	-----+ CO-01	-----+ + '
47-08	-----+ NTNX3756	NTNX36AT/GD/CW
47-07	-----+ (NOTE 4)	-----+ CO-00
+-----+ 	-----+ 	-----+
+-----+P3	-----+ 	-----+
MSP 61-08	-----+ 	-----+
+-----+ NTNX3766 (Always provided)		
		OR NTNX3778 (Release 05 & later cabinets)

The NTNX3766 cable cables out MDF connections from ISM slot positions 47-07 & 47-08, and cabinet alarms from the MSP (AISLE, PDC, & ABS). The NTNX3778 cable only cables out the cabinet alarms from the MSP (AISLE, PDC, & ABS). On release 05 and later cabinets ISM slots 06, 07, and 08 are reserved for EDRAM/CTM packs and thus are cabled to the bulkhead for DS30 ports with the NTNX3751 cable.

Note:

- 1) Provision NTNX36AT when a cable with female connectors at both ends is required.

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- 2) Provision NTNX36GD when a cable with one male and one female connector is required.
- 3) Provision NTNX36CW cable when a single ended cable with one female connector is required.
- 4) The NTNX3756 & 66 cables to the MDF are provided only on release 01 to 04 cabinets, and the MDF connections on ISM slots 07 & 08 will not be used when upgrading to IOM in the field with upgrade kits NTNX37UA (SH.47), NTNX37UB (SH.33), and NTNX37UC (SH.19). MDF cable connectors on the ISM backpanel slots 07 & 08 will be disconnected and tied back. The NTNX3751 cable connectors that were on slots 04 & 05 will be moved to slot 07 & 08 respectively. EDRAM/CTM may then be provisioned in slots 06, 07, & 08 on the ISM.

Figure 30. MDF Cabling from ISM backpanel for ISM at shelf 47.

ISM Shelf-ISM Slot	EMI Bulkhead	MDF
XX-20	NTNX3762	NTNX36AT/GD/CW
XX-19	CO-06	
<T> XX-18	NTNX3761	NTNX36AT/GD/CW
XX-17	CO-05	
XX-16	NTNX3760	NTNX36AT/GD/CW
XX-15	CO-04	
<S> XX-14	NTNX3759	NTNX36AT/GD/CW
XX-13	CO-03	
XX-12	NTNX3758	NTNX36AT/GD/CW
XX-11	CO-02	
<U> XX-10	NTNX3757	NTNX36AT/GD/CW
XX-09	CO-01	
XX-08	NTNX3756 (NOTE 6)	NTNX36AT/GD/CW
XX-07	CO-00	

Note:

- 1) XX can be an ISM in shelf 19 or shelf 33.
- 2) Cable NTNX3756 is an always provided item.
- 3) Provision NTNX36AT when a cable with female connectors at both ends is required.
- 4) NTNX36GD when a cable with one male and one female connector is required.
- 5) Provision NTNX36CW cable when a single ended cable with one female connector is required.
- 6) The NTNX3756 & 66 cables to the MDF are provided only on release 01 to 04 cabinets, and the MDF connections on ISM slots 07 & 08 will not be used when upgrading to IOM in the field with upgrade kits NTNX37UA (SH.47), NTNX37UB (SH.33), and NTNX37UC (SH.19).

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MDF cable connectors on the ISM backpanel slots 07 & 08 will be disconnected and tied back. The NTNX3751 cable connectors that were on slots 04 & 05 will be moved to slot 07 & 08 respectively. EDRAM/CTM may then be provisioned in slots 06, 07, & 08 on the ISM.

Figure 31. MDF Cabling from ISM backpanel for ISM shelves 19 and 33.

The following is a list of components of an IOM subsystem. Quantities depend on the office requirements.

INPUT OUTPUT MODULE (IOM)

1. NTNX37UA/UB/UC - MCAM-3 ISM RETROFIT KITS FOR IOM (FIELD UPGRADES ONLY)

These kits are provided on the MCAM-3 to allow provisioning of the IOM Controller and Storage Media Card at ISM slot position 03F and 04F respectively. They are used for field upgrades only to add IOM Modules to the MCAM-3 cabinet.

The kits contain one NTFX31AA Paddleboard Assy., one P0749586 Insertion Guide, one NTFX39AA Bulkhead Cable Splitter (1 to 9), one P 832228 Connector Key Bracket, and hardware to install these items plus associated cables. The IOM Controller CP and the Storage Media CP are provisioned separately.

Kit NTNX37UA is used at ISM shelf position 47, NTNX37UB at shelf position 33, and NTNX37UC at shelf position 19. IOM upgrade kits should be applied on shelf position 19 and 33 first to eliminate having to remove -48VABS from the line-up to do the upgrade. This applies to release 01 cabinets only where the bulkhead personality plate must be replaced for the NTFX39AA to fit on the BH.

These kits are only used for field upgrades to the IOM Input/Output Controller. Factory installation will be cut in January of 1998.

2. NTNX37UD - MCAM-3 IOM Hardware Kit (Manufacturing Installation)

This kit is provided on the MCAM-3 to allow provisioning of the IOM Controller and Storage Media Card at ISM slot position 03F and 04F respectively. It allows ordering of new cabinets from the factory equipped with an IOM Module on any of the three ISM shelves in the cabinet. One (1) kit is needed for each IOM Module.

The kit contains one NTFX31AA Paddleboard Assy., one P0749586 Insertion Guide, one P0832228 Connector Key Bracket, one P0871015 Bulkhead Splitter Diagram Label for the rear door of the cabinet, and associated cables. The IOM Controller CP, IOM Bulkhead

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Splitter (NTFX39AA), and the Storage Media CP are provisioned separately.

3. NTFX30AA - IOM CONTROLLER CARD (IOM)

The IOM connects to the Message Switch (MS) via one DS30 link per plane. The IOM Controller Card contains hardware and firmware to support 16 general purpose ports (RS-232C, V.35, Current Loop, and PERTEC), and 2 optional external SCSI devices on the Storage Media Card. The card occupies one slot (slot 03F) on the ISM Shelf. Slot 04F is reserved for a NTFX32AA Storage Media Card and may NOT be provisioned with another IOM Controller CP on each ISM shelf in the MCAM-3 Cabinet.

A. NTFX31AA - IOM PADDLEBOARD ASSEMBLY

This Paddleboard Assembly has 20 connectors to distribute 20 ports to the bulkhead. Sixteen (16) of the ports provide power along with signaling to a Smart Box at the end of each cable. Two of the 20 ports are for connection to the MS and the last two are unused.

The NTFX31AA IOM Paddle Board Assembly also contains the power feed circuitry to 16 Smart Boxes and circuitry to implement local loopback for diagnostic purposes.

The NTFX31AA is mounted on the rear side of the backplane.

The NTFX31AA Paddleboard Assembly contains an additional connector to link the IOM Controller Card to the Storage Media Card in slot 4 through a SCSI bus. The DC current on each link is limited to maximum 100mA. The NTFX31AA is always provisioned with the NTFX30AA.

4. NTFX32AA - STORAGE MEDIA CARD (SMC)

The Storage Media Card is a provisionable circuit pack with the IOM Controller. It can hold a maximum of two Plug-In Module DDUs or one DAT Plug-In Module.

Two (2) housed connectors on the CP are designated slot 00 and slot 01. Slot 0 is located at the top of the SMC and slot 01 is at the bottom. Functionally, with a DDU and a DAT Plug-In module installed, the card is the equivalent to the DDU and 9 Track MTD. It is used for all applications that require a DDU and/or 9 Track MTD.

The card can only be inserted in slot 04F on the ISM Shelf, filling two slots 04F-05F with a double faceplate. The Storage Media Card is connected to the IOM Controller Card in slot 03F with a SCSI Cable. The SCSI Cable (NTFX40HB) and Connector Key Bracket (P0832228) are provided in Kits NTN37UA, UB, & UC. Designation

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Label (P0831733) is needed when the NTFX32AA is ordered and must be provisioned.

4A. NTFX32BA - DDU PLUG-IN MODULE

This is a 1 Gbyte 3.5" SCSI disk provisionable drive. It is inserted into a housed connector on the Storage Media Card. A maximum of two DDUs can be mounted on the SMC as Units 0 and 1. The first DDU should always be provisioned in SMC slot 00.

4B. NTFX32CA - DAT PLUG-IN MODULE

This is a 1.3 Gbyte 3.5" SCSI 4mm DAT drive. It plugs into a housing on the Storage Media Card. It is only provisionable in the unit 1 position. This unit uses a 4mm cassette tape and provides the same functionality as the 9 track MTD. A maximum of one DAT would be found in an office per IOM. The DAT may co-exist on the same IOM with an MTD.

4C. NTFX32DA - STORAGE MEDIA FILLER CARD

Used on the NTFX32AA SMC when an open plug-in module slot 00 or 1 exists.

5. SMART BOXES

5A. NTFX34AA - RS-232C Smart Connector (Box) Assembly

Smart Connector (Box) Assembly containing IOM to RS-232C message protocol conversion circuit.

5B. NTFX35AA - V.35 Smart Connector (Box) Assembly

V.35 Smart Connector (Box) Assembly containing IOM to V.35 message protocol conversion circuit.

5C. A0300753 - Passive Adapter for 25 pin V.35 connector to 34 pin V.35 connector.

The V.35 Smart Box connector is 25 pin and this adapter may be needed to connect to devices that have V.35 34 pin connectors.

5D. NTFX35BA - 512Kbps Compatible Smart Connector (Box)

For use in MCI specific requirements for 512Kbps Synchronous Communications support on IOM. Supports X.25 links at 512Kbps synchronous speed for up to a maximum of 2 links per IOM.

5E. NTFX38AA - Current Loop Smart Connector (Box)

Smart Connector (Box) providing 20mA current loop. Contains IOM to Current Loop protocol conversion circuitry.

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5F. NTFX36AA - PERTEC Smart Connector (Box) Assembly

Smart Connector (Box) containing IOM to PERTEC protocol conversion circuit for 9 track MTD support.

If the PERTEC device is cabinetized the PERTEC Smart Box is mounted inside the cabinet, on the right hand side upright, looking from the rear. The PERTEC Smart Box to bulkhead connection is made using the cable NT0X4321 (length=2.5 feet).

6. SMART BOX CABLE ADAPTERS

6A. NTFX40UD - This is a gender adapter cable used to connect modems with a male RS232 (DB25F) to a Smart Connector (DB25F).

6B. NTFX40UE - This is a Smart Connector gender adapter cable required to connect the IOM Smart Connectors to MAP Terminals or printers. The NTFX40UE is provided when a plug (male) end is required at the MAP terminal or printer.

6C. NTFX40UF - This is a Smart Connector gender adapter cable required to connect the IOM Smart Connectors to MAP Terminals or printers. The NTFX40UF is provided when a plug (female) end is required at the MAP terminal or printer.

7. IOM BULKHEAD SPLITTER

7A. NTFX39AA - The Bulkhead 1-9 Cable Splitter Assembly is an interconnect panel mounted on the MCAM3 bulkhead. It covers four (4) 37 pin D-Sub connector positions on the bulkhead will split out 16 I/O DS30 ports and both plane 0 & plane 1 MS ports from two IOM modules.

The NTFX39AA will be mounted at shelf position 33 bulkhead personality plate for IOM's provisioned on ISM shelf positions 9 and 33. The IOM at shelf position 19 ISM shelf will use output connectors S03MS0, S03MS1, and S03P00 to S03P15. The IOM at shelf position 33 ISM shelf will use output connectors S04MS0, S04MS1, and S04P00 to S04P15.

The NTFX39AA will be mounted at shelf position 47 bulkhead personality plate for the IOM provisioned on ISM shelf position 47. The IOM at shelf position 47 ISM shelf will use output connectors S03MS0, S03MS1, and S03P00 to S03P15.

8. IOM DS30 CABLES

8A. NTRX26GA - MCAM3 to Smart Boxes

8B. NTAX36BA - MS ports from MCAM3 IOM to MSL DPCC for one (1) or two (2) IOM modules.

8C. NTAX36BB - MS ports from MCAM3 IOM to Custom EMI DPCC for

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- one (1) or two (2) IOM modules.
8D. NTRX26GD - MS ports from MCAM3 IOM to SNSE.

9. LEFT POWER BULKHEAD

- 9A. NTNX37PC - MCAM3 Power Bulkhead Kit which provides the NTNX37PB Left Power Bulkhead and all the hardware required to mount a the bulkhead in the rear of the cabinet to provide power for external to line-up equipment.
9B. NTNX37PD - Power Personality Plate Assy. provisioned when the NTNX37PC Kit is provisioned. One (1) plate provides two -48V A-Feed, two -48V B-Feed, and two logic ground connections. From (1) to (5) NTNX37PD plates may be provisioned from the bottom of the bulkhead (position 2) up.

The maximum gage cable that can be attached to the feed thru terminals on the outside of the bulkhead is 6 AWG. Maximum voltage drop in external cable should be calculated to be less than 0.5 volt and will depend on current drain of equipment being powered and length of the cable.

- 9C. P0725640 - Blank 5 Inch Personality Plate - 10 P0725640 plates may be provisioned. The number of P0725640 Plates will be equal to 10 minus 2 times the number of NTNX37PD Pesonality Plate Assemblies provisioned.
9D. NTNX37PE - PDP to Power Bulkhead Cable Assembly for bulkhead positions 2 & 3 Personality Plate (NTNX37PD) on the power bulkhead.
9E. NTNX37PF - PDP to Power Bulkhead Cable Assembly for bulkhead positions 4 & 5 Personality Plate (NTNX37PD) on the power bulkhead.
9F. NTNX37PG - PDP to Power Bulkhead Cable Assembly for bulkhead positions 6 & 7 Personality Plate (NTNX37PD) on the power bulkhead.
9G. NTNX37PH - PDP to Power Bulkhead Cable Assembly for bulkhead positions 8 & 9 Personality Plate (NTNX37PD) on the power bulkhead.
9H. NTNX37PJ - PDP to Power Bulkhead Cable Assembly for bulkhead positions 10 & 11 Personality Plate (NTNX37PD) on the power bulkhead.

13.2.4 Office Layout Information

MCAM-3 provides power to cabinets for its line up. It is recommended that the MCAM-3 be the first cabinet in a line up.

13.2.5 Traffic Tables

Not applicable.

13.3 Product/System Specification

Refer to Figure 23 on page 17-119 for brief description.

13.3.1 Physical Characteristics

13.3.2 EMI/Earthquake Information

The MCAM-3 cabinet is designed to meet FCC part 15 class A requirements.

13.3.3 Sparing Information

Circuit pack sparing is based on turned-around time, geographic location of depot and MCAM-3 cabinets, and the amount of equipment concentrated at a single location.

Provisioning spares should be a minimum of one each per ISM and DIO circuit pack, up to a maximum of 10% of what's in the MCAM-3.

13.3.4 Power Feed and Fusing Requirements

The following fuses and feeds are required:

DESIG	FUSE	POTENTIAL	ONE PER
10-F1	0.75	L-OUT1 (ABS)	CABINET
10-F2	0.75	L-OUT2 (ABS)	CABINET
10-F3	0.75	L-OUT3 (ABS)	CABINET
10-F4	0.75	L-OUT4 (ABS)	CABINET
10-F5	0.75	L-OUT5 (ABS)	CABINET
10-F6		NC	
10-F7		NC	
10-F8		NC	
12-F1	3.0	FLT0	ISM 0
12-F2	3.0	FLT2	ISM 1
12-F3		NC	
12-F4		NC	
12-F5	5.0	SP1	ISM 0
12-F6	5.0	SP1	ISM 1
12-F7	5.0	SP1	ISM 2
12-F8		NC	
13-F1	3.0	FLT1	ISM 1
13-F2		NC	
13-F3		NC	

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13-F4		NC	
13-F5	5.0	SP2	ISM 0
13-F6	5.0	SP2	ISM 1
13-F7	5.0	SP2	ISM 2
13-F8		NC	
11-CB01	10.0	L-(ABS)	FUSE MOD. 61-10
11-CB02	10.0	-48VABS	61-TB2
16-CB03	10.0	-48V(A)	ISM 0
16-CB04	10.0	-48V(A)	ISM 2 - Opt. <Z>
16-CB04	10.0	-48V(A)	DIO - Opt. <Y>
17-CB05	10.0	-48V(B)	ISM 1
17-CB06	10.0	-48V(B)	DIO - Opt. <Y>

Voltage limits potentials: -48V
Voltage limits range: -42.5V to 55.8V

MCAM-3 requires six (6) circuit breakers from the PDP. Three each from the A-feed and three each from the B-feed.

13.3.5 Current Drain Information

The typical maximum current drain for the MCAM-3 is 11.0 Amps @ 52.0 Volts. This would be for an MCAM-3 equipped with three (3) ISM shelves.

13.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

13.4.1 Required Software Packages and Interdependencies

ISM S/W support will be included in BCS36 by the following patches:

- TOM01
- TOM06
- ETT03
- ETT12

13.4.2 Software Usage Restrictions

MCAM-3 will require BCS36 and above.

13.4.3 Memory Provisioning

Not applicable.

13.5 Real Time Impact

Not applicable.

Chapter 18

NETWORK EQUIPMENT

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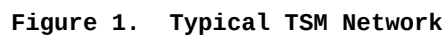
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1.0 ECM339 - Transport Services Management (TSM)

1.1 Overview

Transport Services Management (TSM) is a Dynamic Network Control (DNC) System application which provides centralized control and provisioning of a transport digital network. This is accomplished by remote monitoring and provisioning of a network of digital cross connect (DCC) systems and the digital trunks that connect them. TSM capabilities can be extended to a Telco's customers for control of their private virtual networks within the Telco's network.

The TSM control node is a software application of the DNC-500 system which uses standard Data Voice System (DVS) hardware. The system communicates with DCC systems under its control via dedicated links. Access can also be provided to a mainframe computer such as an Operational Support System (OSS) host. Figure 1 on page 18-2 depicts a typical TSM network configuration.



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Digital cross connect systems serve as the controlled nodes in a TSM network. These may connect to other controlled nodes or to nodes which are not monitored or controlled by TSM (eg. channel banks, central office switches). The existence of both types of nodes (controlled, uncontrolled) is stored in the TSM database. The uncontrolled nodes serve as the endpoints for accessing the network.

The Facilities which physically link nodes are DS1 transmission trunks (1.544 Mbits/sec) which terminate at Service Ports (digroups) at both ends. DS1 facilities are divided into 24 DS0 channels of 64 kbits/sec each. These channels may be assigned into "Circuits"

TSM currently supports Point-to-point circuits. A Simple Point-to-point circuit is a route between nodes composed of Facilities. Compound Point-to-point circuits are defined below under the NSR-23 Customer Network Management feature.

1.1.1 DNC-500 Hardware Description

The DNC-500 consists of a Data Voice System, provisioned with Shared Resource Units (SRUs) and Remote Resource Units (RRUs) to implement the TSM function.

1.1.2 System Parameter Terminology

Terms were defined in the "General" section of this document for the various entities in the network such as controlled nodes, digroups, facilities, etc. It will also be necessary to define some of the user functions that are performed on TSM. Full definitions are given in NTP 450-1031-311, "Network Operator's Guide for TSM Operation":

- * Network Planning - Assigning routes to Routing Preference Tables for use by the optional Capacity Management/Automatic Route Selection feature.

- * Network Status - Monitoring trouble and alarm states in TSM through surveillance capabilities, and closing and deleting status reports.

- * Node Provisioning - Defining controlled and uncontrolled nodes in the TSM database.

- * Facility Provisioning - Defining in the TSM database the DS-1 facilities and their endpoint nodes, and bringing these facilities into and out of service or alignment.

- * Circuit Provisioning - Defining circuit entities (access, capacity, point-to-point) in the database and bringing these circuits into and out of service.

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* Map Provisioning - Assigning service circuits into maps, and bringing these maps into and out of service.

* Service Data Manager - Directly manipulating DNC-500 system data (for example, channel unit data) through a man-machine interface.

* DNC Scheduler - Setting up tasks to be run on the system according to a pre-defined schedule.

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

1.2.2 Hardware Dependencies

1.2.2.1 P and C Side Port Requirements

1.2.2.2 DMS BUS Port Requirements

Not applicable

1.2.2.3 Circuits Per Card

1.2.2.4 Discrimination Numbering

1.2.3 Provisioning Considerations

1.2.3.1 TSM NSR-24 Hardware Features

A redundant N+1 application processor is added in this release to provide a 'hot spare'. In the event that one of the other application processors fails, its software will be automatically loaded onto the hot spare and restarted.

Small Computer System Interface (SCSI) hardware as identified in ECM-344 may be provisioned in this release.

1.2.3.2 DCC Equipment Provisioning Considerations

There are certain restrictions on the type of digital cross connect (DCC) hardware which is supported by TSM:

DNX-100 - NT5A03, NT5A04 and NT5A05 digroup types are supported

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1.2.3.3 TSM DNC-500 Provisioning Procedure

() Refer to ECM 344 Data Voice System for general DVS provisioning rules, including power, cabling and mechanical considerations. Always provide the following:

- One (1) NT4G16EE SCSI Primary Processor to run base DVS and DNC software.
- One (1) NT4G21AA SCSI Cartridge Tape SRU for loading system software.
- One (1) NT4G20TA SCSI 350 MByte Disk SRU for storing system software and all or a part of the TSM database.
- One (1) NT0M90PA M4010 Data Terminal for system user interface.
- One (1) NT3M20AA NT-220 or customer-supplied VT-100 compatible ASCII terminal for system initialization.

() Provision Application Processors to run TSM software features. Refer to the next section, "Application Processor Provisioning Method", for this information.

If N+1 redundancy is required, provide one (1) NT4G25GA 68020-10 Applications Processor.

() Provide additional NT0M90PA M4010 Data Terminals and/or NT3M20AA NT-220 (or equivalent customer-supplied VT-100 compatible) terminals as needed by the customer to support the anticipated number of system users.

(4) Provide one (1) A0317073 System Matrix Printer for printing reports and system logs. Additional printers may be provided as required by the Customer.

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(5) Provide NT4G46CA LIUs as follows:

Step 1 - Determine the overall TSM network configuration.

List all ASCII terminals, serial printers, DCC systems, host computers and other TSM systems that the DNC-500 must interface to, and the data transmission rates required.

The LIU allows terminal devices to interface to the DNC system. It provides two serial data ports and a parallel printer port. Each serial port can support one of these devices:

- ASCII Terminal
- Serial Printer
- Modem

The NT4G46EK 8-Line MUX Kit can be factory installed into the LIU housing to provide an additional eight serial ports.

Step 2 - Determine LIU port "personalities" required.

Personality software is loaded into the LIU's memory which determines the function and data communication protocol for each port. This software comes with the base DVS software load and does not have to be ordered separately. LIU port personalities used in TSM are:

ATA -

ASCII Terminal Access allows local or remote ASCII terminals to access the DNC system. An M4000 terminal emulation function is employed to enable these terminals to use such features as softkeys and windows.

APT -

ASCII Passthrough is a subset of the ATA personality which allows ASCII terminals to "pass through" the DNC system and communicate directly with a host computer.

AHA -

Asynchronous Host Access interfaces an ASCII host computer or other asynchronous device to the DNC system for communication with the DNC's M4000 terminals.

APIO -

ASCII Programmed Input/Output interfaces an ASCII host computer or other asynchronous device to the DNC system for communication with the DNC's ASCII terminals.

IBM-SDLC -

This personality interfaces an IBM host computer to the DNC using the Synchronous Data Link Control data communication protocol, for communication with the DNC's M4000 or ASCII terminals.

IBM-BSC -

This personality interfaces an IBM host computer to the DNC using the Binary Synchronous data communication protocol, for communication with the DNC's M4000 or ASCII terminals. It is also required to support NSR24 optional feature NT6N93AA 3780 Remote File Transfer.

Printer -

A serial printer can be connected to a port equipped with the Printer personality.

Figure 2 on page 18-8 illustrates the connections between terminals and hosts using the port personalities. Not shown are printers or terminals used for man-machine interface to TSM software.

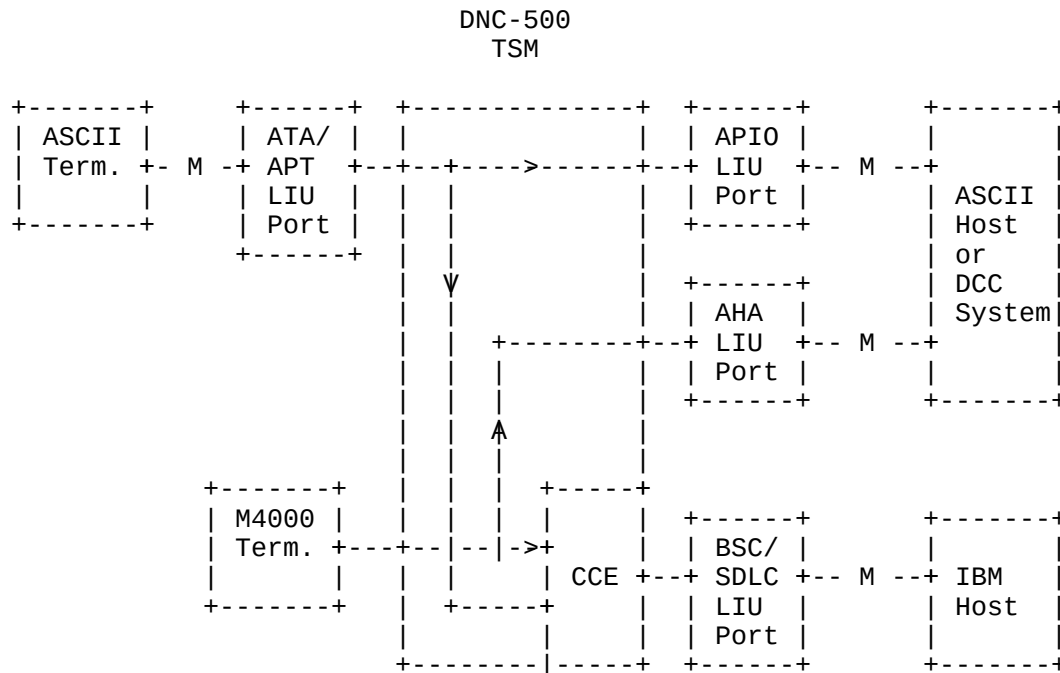


Figure 2. LIU Port Personalities for Host Reach-Through

Notes:

1. "M" signifies that a modem is required here if the distance is greater than 50 feet (15 metres)
2. "CCE" is the Cluster Controller Emulator software provided as part of the optional OSS Reach-Through feature.
3. Note that two separate port personalities and modem links are required if access to an ASCII host is required from both M4000 and ASCII terminals.
4. Connections shown inside the DNC-500 are established by software. No physical connections are implied.

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Assign LIU ports and personalities to perform the following specific TSM functions:

- Each TSM controlled (DCC) node requires one port equipped with AHA personality. The only possible data communication rates with these nodes are 1200 and 9600 bits/second.
- Assign one port equipped with ATA/APT personality for each ASCII terminal to be connected to the DNC system. At least one port is required for an ASCII terminal to initialize the system. Also, a port is usually provided for an Emergency Technical Assistance Service (ETAS) dial-up line to the DNC system. Do not assign LIU ports for M4000 terminals; these do not require an LIU to interface to the DNC.
- When the OSS-Reach Through feature is required and ASCII terminals will be used to access an ASCII host, assign one port equipped with APIO personality for each data link to the host. Note: There can be a maximum of 40 ASCII host computers.
- When the OSS-Reach Through feature is required and M4000 terminals will be used to access an ASCII host, assign one port equipped with AHA personality for each data link to the host. Note: There can be a maximum of 40 ASCII host computers.
- When the OSS-Reach Through feature is required to access an IBM host, assign one port equipped with IBM-SDLC personality for each SDLC data link to the host.
- When the OSS-Reach Through feature is required to access an IBM host, assign one port equipped with IBM-BSC personality for each BSC data link to the host.
- When the 3780 Remote File Transfer feature is provided, assign one port equipped with IBM-BSC personality for each link to the network terminating equipment.

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Step 3 - For each required port personality, determine the LIU capacity available.

Port personality software consumes memory and real-time capacity of the LIU. Thus, not all combinations of ports and data transmission rates are possible. Use the following table to determine the number of ports available on an LIU given the required personality and data transmission rate. The table assumes that all ports on the LIU are assigned the same personality. Rules for combining different personalities in a single LIU have not yet been developed, with the exception of the Printer personality (see Note 4 below):

Personality	Maximum Data Xmit Rate (bits/sec)	8-Line MUX Kit Installed?	# Ports Available	Notes
ATA/APT	9600	No	1	
ATA/APT	4800	No	2	
ATA/APT	4800	Yes	1	1
ATA/APT	2400	Yes	7	1
ATA	9600	Yes	6	1, 2
AHA	9600	No	2	
AHA	4800	Yes	5	1
APIO	19200	No	1	
APIO	9600	No	2	
APIO	4800	Yes	3	1
APIO	2400	Yes	7	1
APIO	1200	Yes	10	3
IBM-SDLC	9600	No	2	
IBM-BSC	9600	No	2	

Notes:

1. When the 8-Line MUX kit is installed, only the eight new ports it provides should be used. The existing two LIU ports should not be assigned.

2. This configuration is only permitted where the LIU is to be used to handle keystrokes from an ASCII terminal and responses from TSM, not for continuous data transmission (eg. from an ASCII host).

3. This is the only exception to note 1.

4. Printer personality may be assigned to any unused LIU port.

Step 4 - Assign the personalities required to the ports available on each LIU and therefore determine the number of NT4G46CA LIUs required. The 8-Line MUX kit should be used where possible to minimize cost.

(6) Provide at least one (1) NT4G14BA LANlink SRU to support the communications interface to the M4010 terminals and the LAN

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Interface Units (LIUs). Each NT4G14BA will support a maximum of 12 communications ports (12 M4010s and/or LIUs). One LANlink SRU is always provided in cabinet 02 slots 3-4 (ie. directly to the left of the Primary Processor).

(7) Provide one (1) NT4G20TA SCSI 350 MByte disk SRU if additional storage space for the TSM database is required.

Existing systems using SASI equipment require one (1) NT4G20FB SASI 80 MByte Storage SRU daisy-chained to one (1) NT4G20SA SASI 350 MByte disk SRU for storage of system software and the TSM database. In addition provide two (2) A0330192 SASI interconnect cables. One of these cables connects the SASI primary processor to the SASI 350 MByte disk. The other connects the SASI 350 MByte disk to the SASI 80 MByte Storage SRU.

New systems should be provisioned with SCSI equipment.

(8) Provide one (1) NT4G26CB 68010-6 SCSI File Processor if a 350 MByte SCSI disk was provisioned in rule (7).

(9) When the Shared Node Access feature (NT6N20AA) is required, engineer two complete, independent TSM systems. Also provide one (1) NT4G54AA Local DataNET SRU on each system to enable inter-system communications. Cabling between systems is detailed in ECM-344. Note: There is only one control link from each controlled node to either DNC-500. TSM accesses nodes not directly connected to it via the DataNET link to the "owner" DNC-500.

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Application Processor Provisioning Method

Note: This section is updated to NSR-27 in this ECM release.

TSM software features, as with all DNC application software, are composed of Program Resource Units (PRUs). PRUs are normally packaged into feature packages and assigned a Product Engineering Code (PEC) for identification and ordering purposes. Using the traditional method, application processors (APs) are engineered based on the feature packages ordered, using rules derived from conservative estimates of memory and real-time processing requirements.

TSM uses the feature package concept for marketing purposes. However, engineering of the APs is done by determining the memory requirements of individual PRUs. Each PRU can vary in size considerably depending on the number of nodes in the TSM network, the number of active system users and so forth.

PRUs can also take advantage of code sharing. This allows portions of software common to all the PRUs on a single AP to be shared rather than duplicated in each individual PRU. Without taking advantage of code sharing, or accounting for the relationship between PRU and system size, the memory capacity on a small system will be over-engineered. More accurate provisioning is possible using the PRU sizing method.

The next section details the size of each TSM PRU and its dependency on system parameters. Four steps are followed in calculating the number of APs required:

() Assign values to system parameters (A,B,C, ... defined in "System Parameters" on page 18-14

() Determine the optional features that the customer does NOT want, and eliminate these PRUs from "Table 1 - PRU Size Calculation" on page 18-18 (see Option column).

() Start by "filling up" 10 MByte APs with the remaining PRUs, using PRU size calculated in "Table 1 - PRU Size Calculation" on page 18-18. They should be assigned in the order shown in the table. It is important to note that the memory actually available for PRUs is less than the quoted AP size, because of Operating System and overhead space requirements. The PEC code and actual memory available for the various sizes of AP are:

PEC	Quoted Size	Actual Space Available for PRUs
-----	-----	-----
NT4G25GA	10 MByte	9,340 kBytes
NT4G25EA	7 MByte	6,368 kBytes
NT4G25DA	5 MByte	4,220 kBytes
NT4G25CA	3 MByte	2,172 kBytes

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No more than ten (10) PRUs of any type should be assigned to 3, 5 or 7 Mbyte APs to avoid exceeding real time capacity. Up to twenty-five (25) PRUs may be assigned to 10 MByte APs since these APs employ a faster CPU.

(4) The last few PRUs left over after completing step (3) may fit into a smaller AP (for example a 3 MByte AP); this should be done if possible to minimize cost.

1.2.3.4 System Parameters

The following parameters are required for performing the calculations. Included in the list is a guide to the minimum/maximum range for each parameter. Parameter names "I", "O" and "X" are not used.

A = Number {1-3000} of Facilities (ie. DS-1 trunks)

B = $77.7 + (0.074 \times A)$ {Minimum 100, round up to integer}

C = Number {1-128} of terminals (M4010, ASCII) connected to system.
Note: A maximum of eight (8) M4010 terminals is supported.

D = Total number {1-248} of simultaneously active user sessions (each user can manage up to six TSM tasks concurrently. Note that the system can support a maximum of 72 users).

E = Number {0-2000} of Uncontrolled Nodes (eg. Channel banks)

F = Number {1-80} of Controlled Nodes (ie. DCC systems)

Note: When engineering two separate TSM systems for the Shared Node Access feature, do not confuse the DCC nodes which are to be "shared". Each DCC is assigned to only one system and only enters into calculations for that system (parameters E,F).

G = Number {1-6000} of Service Ports (ie. digroups) - usually $2 \times A$

H = Number {1-16} of concurrent Network Planning sessions

J = Number {1-96} of concurrent Network Status sessions

K = Number {1-24} of concurrent Node Provisioning sessions

L = Number {1-48} of concurrent Facility Provisioning sessions

M = {1-48} Every circuit or facility can be in one of four states:

- Pending: Circuit/facility defined
- Configured: Route completed, channels reserved
- Provisioned, Out of Service (POS): Cross-connections enabled

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- In Service: Carrying service

Every time a TSM user takes a circuit or facility from the Configured to the POS state, a block of memory is set aside in the AP for data storage. If several users are performing this operation simultaneously, each user requires a block of memory for data storage. Parameter M is defined as the number of Facility provisioning users taking facilities from the Configured to the POS state concurrently.

N = Number {1-96} of Telco* circuit provisioning users taking circuits from the Configured to the POS state concurrently

Q = Number {1-96} of concurrent Telco* Circuit Provisioning sessions

R = Number {1-96} of concurrent Telco* Map Provisioning sessions

* - Circuit and map provisioning is also performed by the Telco's customers when the optional Customer Network Management feature is provided. Count these sessions with parameters "P", "c" and "d" instead.

S = Number {0-80} of DNX-100 cross connect systems in the network

T = Number of concurrent Service Data Manager sessions

U = Number of links to IBM host computer(s) using BSC protocol

V = Number of links to IBM host computer(s) using SDLC protocol. There can be a maximum of eight (8) IBM host interfaces.

W = Total number of terminals concurrently accessing IBM host computer(s)

Y = Number of concurrent DNC Scheduler sessions

The following parameters are only applicable when the optional Customer Network Management features (NT6N31AA, NT6N43AA) are to be provided. Otherwise they are to be set to zero (0). TSM can support up to 72 independent Customer and Telco networks. These parameters should be captured for each Customer network individually.

Z = Number {1-72000} of circuits in this network

a = If $Z = 0$, $a = 0$

If $0 < Z < 2000$, $a = 27.78 + (0.011 \times Z)$

If $Z > 2000$, $a = 11.11 + (0.019 \times Z)$

{Minimum 100, maximum 900}

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b = Total number of concurrent circuit and map provisioning and map activation sessions in the Customer network, including both Telco and customer sessions

P = Number {1-96} of Customer* circuit provisioning users taking circuits from the Configured to the POS state concurrently

c = Number of concurrent Customer* Circuit Provisioning sessions

d = Number of concurrent Customer* Map Provisioning sessions

* - Circuit and map provisioning are also performed by the Telco. Count these sessions with parameters "N", "Q" and "R" instead.

Table 1 - PRU Size Calculation

Use "Table 1 - PRU Size Calculation" on page 18-18 to calculate the size of each PRU. It is ordered; that is, PRUs should be provisioned into APs in the order that they appear in the table. Note carefully the definitions for Unique Code and Shared Code. These describe how to reduce memory requirements by allowing PRUs to share common software elements on the AP. All calculations are in kBytes.

Table Field Definitions:

PRU Name

English text description and abbreviation of PRU (for reference purposes)

Option

Item number of software option (see "NSR-xx Features" above for item numbers). Only provision those optional features that the customer orders. "No" indicates that the PRU is not part of an optional package and must be provided.

Code Size

Code size is expressed in kBytes. There are two types of code:

Unique

Unique code can not be shared by any other PRUs. The exception is when "multiple instances" of a PRU are assigned. This is done for certain PRUs to increase capacity (for example, one PRU instance supports 8 users, two PRU instances support 16 users, etc). Each instance requires its own data space (see Data Size below), but does not require another copy of the Unique code on that AP.

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Thus, the rule is as follows: Assign Unique code space only once on an AP. Where all additional instances of this PRU do not fit on the AP, assign another copy of the Unique code to a new AP and continue assigning instances as required. Shared

Certain portions of software can be shared by the other PRUs (and their instances) on an AP. These Shared code segments are named as follows, with their size in kBytes:

Name	Size (kBytes)
-----	-----
TSBASE	100
TSDB	20
TSDA	110
NSBASE	40
BSUTIL	40
TSTFDEFS	2
TSDG	114
TSCI	740

"Table 1 - PRU Size Calculation" on page 18-18 lists the Shared code segments that each PRU can take advantage of. The rule is as follows: Assign Shared code segments only once on an AP.

For example, the first two PRUs provisioned are BSDB and BSTS. Shared code space TSBASE, TSDB and TSDG is assigned as indicated for BSDB in the table. PRU BSTS will invariably fit on the same AP; one need only assign Shared code space TSDA for it since TSBASE and TSDB are now already present on that AP.

Data Size

Data size is expressed in kBytes. There are two types of data space:

Fixed

Fixed data space is required by every instance of this PRU.

Config

The size of the "configurable" data space is dependent on system parameters. The table lists the formula to calculate the memory requirements based on parameters defined previously (A,B,C etc).

Rule

Refer to the additional rules at the end of the table for important provisioning considerations.

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Table 1 - PRU Size Calculation

PRU Name	Code Size		Data Size		Option Rule	
	Unique	Shared	Fixed	Config		
TSM Database Server (BSDB)	30	TSBASE TSDB TSDG	470	1.1 X B	No	
TSM Application Server (BSTS)	460	TSBASE TSDB TSDA	230	210 + (4 X C) + D	No	1
TSM Application Server 2 (BSAP)	350	TSBASE TSDB TSDA	190	470 + (0.14 X A) + (0.06 X E) + (2.00 X F) + (0.15 X G)	No	1
TSM Network Planning (BST1)	220	TSBASE TSDB TSDA	140	110 + (44 X H)	No	1, 3
TSM Network Status (BST3)	330	TSBASE TSDB TSDA	150	120 + (43 X J)	No	1, 2, 3
TSM Node Service (BST4)	230	TSBASE TSDB TSDA	180	80 + (39 X K)	No	1, 3
TSM Facility Service (BST5)	340	TSBASE TSDB TSDA	180	80 + (37 X L) + (20 X M)	No	1, 2, 3
TSM Circuit/Map Service (BST6)	30	TSBASE TSDB TSDA TSCI	160	80 + (70 X Q) + (54 X R) + (40 X N)	No	1, 2, 3
TSM Node Guardian	250	TSBASE TSTFDEFS	130 (BSDN)	50 + (32 X F)	No	1
TSM DNX-100 Interface (BSKR)	270	TSBASE	300	24 X S	No	2

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Table 1 - PRU Size Calculation (Continued)

PRU Name	Code Size		Data Size		Option	Rule
	Unique	Shared	Fixed	Config		
Service Table Editor (BSFG)	790	0	0	100 X T	No	
Service Data Manager Notification (BSSN)	300	0	0	0	No	
Host Agent (HAG)	50	0	50	0	2	
Cluster Controller Emulator (CCEBSC)	182	0	187	12 X U	2	2,4
Cluster Controller Emulator (CCESNA)	303	0	198	12 X V	2	2,5
3274 Display Emulator (DE)	98	0	73	15 X W	2	2
TSM Service Agent (BSAA)	80	TSBASE	260	0	No	
DNC Applic'n Scheduler	170	NSBASE BSUTIL	190	0 (BSSC)	No	
DNC Applic'n Scheduler MMI	70	TSBASE NSBASE BSUTIL	220	64 X Y (BSJS)	No	3,8
DNC Job Manager	80	NSBASE BSUTIL	190	0 (BSGM)	No	8

Table 1 - PRU Size Calculation (Continued)

PRU Name	Code Size		Data Size		Option	Rule
	Unique	Shared	Fixed	Config		
TSM Circuit Network (BST7)	100	TSBASE TSDB TSDA TSDG TSCI	160	203.3 + (1.1 X a) + (1.3 X b) + (70 X c) + (54 X d) + (40 X P)	1	1,2,3
DNC Log Query MMI (BSLQ)	500	0	0	0	No	
DNC Logger (BSLG)	300	0	0	0	No	
CampusNet Manager (CNETM)	60	0	0	0	7	

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Rules:

1. Round up the calculation for configurable data to the nearest increment of 128 kBytes (ie. 128k, 256k, 384k, 512k, etc) for this PRU.

2. Multiple instances of this PRU may be provisioned to increase capacity. The configurable data size calculation should be performed separately for each instance. For example, in the calculation for PRU BST3, let us assume parameter J equals 31 node provisioning sessions. Assign 25 sessions to the first instance and calculate its size. Assign the remaining 6 sessions to a second instance and calculate its size (taking advantage of Unique and Shared code sharing).

"Table 2 - PRU Capacity per Instance" indicates the capacity, relevant parameters, and maximum number of instances for each PRU.

Table 2 - PRU Capacity per Instance

PRU Abbrev.	Capacity per Instance	Capacity-affecting Parameter(s)	Maximum # of Instances
-----	-----	-----	-----
BST3	25 sessions	J*	4
BST5	25 sessions 10 state changes	L**,M	4
BST6	25 sessions 10 state changes	N,Q*,R*	4
BSKR	10 DNX-100 nodes	S***	4
CCEBSC	32 sessions	U	32
CCESNA	32 sessions	V	32
DE	32 sessions	W	32
BST7	1 circuit network 25 sessions 10 state changes	P,b,c*,d*	128

Notes:

- * - System maximum 96 sessions
- ** - System maximum 48 sessions
- *** - Each instance must be assigned to a new AP

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When there is more than one customer using Customer Network Management, do not mix the user sessions from different customers on the same instance of BST7.

3. A DNC Forms Handler PRU is required to be resident on the same AP that contains this PRU. The Forms Handler performs man-machine interface functions for all PRUs on that AP. Additional instances of the Forms Handler may be provisioned to increase capacity. There are two types of Forms Handler; choose one depending on the number of PRUs on that AP which require a Forms Handler, and the number of user sessions that these PRUs will be supporting "Table 3 - Forms Handler Options and Capacity"

Table 3 - Forms Handler Options and Capacity

PRU Name	Code Size		Data Size		Capacity (each instance)
	Unique	Shared	Fixed	Config	
DNC Forms Handler (3) (SFHPD)	120	0	170	0	Supports up to 48 concurrent user sessions and 2 different types of PRU on one AP.
DNC Forms Handler (4) (SFHPD)	120	0	310	0	Supports up to 96 concurrent user sessions and 5 different types of PRU on one AP.

4. Provide this PRU only if BSC communication links to an IBM host are needed.

5. Provide this PRU only if SDLC communication links to an IBM host are needed.

1.2.4 Office Layout Information

Not applicable.

1.2.5 Traffic Tables

Not applicable.

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1.3 Product/System Specification

1.3.1 Physical Characteristics

1.3.2 EMI/Earthquake Information

1.3.3 Sparing Information

Not applicable.

1.3.4 Power Feed and Fusing Requirements

1.3.5 Current Drain Information

1.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

1.4.1.1 TSM NSR-23 Features

The NSR-23 TSM software release provides all the basic functionality for managing the above circuit and facility concepts. It consists of the following required features:

- NT6N00AA TSM NSR23 Base
- NT6N01AA M4010 Console Interface
- NT6N02AA ANSI Console Interface
- NT6N10AA DNX-100 Interface
- NT6N30AA Telco Network

Note that only DNX-100 Digital Network Cross Connect systems can be controlled. The term ASCII terminal will be used in place of ANSI Console throughout this document to maintain uniformity with other DNC applications. "ASCII terminal" refers to an NT3M20AA NT-220 video terminal or customer-supplied VT-100 compatible terminal.

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Following are the optional NSR-23 features:

1. NT6N43AA Customer Network Services and NT6N31AA Customer Network allow the Telco's customers to take over some of the network management functions for their own private virtual network. Base feature NT6N30AA gives network management capabilities to the Telco, while NT6N31AA extends these capabilities to their customers.

The Telco supplies Component circuits for this purpose by defining Access circuits, which link uncontrolled nodes to controlled nodes (DCCs), and Capacity circuits, which link two controlled nodes via zero or more intermediate DCCs. These Telco-defined Component circuits can then be used by the customer to build Service circuits (also referred to as Compound Point-to-point circuits). Two of the customer's Access circuits are joined by one or more Capacity circuits to form a Service circuit.

Customers can also specify and activate Maps, which are groups of service circuits which can be put in to (or out of) service at the same time. Maps can be automatically activated by pre-arranged schedule.

2. NT6N90AA ASCII Host Access and NT6N91AA IBM Host Access provide the Telco's TSM operators with the capability to access ASCII and IBM host computers through M4010 and ASCII terminals connected to the TSM DNC-500.

Refer to TSM NSR23 Update for details of the base and optional features in NSR-23.

1.4.1.2 TSM NSR-24 Software Features

NT6N00AB TSM NSR-24 Base provides the following enhancements to base features:

- System performance, reliability, capacity, administration capabilities and man-machine interface are enhanced.
- Increased capabilities are provided for facility alarm reporting and misalignment detection.
- Circuit provisioning is enhanced.
- Surveillance capabilities are enhanced to include the collection, processing and distribution of equipment alarms, with a display of alarm peg count.

Optional features with the NSR-24 release are as follows:

3. NT6N42AA Network Alignment allows TSM to detect and recover from misalignments between the TSM database and the actual status

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of the network (misalignments can result from several conditions including communications failures during provisioning operations or node-originated local changes).

4. NT6N41AA Maintenance and Test provides centralized access to facility maintenance and circuit test functions available on DCC systems.

5. NT6N40AA Circuit Autoroute Selection gives the TSM user the option of enabling automatic selection of access, capacity or point-to-point circuit routes. Routes are selected according to recommendations in user defined Routing Preference Tables.

6. NT6N93AA 3780 Remote File Transfer provides batch file transfer capability between TSM, which functions as an IBM 3780 terminal, and a remote system such as a mainframe computer. Bi-synchronous protocol is used for communication.

1.4.1.3 TSM NSR-25 Features

NT6N00AC TSM NSR25 Base package adds several new increments to the base TSM software, and introduces new options. Base increments are as follows:

- TSM users can determine which circuits (access, capacity, service) are affected by an alarm generated by a failed facility. They can query access and capacity circuit alarms, and specify users which are to receive alarm notification.
- Access/capacity circuits can now be shared by more than one service circuit definition.
- Customer network users can now define temporary capacity circuits to handle peak traffic loads.
- Maintenance and testing of circuits and facilities is enhanced through new test capabilities.
- The alignment function which ensures the TSM database agrees with actual network status is enhanced to include more complex types of circuits.

The optional NSR-25 feature is:

7. NT6N20AA Shared Node Access Interface links two co-located TSM systems (maximum) over a local area network (DataNet) to increase TSM system capacity. The two systems operate as if they were not connected. However, network nodes designated as being "shared" appear in both systems' databases and thus are recognized by both systems when routing circuits.

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1.4.1.4 TSM NSR-26 Features

NT6N00AD TSM NSR26 Base software consists of an enhancement to the management of facilities, allowing individual channels to be assigned to different facility "pools". There are no optional NSR26 features.

1.4.1.5 TSM NSR-27 Features

NT6N00AE TSM NSR27 Base software includes enhancements to the man-machine interface and the introduction of an install/save & restore capability for system data. The latter feature facilitates system NSR upgrades. The following optional feature is introduced:

8. NT6N44AA Digital Multipoint Bridge gives users the capability to provision voice and voiceband data multipoint circuits on the DNX-100 cross-connect. These circuits permit connection of three or more pieces of network terminating equipment and allow 2-way voice or 1-way voiceband data communication between all participants. Digital Multipoint Bridge cards must be provisioned on the DNX-100 for this function.

1.4.1.6 TSM software packages and interdependencies.

This table shows TSM software packages and their interdependencies.

PEC	Description	Dependencies
-----	-----	-----
NT6N00AA	TSM NSR23 Base	None
NT6N00AB	TSM NSR24 Base	NT6N00AA
NT6N00AC	TSM NSR25 Base	NT6N00AB
NT6N00AD	TSM NSR26 Base	NT6N00AC
NT6N00AE	TSM NSR27 Base	NT6N00AD
NT6N01AA	M4010 Console Interface	NT6N00AA
NT6N02AA	ANSI Console Interface	NT6N00AA
NT6N10AA	DNX-100 Interface	NT6N00AA
NT6N20AA	Shared Node Access Interface	NT6N00AC
NT6N30AA	Telco Network	NT6N00AA
NT6N31AA	Customer Network	NT6N43AA
NT6N40AA	Circuit Autoroute Selection	NT6N00AB
NT6N41AA	Maintenance and Test	NT6N00AB
NT6N42AA	Network Alignment	NT6N00AB
NT6N43AA	Customer Network Services	NT6N00AA
NT6N44AA	Digital Multipoint Bridge	NT6N00AE
NT6N90AA	ASCII Host Access	NT6N00AA
NT6N91AA	IBM Host Access	NT6N00AA
NT6N93AA	3780 Remote File Transfer	NT6N00AB

1.4.2 Software Usage Restrictions

1.4.3 Memory Provisioning

Not applicable.

1.5 Real Time Impact

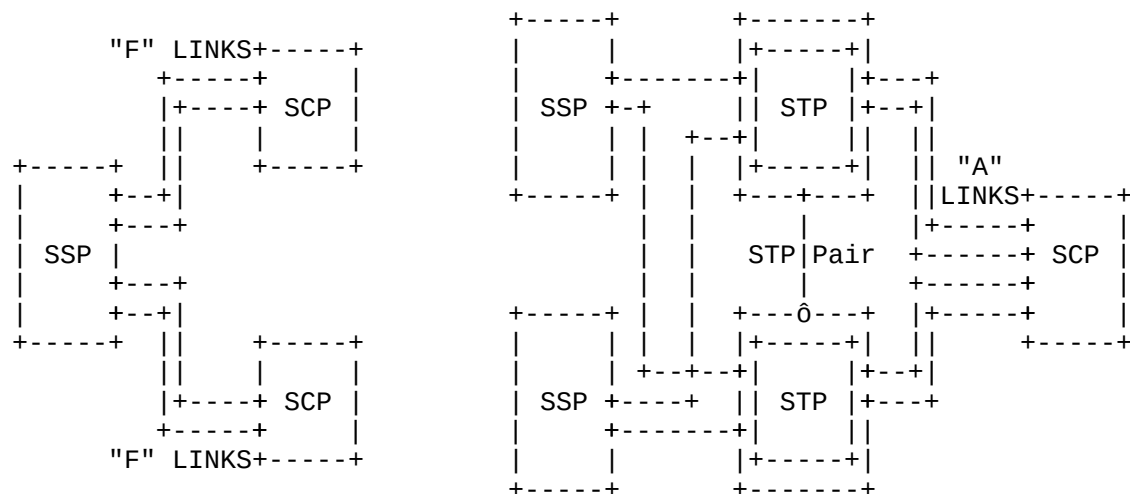
Not applicable.

2.0 ECM426 - DMS - Service Control Point (DMS-SCP)

2.1 Overview

The DMS - Service Control Point (DMS-SCP) is a node in an SS 7 network which provides a real-time transactional environment from which to answer database queries. The initial applications which are supported are as follows:

- 8 0 Plus Service (800+ in Canada, E008 in Australia. 800+ refers to both services unless otherwise specified.)
- Automated Calling Card Service (ACCS)
- Billed Number Screening (BNS) (Telecom Canada only)
- The SS7 Network is classified in two ways; the FULLY ASSOCIATED NETWORK and the QUASI ASSOCIATED NETWORK. The Fully Associated Network has every Service Switching Point (SSP - End Of-office) connected directly to the SCP(s). The Quasi Associated Network has every SSP connected to the SCP through a Signaling Transfer Point (STP).



FULLY ASSOCIATED NETWORK

QUASI ASSOCIATED NETWORK

There is at least one provisionable SS7 "F" Link Set from each SSP to each SCP node in the Fully Associated Network. In the Quasi Associated Network, the SS7 "A" link pairs exists from each Toll SSP to the corresponding regional STPs and "A" link pairs exist from each SCP to corresponding regional STP pairs.

The DMS-SCP network is made up of one SCP Transaction Processors (SCP-TP) and one or two SCP Operations, Administration and Maintenance (SCP-OAM) machines. The SCP-TP is

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made up of two (2) DVS cabinet lineups and performs the actual query processing and real time functions by responding to incoming database queries from the network. The SCP- OAM consists of one (1) DVS cabinet lineup. It updates the application databases and handles the OA&M functions of the system.

The SCP-OAM is capable of handling OA&M functions for up to two SCP-TP machines. In addition, OA&M functions may be distributed over several SCP-OAM machines.

Each DMS-SCP site must also be equipped with a "Minisys" software update machine. The Minisys can be used for save and restore of system data, backup tape verification, Master/Slave audit, ETAS Dial-in, and installation of Network Software Release (NSR)/SCP Software updates.

The SCP-TP architecture is illustrated in Figure 4 on page 18-32 made up of the following components:

- Link Interface Module (LIM)/Link Peripheral Processor (LPP)
- Message Switch and Buffer (MSB7) (replaced by the LIM)
- Data-Voice System (DVS)
- DMS-Core (Dual Plane Combined Core Cabinet)
- Speech Link Connector (SLC)
- Double Shelf Network (DSN)
- Digital Network Interconnect (DNI)
- Digital Trunk Controller (DTC) (replaced by the LIM)
- Input/Output Equipment (IOE)
- Trunk Module Equipment (TME)
- Power Distribution Center (PDC)
- Miscellaneous Equipment (MIS)
- Maintenance Spares Storage (MSS)
- Meridian Storage Frame

The MSB7 is a dedicated peripheral module responsible for distributing messages between the SCP-TP components and the SS7 network (Message Transfer Part (MTP) signalling message handling and Signalling Connection Control Part (SCCP)). It is provisioned with Signalling Terminals (STs) which interface to the SS7 links. For more information on the MSB7, refer to ECM-271 Common Channel Signalling System #7.

The LIM, which interfaces directly with the DMS SuperNode DMS-BUS, also interfaces SS7 signalling links. LIMs are to be provided for new jobs and for extensions where the maximum capacity of the MSB7-based system is exceeded.

For Telecom Australia, V.35 signalling links interface with the LIM through a MUX. Refer to Figure 3

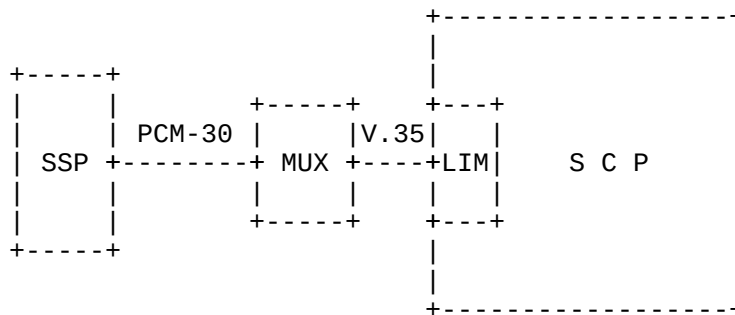


Figure 3. Telecom Australia Signalling Links to SCP (BCS-330)

For more information on the LIM, refer to ECM-386 Signalling Transfer Point (STP).

The TP1 and TP2 lineups are Slave Database modules responsible for database querying, Transaction Capabilities Application Part (TCAP) encoding/decoding, and remote operation server functions. Each TP lineup consists of up to ten cabinets equipped with Shared Resource Units (SRUs), each of which performs a specific hardware function.

The DMS SuperNode equipment consists of the DMS-CORE and the DMS-BUS housed in a single cabinet:

The DMS-CORE consists of a Computing Module (contains duplicated DMS SuperNode CPUs) and System Load Module SLM. It is responsible for the overall control of all components except the TP1 and TP2.

The DMS-BUS performs the routing of messages within the SCP-TP.

The SLC is a digital cross-connect, connecting the network side of the MSB7, DTC and MTM to the peripheral side of the DSN.

The DSN is used to nail-up connections between the DTC and MSB7. It also carries maintenance messages and alarms to and from the MTM, DTC and MSB7.

The optional DNI provides a patch cord junctor cross connect facility for the DSNs.

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The DTC is a dedicated peripheral module which interfaces the SS7 links to the SCP-TP. In other words, it is responsible for the data link function of the Message Transfer Part (MTP). (The DTC is replaced by the LIM on new jobs or extensions where the maximum capacity of the MSB7-based system is exceeded.)

The IOE supports various devices including disk, tape and MAP terminals required to load and operate the DMS SuperNode.

The TME houses the MTMs which support service circuits, test facilities and office alarm circuits. The latter facility provides visual and audible indication of trouble conditions in the DMS equipment. The TME also houses the Alarm Cross-connect Unit (AXU).

The PDC houses the interface between the -48V office batteries and the other DMS-SCP frames and equipment.

The MIS frame provides rack space for housing modems, DVS Lan Interface Units (LIUs), power inverters and other equipment.

The MSS cabinet offers storage space for DMS Supernode spare circuit packs. The Meridian Storage frame offers storage space for the DVS SRU equipment.

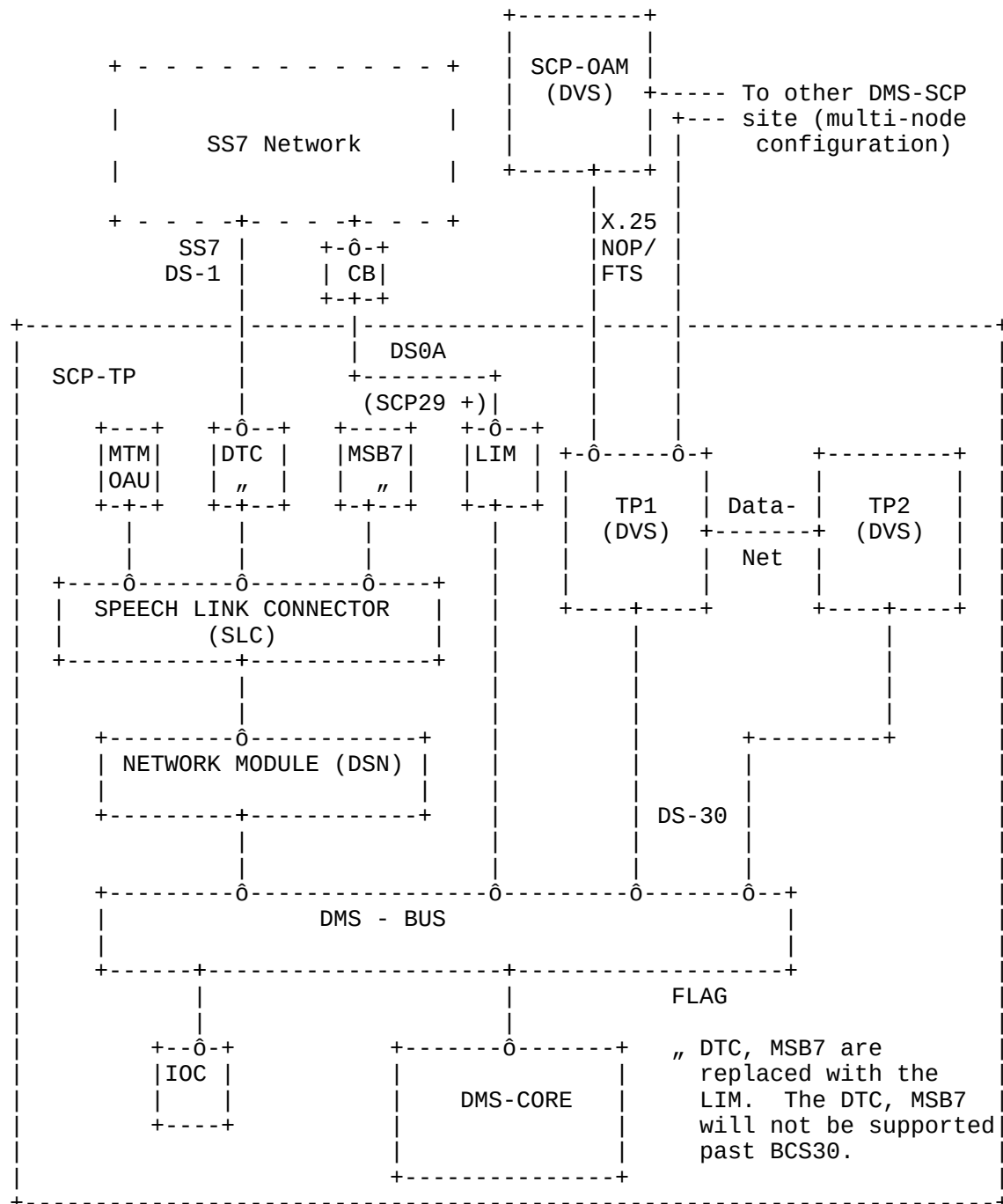


Figure 4. DMS - Service Control Point (DMS-SCP)

The SCP-OAM consists of a Data Voice System, provisioned with Shared Resource Units for implementation of the OA&M function.

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2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

DVS Restrictions

1. The DC power SRU must reside on the top shelf of a cabinet due to heat generation. There must be one DC power SRU per cabinet. The DC power SRUs are mounted on the cabinet to which they power or on the adjacent cabinet. The power SRU cannot be located on the right hand side of the top shelf due to interference with other connectors.
2. The 350MB disk SRU must reside on the bottom shelf due to its weight. Since this is a full SRU, there can be no more than one 350 meg disk per cabinet.
3. The prime processor must be slotted on the right hand side of the top shelf in the first cabinet (for SCP29 applications and up). One of the Lanlinks must be immediately to the left of this SRU to allow an M4000 terminal to boot off it. One (1) M4000 must be on line 1 of this Lanlink.
4. SCSI disks must be set to an address of 0. If disk are daisy chained, the addresses within the chain are sequential. The SCSI Mag Tape should be set to an address of 1: chained disks should skip this address.
5. Disks and tapes are to be physically located as close as possible to their file processor (or the prime processor in the case of the system disk and cartridge tape). This is to minimize cable lengths. The maximum length of a SCSI bus (the cables connecting all the disks and tapes to the File Processor or Prime Processor) is 6 metres.
6. Cabinet 8, slot address 16 (bottom right slot) is not addressable. It can only be used for an AC power supply or a 160/350 MByte SCSI Storage SRU, or it can be left empty. Application Processor and File Processor SRUs cannot be located there because this slot cannot be addressed.
7. The Datanet SRU cannot be located in cabinet 2, slot 1 (next to the first lanlink) (NSR25 only).
8. The maximum number of cabinets per DVS system is eight. Optional 9th and 10th cabinets may be provisioned with the restriction that each one can contain one Power SRU and one 350 MByte Storage SRU, or one Power SRU and up to five (5) 160 MByte Storage SRUs ONLY. These two optional cabinets should not be connected to the DVS bus.

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2.2.2 Hardware Dependencies

None.

2.2.2.1 P and C Side Port Requirements

2.2.2.2 DMS BUS Port Requirements

Not applicable

2.2.2.3 Circuits Per Card

2.2.2.4 Discrimination Numbering

2.2.3 Provisioning Considerations

2.2.3.1 Equipment

In general, the number of SCP components required is dependent on the component capacity and the over all traffic load. The number of DMS-SCP components required for DMS portion is:

$$\text{No. Units} = \frac{\text{Total HDBH Query Traffic}}{\text{Per Unit Component Capacity}} \quad \begin{array}{l} \text{(Round up} \\ \text{to next} \\ \text{integer)} \end{array}$$

Refer to SEL 90-04-032 for more information on DMS-SCP hardware provisioning.

SuperNode Equipment

DMS-SCP will use the Dual Plane Combined Core Cabinet (DPCC) NT9X01JA. This cabinet contains two MS shelves and one CM shelf. One () DPCC is required per SCP-TP configuration. Note that combined SS7 products are not currently supported. Thus, DMS-SCP requires its own dedicated DPCC.

PER UNIT COMPONENT CAPACITY:

Each DMS-BUS: 9,000 Q/S
Each DMS-CORE: 200 Q/S (Combined 800+/ACCS/BNS)
180 Q/S (ACCS/BNS)
225 Q/S (800+)

The provisionable circuit packs for the DMS-BUS are the number of 4-Port cards (NT9X17AA) and associated paddle boards (NT9X23AA). In addition to the always provided number of NT9X17AA cards, the following equation should be used to calculate the number of NT9X17AA and NT9X23AA to provision the MS for DMS-SCP:

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$$\begin{aligned} \#NT9X17AA = \#NT9X23AA = & \# \text{ Network Modules (NM)} / 4 \\ & + \# \text{ IOCs} / 4 \\ & + \# \text{ DS-30 SRUs} / 4 \end{aligned}$$

(Rounded up to the next integral number)
(Note: NM is a single plane)

Note: The Application Processor SRU section in the Data Voice System section "SCP-TP Provisioning" (below) define the "DS-30 SRU" term used in this formula.

If the DMS Synchronizable Clock / Stratum II is employed in the DMS-SCP system, related equipment must be provisioned on the IOE (see IOE section below).

Refer to ECM331 for more details on DMS SuperNode Provisioning.

Link Connector Frame

Provide Speech Link Connector (SLC) frames as required. Depending on the number of peripheral-side links it is usual to provide the single-bay Speech Link Connector Combined (SLCC) frame. Refer to Engineering Manual Section EMA3-02-000 for provisioning information for the SLC/SLCC.

Module Equipment (TME)

In each SCP-TP provide one TME equipped with at least two MTM shelves. Refer to Engineering Manual Section EMA2-01-000 for engineering information for the MTM/AXU. Refer also to ECM386 Signal Transfer Point "Office Alarm System" section for recommended provisioning of MTM cards.

Equipment

Provide Input/Output Equipment (IOE) as required. Refer to the Engineering Manual section EMA5-01-000 for provisioning information for the IOE. Two IOCs per SCP-TP are required along with their associated disk, tape and terminal requirements. If Stratum clock synchronization (Stratum II or Stratum 2.5) is required for the DMS-SCP, a Remote Oscillator Shelf and associated circuit packs are required. Refer to ECM317 Synchronization for DMS-Core Offices for further information.

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Interface Module

The number of LIU7s required is based on the query rate and length of SS7 query messages.

$$\# \text{ LIU7} = \frac{\text{Total HDBH Query Traffic}}{\text{LIU7 Capacity at 0.4 Erlangs}} \quad \begin{array}{l} \text{(Round up to the} \\ \text{next even integer)} \end{array}$$

Where:

Total HDBH Query Traffic is taken at the SCP for Quasi Associated Networks; at the SSP for Fully Associated Networks.

$$\text{LIU7 Capacity} = \frac{0.4 \text{ Erlangs} \times \text{Data Transmission Rate} \times 2}{\# \text{ of bits/Octet} \times \text{msg length} \times \text{msgs per query}}$$

2 is due to a full duplex link

of bits/Octet = 8 bits

Typical SS7 message lengths: 800+ Applications: 100 Octets
ACCS/BNS Applications: 130 Octets

Number of messages per query for 800+/ACCS/BNS = 2

The calculation above represents the number of LIU7s assigned to the SCP in the Quasi Associated Networks; the number of LIU7s assigned to an SSP in the Fully Associated Network.

The number of links in a Linkset is 1/2 the total number of LIU7s (as calculated in the formula above).

A LIM can hold 24 LIU7s now and 36 in the future. Refer to ECM386 Signal Transfer Point for detailed LIM engineering information.

Trunk Controller

Provide Digital Trunk Controller (DTC) equipment as required to support Signalling Data Links. The DTC is not used when the Link Interface Module (LIM) is used to interface SS7 signalling links from the SS7 network. The DTC supports a maximum of 20 DS-1 links from the SS7 network. Refer to the Engineering Manual section EMA2-06-000 for provisioning rules for the DTC. ECM271 also contains required information for provisioning a DTC in an SS7 environment. The LIMs are to be provided instead of the DTC and MSB7 for new jobs and for extensions where the maximum capacity of the MSB7-based system is exceeded.

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Switch and Buffer

The recommended number of MSB7s is based on query rate and length of SS7 query messages. For Telecom Canada, use the following formula to calculate the number of MSB7s required:

$$\# \text{ MSB7} = \frac{\text{Expected database query rate (queries per HDBH)}}{75,600}$$

(Rounded up to the next integral number)
(HDBH = High Day Busy Hour)

The maximum number of Message Switch/Buffers (MSB7) per SCP-TP is 10. The maximum number of Signalling Terminals (STs) per SCP-TP is 256. Refer to ECM271 for detailed provisioning rules for the MSB7 and associated STs. For new applications, provision the Link Interface Module (LIM) in place of MSB7.

Shelf Network

Provide one Double Shelf Network (DSN) for every two (2) MSB7s provisioned; that is,

$$\# \text{ of NM units (DSN)} = \frac{\text{No. of MSB7s}}{2} \text{ or } \frac{\text{Traffic Load}}{45 \text{ Q/S}}$$

(which ever is greater)
(round up to the next highest integer)

Where:

45 Q/S is the Component Capacity.

Allocation of messaging links must be spread across the four network subgroups; that is, the 4 links from every two MSB7s must connect one to each of the 4 network subgroups.

Refer to ECM191 for provisioning rules for the DSN. Depending on the number of network modules provided, a Digital Network Interconnect (DNI) frame may also be required. Refer to ECM191 and Engineering Manual section EMA3-01-000 for details.

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Distribution Center

Refer to ECM295 for provisioning rules for the PDC to power the DMS equipment. Note that the DVS cabinets are cabled directly to the battery plant for Telecom Canada.

Cross-Connect Panel

The BIX Cross-Connect Panel A0332547 is a self-contained wall mounted cross-connect system that is required by the DVS for connections to stand-alone equipment (see Input/Output Devices). It is equipped with five 50-pin teledapt connectors across the top allowing termination of up to five (5) LANLINK or Datanet SRUs; one SRU per connector. Inputs are required for the Datanet SRU's in order to connect the Local Datanet link between TP1 and TP2. Below this there are five panels which will each accept 12 teledapt connectors. Each panel is associated with one of the five 50-pin connectors on the top row. Thus 12 ports for each of the five (5) LANLinks (max) for a maximum of 60 ports.

Equipment Frame

Provide as required for housing modems, LIUs, power inverters and BIX panels. Refer to Engineering Manual section EMA13-01-000 for more details on this frame. The LIUs are to be oriented vertically on standard NT3X25AA Common Equipment Shelves (maximum 5 LIUs per shelf). LIUs are to be powered from protected AC via an inverter unit.

Spares Storage

Provide as required for storage of spare DMS Supernode circuit packs. Refer to ECM331 for provisioning information.

Provide NT1M40AN (A0363241) Meridian Storage Frame for storage of spare DVS SRUs. The Meridian Storage Frame is to be equipped with doors and end panels, and can house up to 40 1/4 SRUs.

Order the following equipment (based on frame colour) on the 134 spec (with the NT1M40AN):

PEC	DESCRIPTION	PROVIDE...
P 711402	Designation Label - Brown	two per NT1M40AN
NTNX2550	Cabinet Door Left - Brown	two per NT1M40AN
NTNX2552	Cabinet Door Right - Brown	two per NT1M40AN
NTNX2531	Right End Panel - Brown	one per lineup
NTNX2532	Left End Panel - Brown	one per lineup
P 711181	Designation Label - Grey	two per NT1M40AN
NTNX2513	Cabinet Door Left - Grey	two per NT1M40AN
NTNX2515	Cabinet Door Right - Grey	two per NT1M40AN

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NTNX2517	Right End Panel - Grey	one per lineup
NTNX2518	Left End Panel - Grey	one per lineup

2.2.3.2 Voice System

The DVS portion of an DMS-SCP is a standard DVS (Data Voice System) hardware configuration with disk, tape, printer, terminal services and communications links. Figure 5 on page 18-40 illustrates the configuration of a typical DMS-SCP for QUASI Associated CCS7 Network.

The computing power of an DMS-SCP is contained in the various Application Processor (AP) System Resource Units (SRU's). Each of these contains a processor and memory and is loaded with a number of Program Resource Units (PRU's) to execute the required functions.

Each DVS cabinet (NT4G13FA) is composed of two shelves with 4 slots on each shelf. Each slot has 2 addresses. Thus a cabinet has 16 addresses starting from address 1 in the top left corner and ending with address 16 in the bottom right corner. The location of an SRU is given by its cabinet number (1-8) and its slot address (1-16) or slot (1-8). An SRU can occupy from one slot (1/4 SRU) to four slots (full SRU).

One (1) -48VDC POWER SUPPLY (1/4 SRU, NT4G50DA) SRU must be provided for each cabinet. NT4G50DA replaces NT4G50BA.

Service Orders to update a database are inputted at an SCP-OAM. Service Orders are additions, changes, and deletions to an Application Database. Updates to the databases are done in two (2) ways; Deferred Transaction and Immediate Transaction.

Deferred Transaction carries out the Service Orders (SO) at a specified low traffic time. The SOs are grouped together in an Update File in the SCP-OAM and sent to the TP ahead of designated time. At the designated time, both the SCP-OAM and the TPs update their databases.

Through Immediate Transactions, the databases are updated immediately (in 15 minutes) by sending transactions to the RAM of the DS-30 SRUs. At the next designated update, the transactions in RAM are applied to the databases stored in hard disks.

Service Orders are entered via terminals. Bulk input is done through a 9-Track Tape format or a Remote File Transfer (RTF) interface (which is used to transfer batch files from a remote host).

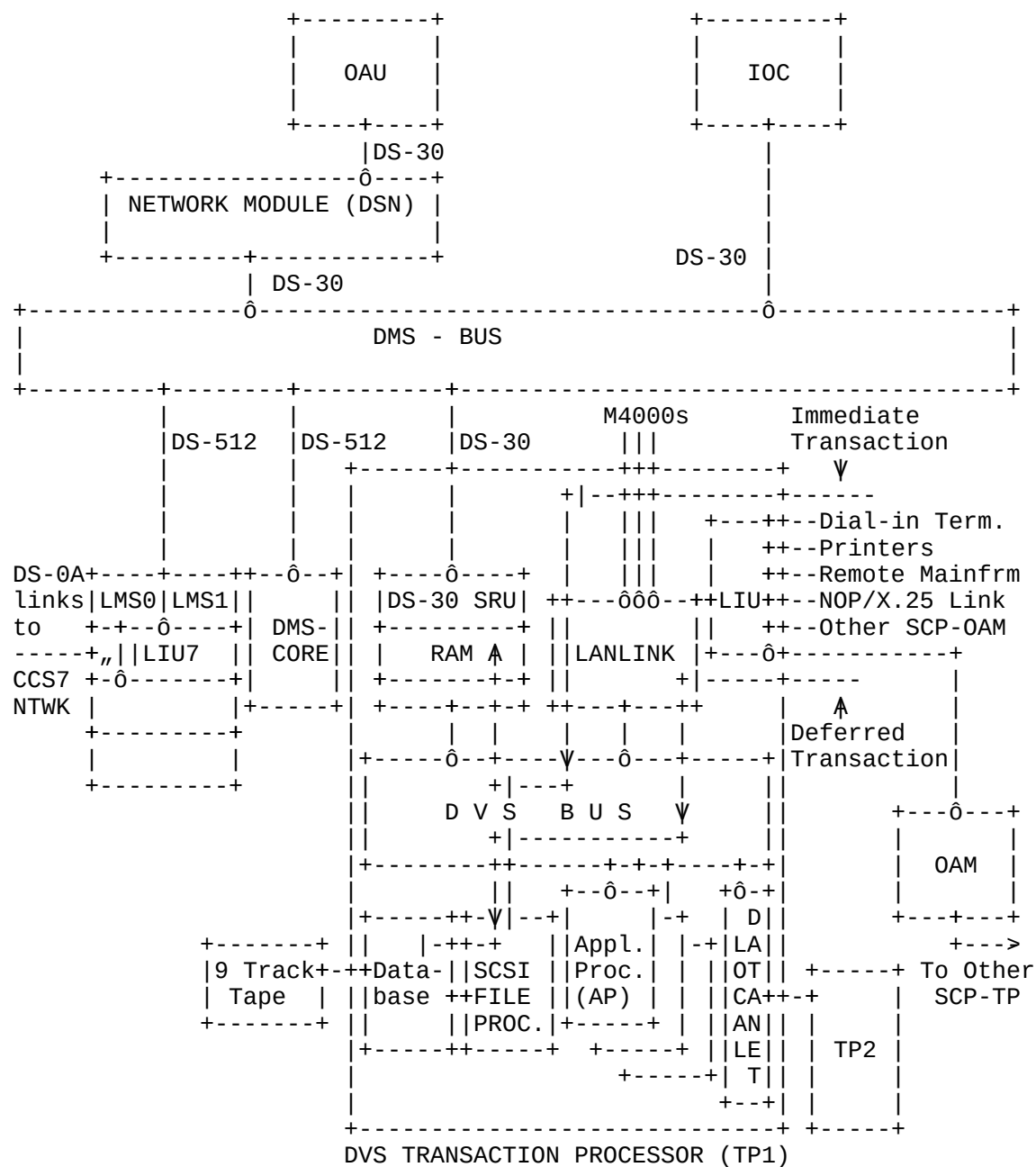


Figure 5. DMS - Service Control Point (DMS-SCP)

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Provisioning

The following SRU's are required in various combinations to build a DMS-SCP. Refer to ECM344 Data Voice System for general DVS provisioning information. Refer to SEL 90-04-032 for Capacity Provisioning Guidelines for the DVS-SCP.

Primary Processor SRU (PP) (6MB, 1/2 SRU, NT4G16EE)

Provide one (1) NT4G16EE SCSI Primary Processor to run base DVS software and provide access to the system disk. This processor must be located in cabinet 01 slots 3-4 (ie. right hand side of top shelf) for SCP29/AUS30 configuration. (For NSR25 configuration, the processor was located in cabinet 02 slots 3-4 (ie. right hand side of top shelf).)

This SRU is required in each DVS system in the SCP-TP. The NT4G20TA SCSI 350 MByte Storage SRUs has been rated (MD) Manufacture Discontinue without replacement.

System Disk (350MB, FULL SRU, NT4G20TA)

Provide one (1) NT4G20TA SCSI 350 MByte Storage SRU per TP line-up (TP#1, TP#2) for storage of system tables and software. The system disk should be located as close as possible to the primary processor. Only one system disk is required, even in a system provisioned with a redundant primary processor.

Provide three (3) additional NT4G20TA SCSI 350 MByte Storage SRU per TP line-up (TP#1, TP#2) for emergency recovery and/or system software increments.

Cartridge Tape (1/2 SRU, NT4G21AA)

Provide one (1) NT4G21AA Cartridge Tape for system software installation as well as saving and restoring. The tape cartridge should be located as close as possible to the primary processor. This SRU is required in each DVS system in the SCP-TP (for NSR25 only).

Application Processor SRU (AP)

The following are AP SRUs:

PEC	SRU NAME	SIZE
-----	-----	-----
NT4G25CA	3 MByte AP	1/4 SRU
NT4G25EA	7 MByte AP	1/2 SRU
NT4G25GA	10 MByte AP	1/2 SRU

These APs are provisioned based on the following applications:

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Network OAM AP:

Provide one (1) NT4G25CA 3 MByte AP for the processing of OMs and logs. This SRU is required only once per SCP-TP; therefore, it must be provisioned into the first SCP-TP DVS lineup (TP1) only.

Base MMI AP:

Provide one (1) NT4G25CA 3 MByte AP to provide the base Man Machine Interface (MMI) functions (NSR25). This SRU is required only once per SCP-TP; therefore, it must be provisioned into TP1 only. Refer to NOP/FTS AP (below) for the required hardware to provide for SCP29/AUS30.

NOP/FTS AP:

Provide one (1) NT4G25EA 7 MByte AP for the processing of X.25/NOP (Network Operations Protocol) and X.25/FTS (File Transfer Service) communications to the SCP-OAM systems (NSR25). This SRU is required only once per SCP-TP; therefore, it must be provisioned into TP1 only.

Provide one (1) NT4G25GA 10 MByte AP SRU to provide the Base MMI AP and the NOP/FTS AP (for SCP29/AUS30 only). This SRU is required only once per SCP-TP; therefore, it must be provisioned into TP1 only.

Slave Anti-Fraud AP:

Provide one (1) NT4G25CA 3 MByte AP to provide ACCS Anti-Fraud functions. This SRU is required only once per SCP-TP; therefore, it must be provisioned into TP1 only.

DB Support AP:

Provide one (1) NT4G25GA 10 Mbyte AP for SCP29/AUS30 (or one (1) NT4G25EA 7 Mbyte AP for NSR25) to perform database (DB) support functions and run the SS7 control program. This SRU is required only once per SCP-TP; therefore, it must be provisioned into TP1 only.

Spare AP:

Provide one (1) NT4G25GA 10 Mbyte AP for SCP29/AUS30 (or one (1) NT4G25EA 7 Mbyte AP for NSR25) as a hot spare in case of failure of any one of the other APs. This SRU is required in each DVS system in SCP-TP and will be referred to as the N+1 Spare AP (for SCP29/AUS30).

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Automatic Call Gapping:

Automatic Call Gapping (ACG) is an 800+/008 Database only feature which aids the SCP service in handling query congestion situations. When ACG detects that its service is congested, it sends messages to the high-traffic SSP nodes that are causing the congestion, request them to regulate their query rates. This feature is available in SCP29/AUS30.

When ACG is implemented, one ACG PRU resides on each SCP-TP. Provide one (1) NT4G25GA 10 Mbyte AP for ACG on the SCP-TP#2. ACG resides on the same 10 MByte AP as the DB Support and the Q-Loss (Disk Auditor) on SCP-TP#1. The ACG PRU can not exist on the same SRU as a query processing DBTM PRU.

Disk Auditor:

Disk Auditor monitors all volumes on a SCP-TP and performs audits of those volumes that exceed a certain capacity threshold. On the SCP-TP, the Disk Auditor disables query routing to those slave DBTMs that would be affected by an audit and would loose SS7 Messages. There is only one () instance of the SCP Disk Auditor running on the SCP-TP; it resides on TP#1. It can exist on the same 10 Mbyte AP as the DB Support AP and the ACG AP. Provide one (1) NT4G25GA 10 Mbyte AP for SCP-TP#1 to accommodate the DB Support, the Automatic Call Gapping, and the Disk Auditor (SCP29/AUG30).

Update Processor AP:

Provide one (1) NT4G25GA 10 Mbyte AP for SCP29/AUS30 to apply daily updates to all database copies on a SCP-TP node. Up to three (3) SCP-TP Update Processor (SUP) PRU can run on a 10 MByte 68020 AP. The SUP is configured on a one per application per TP basis. For example, in a SCP-TP with two TPs and three applications (800+, ACCS, BNS), a total of six SUPs would be configured on the system, three for each TP; therefore, one (1) SRU is required in each DVS lineup in SCP-TP.

DS-30 SRU

The following are DS-30 SRUs:

PEC	SRU NAME	SIZE
-----	-----	-----
NT4G60AA	5 MByte DS-30	1/2 SRU

These SRUs are provisioned based on the following applications:

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DNC Base SCP-TP1 DS-30 AP:

Provide one (1) NT4G60AA 5 MByte DS-30 AP to run base DNC software and the SCP Alarm/Audit feature. This SRU is required in each DVS system in the SCP-TP. In lineup #2 this will be referred to as the DNC Base SCP-TP2 DS-30 AP.

Spare DS-30 AP:

Provide one (1) NT4G60AA 5 Mbyte DS-30 AP as a hot spare in case of failure of one of the other DS-30 APs. This SRU is required in each DVS system in the SCP-TP.

ACCS/800+/BNS DS-30 AP:

Provide NT4G60AA 5 MByte DS-30 APs for each application (800+/ACCS/BNS) as required to support the expected query rate.

The number of DS-30 SRUs required is determined by the expected query rate and SRU throughput capacity; that is:

$$\# \text{ DS-30 SRU} = \frac{\text{Application HDBH Traffic (Q/S)}}{\text{DS-30 SRU Capacity for Application}}$$

(round up to the next even integer)

Where: Q/S is Queries per Second

DS-30 SRU Capacity is a function of the call distribution, % Cache Hit, No. of DBTM/DB, No. of DBs/Disk, DB Size. The DS-30 SRU Capacities (68010) are as below:

ACCS DS-30 SRU Cap. = 8.5 Q/S (assuming 1% Cache Hit)

BNS DS-30 SRU Cap. = 11.5 Q/S (assuming 30% Cache Hit)

$$800+ \text{ DS-30 SRU Cap.} = \frac{12.1 * 0.8}{(1-(\%VCR + \%SNS)) + 2*\%VCR + 1.5*\%SNS}$$

(assuming 20% Cache Hit)

%VCR is the percentage of Variable Call Routing of the total 800+ traffic.

%SNS is the percentage of Single Number Screening of the 800+ traffic.

The upper limit of DS-30 SRUs is 16 per Application. There should be at least two (2) DS-30 SRUs per line up per application.

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For efficient load-sharing and reliability in a two-DVS configuration, the number of DS-30 SRUs should be rounded up to an even number and they should be distributed equally on each lineup.

Storage SRU - Capacity

The slave database for an application (ACCS, 800+ or BNS) is kept on disk Storage SRUs. The number of disks required is based on the number of database records, the size of each record, disk overhead considerations, and application DS-30s. A disk can hold more than one type of database. Thus, it is required for reliability that at least two (2) copies of each database be provided per DVS lineup, that the copies be distributed evenly over the available disks, and that the disks be distributed evenly in the case of two-DVS configurations. Disk provisioning should take growth considerations into account.

The number of Slave Databases is as follows:

$$\# \text{ Slave Databases} = \frac{\# \text{ DS-30 SRU}}{\# \text{ DBTM/Disk (1,2, or 3)}}$$

Where:

DBTM = DataBase Task Manager.

The minimum number of copies per database type per DVS line-up is two (2).

Storage SRU - Disk Provisioning

Each slave database requires two (2) support files contained on a different disk from the database disk and are only required on TP#1. Therefore:

$$\text{Size of Support} = \text{Support Update Batch size} * \text{S0 Volume/Day}$$

Each slave database requires S0 Update Batches (UB) on disk sized as below:

$$\text{Size of UBs} = \text{Daily Peak S0 Volumes} * \text{Bytes per UB/Day}$$

Slave Database Disk Size is defined as:

$$\text{Disk Size} = \text{Database Size} + \text{Support Files} + \text{UB Sizes}$$

The maximum disk size must be less than 90% of the formatted disk capacity.

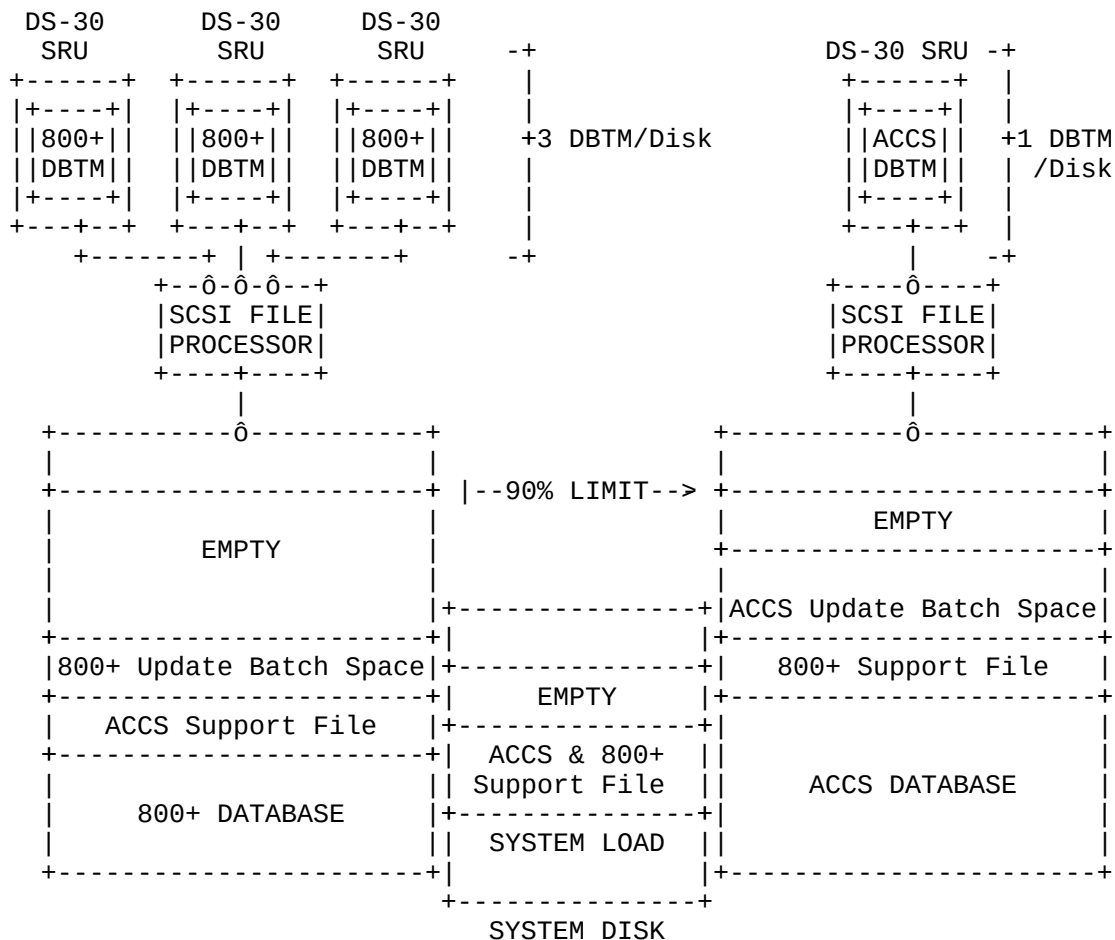


Figure 6. SCP-TP Database Example

The NT4G20TA has been rated Manufacture Discontinue without a replacement. Provide NT4G20TA SCSI 350 MByte Storage SRUs (FULL SRU) as required to store slave database records for the applications. The formatted capacity is 254 MBytes. The 350 MByte Storage SRU is supported in NSR25, SCP29, and AUS30 and can be daisy chained to a maximum of two () for a maximum disk space of 508 MBytes.

Provide NT4G20PA SCSI 160 MByte Storage SRUs (1/4 SRU) as required to store slave database records for the applications. The formatted capacity is 158 MBytes. The 160 MByte Storage SRU is supported in SCP29 and can be daisy chained to a maximum of three (3) for a maximum disk space of 474 MBytes. This configuration requires local a SCSI cable (NT4G09AE) between each of the daisy chained disks. The NT4G20PA is not yet available for Telecom Australia.

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2MB SCSI File Processor SRU (FP) (2MB, 1/4 SRU, NT4G26AA)

Provide one (1) NT4G26AA 68010-2 SCSI File Processor for each Storage SRU provisioned which stores online database records (for NSR25 applications only).

6MB SCSI File Processor SRU (FP) (6MB, 1/2 SRU, NT4G26CB)

Provide one (1) NT4G26CB 68010-6 MByte SCSI File Processor for each 350 MByte disk or 160 MByte (daisy chained) disk provisioned which stores online database records and/or is connected to the SCSI Mag Tape Drive (see Input/Output Devices below).

Local Data Net SRU (1/4 SRU, NT4G54AA)

If more than one TP is provisioned in the SCP-TP, provide one (1) NT4G54AA Local Data Net SRU in each DVS system in the SCP-TP. This SRU connects the first DVS to the second DVS in a multi-TP SCP.

Restriction: This SRU cannot be located in cabinet 02 slot 1 at the present time.

Lanlink SRU (1/4 SRU, NT4G14DA)

Provide at least one (1) NT4G14DA Lanlink SRU to support the communications interface to M4000 terminals and Lan Interface Units (LIUs). Each NT4G14DA will support a maximum of 12 communications ports (2 LIUs and/or M4000 terminals). NT4G14DA replaces NT4G14BA (MD) Manufacture Discontinue.

Always provide at least one Lanlink SRU. This SRU is required in each DVS system in the SCP-TP and is provided directly to the left of the Primary Processor.

Input/Output Devices

SCSI 9 TRACK MAGNETIC TAPE DRIVE (6250 BPI): This is a stand-alone 9 track, 6250 BPI MTD. Provide one (1) NT4G08AA/NT3M08AA per TP line-up (TP#1, TP#2) for bulk loading and dump/restore of database records. NT4G08AA is for North American markets while NT3M08AA is for Telecom Australia (240V, 50 Hz product). The Tape Drive should be connected via SCSI to one of the Storage SRUs and must be the last device on the SCSI bus.

M4110 TERMINAL: Provide one (1) for each DVS system to allow booting the system. The M4110 Terminal consists of the following:

PEC	DESCRIPTION
NT0M90PA	M4110 Controller
NT0M91BA	M4110 Keyboard
NT0M92DA	Monitor

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NT0M96AA Spacing Collar

This terminal must be connected to port 1 of the Lanlink SRU located to the left of the Primary Processor. Additional M4110 terminals may be provided as required. Provide one (1) NT0M92DB Monitor, Monochrome for Telecom Australia.

DOT MATRIX PRINTER: Provide one (1) for printing log reports. The A 317073 Genicom Corporation Model 3304 Desktop Matrix Printer is recommended. One Paper Catcher C2501313 and one Pedestal Stand A0317078 is to be provided for each Desktop Matrix Printer. For Telecom Australia, provide the Universal Desktop Matrix Printer NT3M56AG (one () per DVS lineup). The printer may be connected to an LIU or directly to one of the M4110 terminals. For LIU-connected printers, refer Figure 8 on page 18-56 (in SCP-OAM EQUIPMENT, Lan Interface Unit (LIU)) for port provisioning considerations.

NT-220 or EQUIVALENT CUSTOMER-SUPPLIED VT-100 COMPATIBLE TERMINALS: Provide as required for terminal access to the SCP-TP.

Lan Interface Unit (LIU) (NT4G46CA/NT3M46AA)

These are standalone devices used to terminate a communications line. Depending on the type of line, they are downloaded with the appropriate software. The 3 major types are X.25, ATA (ASCII Terminal Access) and Bisync (3780 RJE). For example, the LIUs can be used for NOP/FTS links to the SCP-OAM(s) (X.25), for dial-up lines (ATA), or direct-connect ASCII terminals (ATA). Each LIU can terminate two (2) serial ports and one (1) parallel printer port. The total aggregated transmission speed of the communication lines connected to the two (2) serial ports must not exceed 19.2 KBS. A printer can also be attached to an LIU using up one of the 2 serial lines (serial printers) or the printer port (parallel printers).

NT3M46AA LIU (240V, 50 Hz product) is to be provided for Telecom Australia instead of NT4G46CA.

Refer to Figure 9 on page 18-60 (in SCP-OAM EQUIPMENT, Lan Interface Unit (LIU)) for provisioning of LIU ports based on link speed and personality.

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Provisioning Procedure

Refer to ECM344 Data Voice System for general DVS provisioning information. Refer to SEL 90-04-032 for Capacity Provisioning Guidelines for the DVS-SCP. The following describes the specific DVS equipment required to implement the SCP-OAM OA&M function.

Primary Processor SRU (PP) (6MB, 1/2 SRU, NT4G16EE)

Provide one (1) NT4G16EE SCSI Primary Processor to run base DVS software and provide access to the system disk. This processor must be located in cabinet 01 slots 3-4 (ie. right hand side of top shelf) for SCP29/AUS30 configuration. (For NSR25 configuration, the processor was located in cabinet 02 slots 3-4 (ie. right hand side of top shelf).) The NT4G20TA has been rated Manufacture Discontinue.

System Disk (350MB, FULL SRU, NT4G20TA)

Provide one (1) NT4G20TA SCSI 350 MByte Storage SRU (per DVS-OAM) for storage of system tables and software. The system disk should be located as close as possible to the primary processor. Only one system disk is required, even in a system provisioned with a redundant primary processor.

Provide three (3) additional NT4G20TA SCSI 350 MByte Storage SRU (per DVS-OAM) for emergency recovery and/or system software increments.

Cartridge Tape (1/2 SRU, NT4G21AA)

Provide one (1) NT4G21AA Cartridge Tape for system software installation as well as saving and restoring. The tape cartridge should be located as close as possible to the primary processor. Only one system disk/tape cartridge is required. This SRU is required in each DVS system in the SCP-OAM (for NSR25 only).

Application Processor SRU (AP)

The following are AP SRUs used in SCP-OAM:

PEC	SRU NAME	SIZE
-----	-----	-----
NT4G25CA	3 MByte AP	1/4 SRU
NT4G25EA	7 MByte AP	1/2 SRU
NT4G25GA	10 MByte AP	1/2 SRU

These APs are provisioned based on the following applications:

DB Support #_:

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Provide two (2) NT4G25EA 7 MByte APs (for Telecom Canada) to perform database support functions for 800+/ACCS/BNS (SCP29) existing on the SCP-OAM. These will be referred to as the DB Support #0 and DB Support #1 APs respectively.

For Telecom Australia, provide one (1) NT4G25EA 7 MByte APs to perform database support functions for 008/ACCS (AUS30). Since Telecom Australia only needs one instance of each of the two databases, only one 7MB SRU is required.

For NSR25, always provide two (2) NT4G25EA 7 MByte APs to perform database support functions.

Network OAM AP:

Provide one (1) NT4G25CA 3 MByte AP for the processing of OMs and logs.

OM Report AP:

Provide one (1) NT4G25CA 3 MByte AP for OM reporting.

Base MMI AP:

Provide one (1) NT4G25GA 10 MByte AP for SCP29/AUS30 (one (1) NT4G25EA 7 MByte AP for NSR25) to provide the base Man Machine Interface (MMI) functions. Each Base MMI AP will support up to two concurrent users of base MMI functions. Additional MMI APs may be provisioned to support two additional concurrent users each.

NOP/FTS AP:

Provide one (1) NT4G25EA 7 MByte AP for the processing of X.25/NOP and X.25 FTS communications to the SCP-TP system(s).

3780 RFT AP:

Provide one (1) NT4G25CA 3 MByte AP to implement the 3780 Remote File Transfer function for host access and interface to the Billing Support System.

Spare AP:

Provide one (1) NT4G25GA 10 Mbyte AP for SCP29/AUS30 (or one (1) NT4G25EA 7 Mbyte AP for NSR25) as a hot spare in case of failure of one of one of the other Applications Processors. This will be referred to as the N+1 Spare AP (for SCP29/AUS30).

800+/ACCS/BNS MMI AP:

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Provide one (1) NT4G25CA 3 MByte AP each for the 800+, ACCS and BNS applications to provide the MMI for service order input.

The MMI APs will support five concurrent users each. Additional MMI APs may be provisioned to support five additional users each.

ACC_ Master DB AP:

Provide two (2) NT4G25GA 10 MByte APs for SCP29 (or two (2) NT4G25EA 7 MByte APs for NSR25) for the ACCS application to perform master database processing functions. These will be referred to as the ACC0 Master DB AP and the ACC1 Master DB AP respectively.

For Telecom Australia, provide one (1) NT4G25GA 10 MByte APs for AUS30 (or one (1) NT4G25EA 7 MByte APs for NSR25) for the ACCS application to perform master database processing functions. These will be referred to as the ACC0 Master DB AP. A second ACCS master database is to be provided, if the need arises prior to the implementation of the SuperNode-based product.

800+/BNS Master DB AP:

Provide one (1) NT4G25GA 10 MByte APs for SCP29/AUS30 (or one (1) NT4G25EA 7 MByte APs for NSR25) each for the 800+ and BNS applications to perform master database processing functions. These will be referred to as the 800+ Master DB AP and the BNS Master Database AP respectively.

For Telecom Australia, provide one (1) NT4G25GA 10 MByte APs for AUS30 (or one (1) NT4G25EA 7 MByte APs for NSR25) for the E008 application to perform master database processing functions. These will be referred to as the E008 Master DB AP.

800+ Billing AP:

Provide one (1) NT4G25GA 10 MByte AP for SCP29 (or one (1) NT4G25EA 7 MByte AP for NSR25) for the 8 0+ Billing feature. This AP is not available for Telecom Australia.

List DB MMI AP:

Provide one (1) NT4G25EA 7 MByte AP to provide the List Database MMI.

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External Audit AP:

Provide one (1) NT4G25GA 10 MByte AP for SCP29/AUS30 (or one (1) NT4G25EA 7 MByte AP for NSR25) for the external audit capability.

Disk Auditor:

Disk Auditor monitors all volumes on a SCP-OAM and performs audits of those volumes that exceed a certain capacity threshold. Unlike the Disk Auditor that resides on the SCP-TP, there is no need for the Disk Auditor on the SCP-OAM to disable query routing to those DBTMs that would be affected by an audit and would lose SS7 Messages. The Disk Auditor PRU is generic enough that it can run on any SRU. It uses less than 5% of total CPU resources, and uses less than 300 kilobytes of memory.

Master Anti-Fraud AP:

Provide one (1) NT4G25CA 3 MByte AP to provide ACCS Anti-Fraud functions.

DS-30 SRU

The following are DS-30 SRUs used in SCP-OAM:

PEC	SRU NAME	SIZE
-----	-----	-----
NT4G60AA	5 MByte DS-30	1/2 SRU

DNC Base AP:

Provide one (1) NT4G60AA 5 MByte DS-30 AP for SCP29/AUS30 (or one (1) NT4G25EA 7 MByte AP for NSR25) to run base DNC software.

Spare DS-30 AP:

Provide one (1) NT4G60AA 5 Mbyte DS-30 AP as a hot spare in case of failure of one of the other DS-30 APs.

Storage SRU - Capacity

The master database for an application (ACCS, 800+, BNS) is kept on disk Storage SRUs. The number of disks required is based on the number of database records and the size of each record. A disk can contain more than one type of database. Unlike the transaction processor, it is not permitted to have multiple copies of each master database. Disk provisioning should take growth considerations into account.

The number of Master (OAM) Databases is as follows:


```

--
\
# OAM Databases = / (# Partitions/OAM * # SCP-OAM with Application
--                  application           in the Network      )

```

Storage SRU - Disk Provisioning

Each OAM database requires two (2) support files: one is contained in the database and the other on a separate disk other than the database disk.

OAM Database Disk Size is defined as:

$$\begin{aligned}
 \text{Disk Size} &= \begin{array}{c} \text{\# Application} \\ \text{Records} \end{array} \begin{array}{c} + \\ \text{Record} \\ \text{Size} \end{array} + \begin{array}{c} \text{Overhead for SO} \\ \text{and UB Processing} \end{array} \\
 &= \begin{array}{c} \text{\# Application} \\ \text{Records} \end{array} \text{Record Constant}
 \end{aligned}$$

Where Record Constants (for Telecom Canada) are:

For ACCS/BNS: 200 Bytes/Record (0-1 million records)
150 Bytes/Record (1-3 million records)

For 800+: 350 Bytes/Record

For Telecom Canada, the maximum OAM disk size must be less than 80% of the formatted capacity (NSR25 pre-split); less than 75% of the formatted capacity (NSR25/SCP29 post-split).

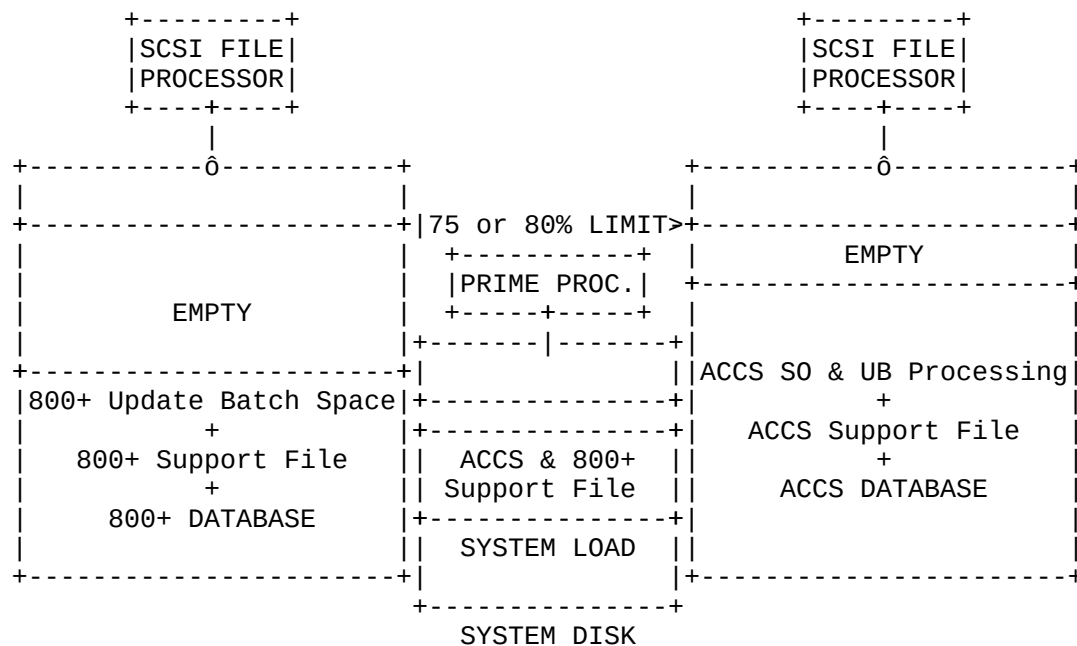


Figure 7. SCP-OAM Database Example

The NT4G20TA SCSI 350 MByte Storage SRUs has been rated Manufacture Discontinue.

Provide NT4G20TA SCSI 350 MByte Storage SRUs (FULL SRU) as required to store master database records for the applications. The formatted capacity is 254 MBytes. The 350 MByte Storage SRU is supported in NSR25, SCP29, and AUS30 and can be daisy chained to a maximum of two () for a maximum disk space of 508 MBytes.

Provide NT4G20PA SCSI 160 MByte Storage SRUs (1/4 SRU) as required to store master database records for the applications. The formatted capacity is 158 MBytes. The 160 MByte Storage SRU is supported in SCP29 and can be daisy chained to a maximum of three (3) for a maximum disk space of 474 MBytes. This configuration requires local a SCSI cable (NT4G09AE) between each of the daisy chained disks. The NT4G20PA is not yet available for Telecom Australia

6MB SCSI File Processor SRU (FP) (6MB, 1/2 SRU, NT4G26CB)

Provide one (1) NT4G26CB 68010-6 MByte SCSI File Processor for each Storage SRU provisioned.

Lanlink SRU (1/4 SRU, NT4G14DA)

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Provide at least one (1) NT4G14DA Lanlink SRU to support the communications interface to M4000 terminals and Lan Interface Units (LIUs). Each NT4G14DA will support a maximum of 12 communications ports (2 LIUs and/or M4000 terminals). NT4G14DA replaces NT4G14BA which has been rated Manufacture Discontinue (MD).

Always provide one Lanlink SRU. This SRU is provided directly to the left of the Primary Processor.

Input/Output Devices

SCSI 9 TRACK MAGNETIC TAPE DRIVE (6250 BPI): This is a stand-alone 9 track, 6250 BPI MTD. Provide one (1) NT4G08AA/NT3M08AA for bulk loading and dump/restore of database records. NT4G08AA is for North American markets while NT3M08AA is for Telecom Australia (240V, 50 Hz product). The Tape Drive should be connected via SCSI to one of the Storage SRUs and must be the last device on the SCSI bus.

M4110 TERMINAL: Provide one (1) for each DVS system to allow booting the system. The M4110 Terminal consists of the following:

PEC	DESCRIPTION
NT0M90PA	M4110 Controller
NT0M91BA	M4110 Keyboard
NT0M92DA	Monitor
NT0M96AA	Spacing Collar

This terminal must be connected to port 1 of the Lanlink SRU located to the left of the Primary Processor. Additional M4110 terminals may be provided as required. Provide one (1) NT0M92DB Monitor, Monochrome for Telecom Australia.

DOT MATRIX PRINTERS: Provide at least two (2). One is required for printing real-time logs and the other for printing OM log and bulk input reports. A0317073 Genicom Corporation Model 3304 Desktop Matrix Printer is recommended. One Paper Catcher C2501313 and one Pedestal Stand A 317078 is to be provided for each Desktop Matrix Printer. For Telecom Australia, provide the Universal Desktop Matrix Printer NT3M56AG (one () per DVS lineup). The printer may be connected to an LIU or directly to one of the M4110 terminals. For LIU-connected printers, refer to Figure 8 on page 18-56 (in Lan Interface Unit (LIU)) for port provisioning considerations.

NT-220 or EQUIVALENT CUSTOMER-SUPPLIED VT-100 COMPATIBLE TERMINALS: Provide as required for terminal access to the SCP-OAM.

LAN INTERFACE UNIT (LIU) (NT4G46CA/NT3M46AA)

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These are standalone devices used to terminate a communications line. Depending on the type of line, they are downloaded with the appropriate software. The 3 major types are X.25, ATA (Ascii Terminal Access) and Bisync (3780 RJE). For example, the LIUs can be used for NOP/FTS links to the SCP-TP(s) (X.25) (one link plus a spare per LIU), for dial-up lines (ATA), direct-connect ASCII terminals (ATA), or for every two 3780 RFT access ports (3780 RJE). Each LIU can terminate two () serial ports and one (1) parallel printer port. The total aggregated transmission speed of the communication lines connected to the two (2) serial ports must not exceed 19.2 KBS. A printer can also be attached to an LIU using up one of the 2 serial lines (serial printers) or the printer port (parallel printers).

NT3M46AA LIU (240V, 50 Hz product) is to be provided for Telecom Australia instead of NT4G46CA.

Refer to Figure 8 for provisioning of LIU ports based on link speed and personality.

LIU Port Personality	Maximum Data Link Rate (bits/sec)	8-Line MUX Kit Installed?	+ Ports Available	Notes
ATA	9600	No	1	
ATA	4800	No	2	
ATA	4800	Yes	1	2
ATA	2400	Yes	7	2
ATA	9600	Yes	6	2,3
X.25	19200	No	1	
X.25	9600	No	2	
X.25	4800	Yes	4	

Figure 8. LIU Port Provisioning Table

Notes:

1. Each NT4G46CA Lan Interface Unit (LIU) provides two serial ports and one parallel printer port. An NT4G46EK 8-Line MUX Kit is provisionable to increase usable serial port capacity to eight ports.
2. When the 8-Line MUX kit is installed, only the eight new ports it provides should be used. The existing two LIU ports should not be assigned.
3. This configuration is only permitted where the LIU is to be used for intermittent terminal keystroke interaction with the DMS-SCP, not for continuous data transmission.
4. Serial printer personality may be assigned to any unused LIU port.

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Hardware Provisioning

The Minisys is a Data Voice System configuration. Always provision the following hardware for the Minisys:

1. Provide two (2) NT4G25GA 10 MByte APs for SCP29 or provide two (2) NT4G25EA 7 MByte APs for NSR25. For Telecom Australia, provide two (2) NT4G25EA 7 MByte APs for AUS30.
2. Provide two (2) NT4G25CA 3 MByte APs (NSR25 only).
3. Provide one (1) NT4G16EE Primary Processor. Mount in cabinet 1, slot 3. The NT4G20TA SCSI 350 MByte Storage SRUs has been rated Manufacture Discontinue (MD).
4. Provide one (1) NT4G20TA SCSI 350 MByte Storage SRU for storage of system tables and software. The system disk should be located as close as possible to the primary processor.

Provide three (3) additional NT4G20TA SCSI 350 MByte Storage SRU (per DVS-OAM) for Database copies used by Database Audit.

5. Provide one (1) NT4G21AA Tape Cartridge SRU for system software installation as well as saving and restoring. The tape cartridge should be located as close as possible to the primary processor. Only one system disk/tape cartridge is required (NSR25, AUS30 only).
6. Provide 160/350 MByte Storage SRUs as backup disks for use in the data save/restore and software install process.
7. Provide one (1) NT4G26CB 68010-6 MByte SCSI File Processors for each backup disk or a daisy-chained disk set provisioned.
8. DNC Base AP: Provide one (1) NT4G25GA 10 MByte AP for SCP29 (or one (1) NT4G25CA 3 MByte AP for NSR25) to run base DNC software.
9. Base MMI AP: Provide one (1) NT4G25GA 10 MByte AP for SCP29/AUS30 (one (1) NT4G25CA 3 MByte AP for NSR25) to provide the base Man Machine Interface (MMI) functions. Each Base MMI AP will support up to two concurrent users of base MMI functions. Additional MMI APs may be provisioned to support two additional concurrent users each.
10. Provide one (1) NT4G14DA Lanlink SRU. This SRU is provided directly to the left of the Primary Processor. NT4G14DA replaces NT4G14BA which has been rated Manufacture Discontinue (MD).
11. Provide seven (7) NT4G13FA DVS cabinets per MINISYS to accommodate the required SRUs.
12. Provide two (2) NT4G46CA Lan Interface Units (LIUs). Configure one with ATA and Printer personalities and the other with

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- X.25 personality. For Telecom Australia, provide one (1) NT3M46AA Lan Interface Units (LIU).
13. Provide one (1) M4110 terminal. The M4110 Terminal consists of the NT0M90PA M4110 Controller, the M4110 Keyboard, the NT0M92DA Monitor, and the NT0M96AA Spacing Collar.
 14. Provide one (1) NT4G08AA/NT3M08AA SCSI 9 Track Magnetic Tape Drive (6250 BPI) for bulk loading and dump/restore of database records. NT4G08AA is for North American markets while NT3M08AA is for Telecom Australia (240V, 50 Hz product). The Tape Drive should be connected via SCSI to one of the Storage SRUs and must be the last device on the SCSI bus.
 15. Provide NT-220 or equivalent customer-supplied VT- 1 0 compatible terminals as required for terminal access to the Minisys.

Support Hardware

In order to ensure an adequate level of support to the SCP system some additional hardware (from now on referred to as SCP Support Hardware) is required. This hardware consists of VDU terminals for low level lineup control (file editing, debugging, tracing, etc.), slave printers, modems for remote dial-up, and related cables, connectors and data line switches. This section will describe the steps required for engineering of the above equipment.

Contact I.N. Services/SCP (Program Manager, Brian Clark, Department S 25, BRW) for further assistance on provisioning the SCP Support Hardware.

Onsite DVS Support Interface

A CI console (VT320 compatible) and a slave printer are used (on site) for low level lineup control (file editing, debugging, tracing, etc.) of the DVS lineups. A console and printer is attached to the Primary Processor (PP) SRU and the Spare Application Processor (SAP) SRU on each DVS lineup. An ABC type RS232 switch is used to switch the console/printer between the PP SRU and the SAP SRU (if the two SRUs exist on one DVS lineup).

FP Monitoring System Configuration

A CI console (VT320 compatible) and a slave printer are used (on site) for monitoring the RS232 ports of the File Processor (FP) SRUs. A Terminal Eliminator (TE) is used to connect the console/printer to the FP SRU. Each TE has eight (8) port connections; one port for each FP SRU connected. One TE/console/printer is used for the OAM; one for the TP (TP1/TP2). If more the eight FP SRUs exist per OAM/TP, a second set of TE/console/printer must be provided.

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ETAS Support

When ETAS Support is required, one 9600 bps modem and one LIU must be order for each DVS lineup (OAM, TP1, TP2, MINISYS).

A typical configuration for an SCP site consisting of 4 line-ups (OAM, TP1, TP2 and Minisys) is shown in Figure 9 on page 18-60

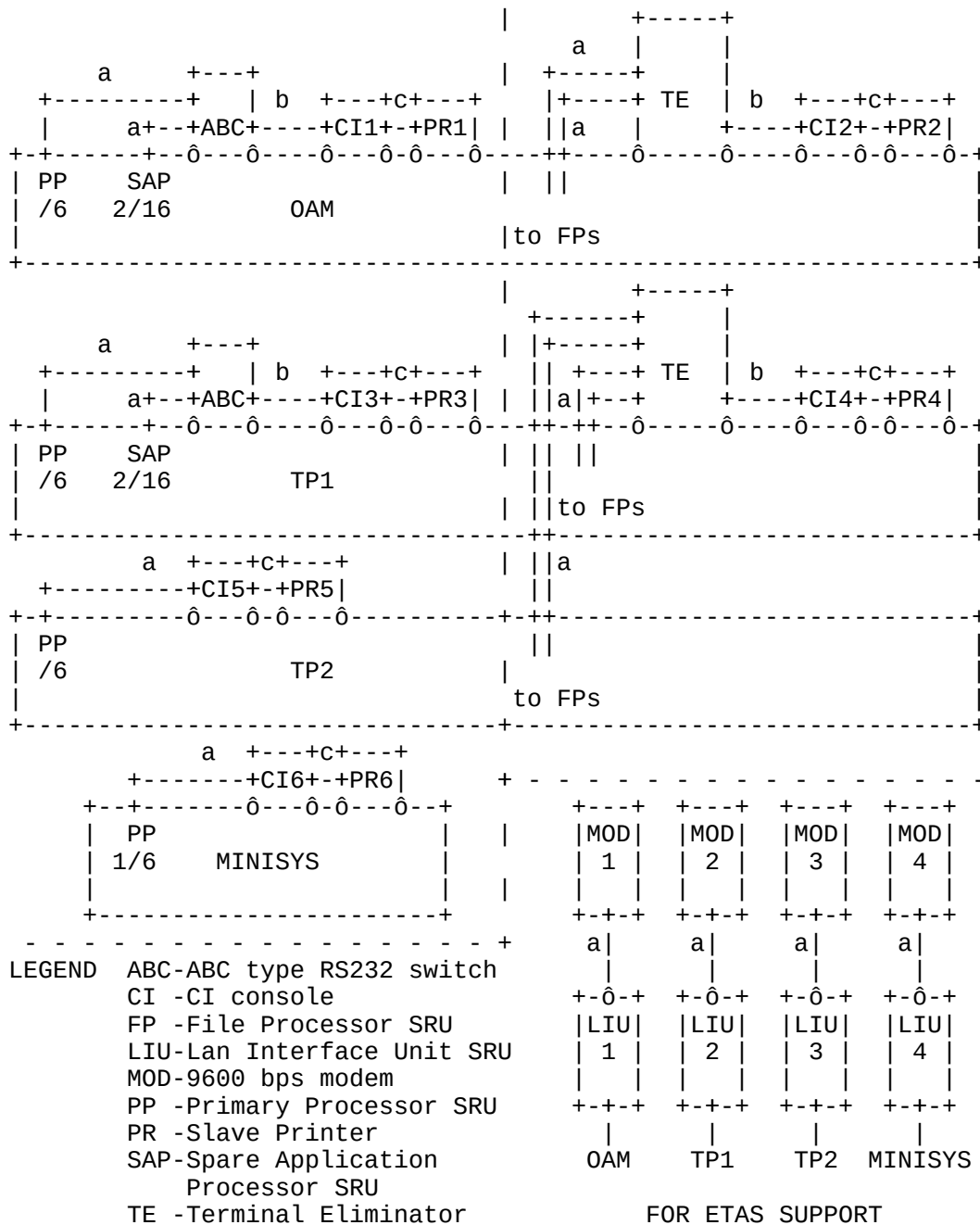


Figure 9. SCP Support Hardware Configuration

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SCP Support Hardware Provisioning

CI Console

Provide one (1) VT320 Terminal per DVS lineup (OAM, TP1, TP2, MINISYS) for Onsite DVS Support Interface. Provide one (1) VT320 Terminal per OAM and one (1) per SCP-TP for FP Monitoring System Configuration.

Slave Printer

Provide one (1) Slave Printer per VT320 Terminal provided. One (1) serial interface must be provided in order that the printer can be connected to the corresponding terminal.

ABC type RS232 Switch

When a Primary Processor SRU and a Spare Application SRU exist on the same DVS lineup, one (1) ABC RS232 Switch is used to connect the SRUs to the terminal for the Onsite DVS Support Interface. Provide one (1) A0345353 ABC RS232 in this situation.

Terminal Eliminator

The Terminal Eliminator is used to connect the File Processor SRUs to the CI consoles and printers for FP Monitoring. Provide one (1) A 367318 Terminal Eliminator, one (1) 4-Port expansion card, and one (1) 3 k Memory Expansion card for every eight (8) FP of an OAM and SCP-TP.

9600 bps Modem

One (1) 9600 bps Modem must be provided per DVS lineup if ETAS support is required.

Data Cables

1. RS232 Cables must be ordered to connect the various SRUs to external equipment (as noted by "a" in Figure 9 on page 18-60). The cables and their associated lengths to provided are as follows:

PEC	LENGTH
-----	-----
NT0M96RV	50 FEET
NT0M96DH	25 FEET
NT0M96DG	10 FEET
NT0M96SE	6 FEET

These cables are shielded, 25 conductor cables with two male ends. Provide one (1) P0654783 Pig Tail adapter per cable for connecting the 25 pin cable to the 9 pin connection on the SRU.

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2. Provide one (1) RS232 Data Cable per Terminal Eliminator and one (1) cable per ABC RS232 Switch to connect directly to the console (as noted by "b" in Figure 9 on page 18-60). The cables and their associated lengths to provided are as follows:

PEC	LENGTH
-----	-----
NT0M96RT	50 FEET
NT0M96RS	25 FEET
NT0M96SC	10 FEET
NT0M96SD	6 FEET

These cables are shielded, 12 conductor cables with one male and one female connection.

3. Provide one (1) Serial Printer cable and one (1) Male DB25 adapter to connect each console to a Slave printer (as noted by "c" in Figure 9 on page 18-60).

2.2.4 Office Layout Information

DVS Cable Concealment Hardware

Provide one (1) DVS Cable Concealment Hardware (pedestals) per each DVS cabinet to meet customer requirements for cable concealment. These pedestals are located at the base of each DVS cabinet. NT0X12AA is equipped with two (2) anchors while NT0X12AB is equipped with four (4) anchors. These pedestals are to be ordered for DVS-SCP equipment only.

The DVS lineups require DC power directly from the plant. The Tape Drives, VDUs, and printers attached to the DVS lineups require AC power. This AC power is not handled by inverters on the DMS equipment.

2.2.5 Traffic Tables

Not applicable.

2.3 Product/System Specification

2.3.1 Physical Characteristics

2.3.2 EMI/Earthquake Information

2.3.3 Sparing Information

The following formula is to be used for calculating spare

Refer to SEL 90-04-032 for Capacity Provisioning DVS SRUs:

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of SPARE SRUs = $0.1 \times \text{SRU count}$
(round up)

Use the formula to determine the number of spares for each of the following DVS SRUs (noting the minimum number required for each):

SRU DESCRIPTION	PEC	MINIMUM REQUIRED
Primary Processor	NT4G16EE	2
AP 3M	NT4G25CA	1
AP 7M	NT4G25EA	1
AP 10M 68020	NT4G25GA	1
File Processor 2M	NT4G26KA	1
File Processor 6M	NT4G26CB	2
DS-30	NT4G60AA	2
1 x 160M Disk	NT4G20PA	2 *
2 x 160M Disk	NT4G20PA	2 (sets of 2) *
3 x 160M Disk	NT4G20PA	2 (sets of 3) *
The NT4G20TA has been rated as Manufacture Discontinue.		
350M Disk	NT4G20TA	3
Lan Links	NT4G14BA	2
48 Volt Power	NT4G50DA	1
Tape SRU	NT4G21AA	1
M4100 Controller	NT0M90PA	1
Monitor	NT0M92DA	1
keyboard	NT0M91BA	1
LIU	NT4G46CA	1
Datanet	NT4G54AA	1

The number of spares are to be calculated on a per office basis. In the event of an office extension, the total number of spares required at the office is to be re-calculated based on the new SRU totals.

| * NOTE: With respect to the 160M Disk, at any given time, system configuration either has one (1) or two (2) or three (3) chained together. A failure with one disks results in the necessity to replace the whole set. Each set of disks should be handled separately. Disk spares should be formatted and grouped as those configured and operating in the office. Spare sets should be separated accordingly, each set of 160M disks (2 or 3) should be recognized as a separate hardware entity.

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Off-Shore Repair & Return Depot

For each international site (i.e. outside North America), it will be necessary to set up a Repair and Return Depot such as NT Myerside for Canada. This is to provide an emergency turn around for hardware of less than one week.

The following algorithm is to be used to calculate the stock requirements for this depot. Any changes to the sites hardware (i.e. capacity increases, extensions), should result in a recalculation of hardware stock for the depot.

Stock Algorithm

$$\text{Spare Level} = \text{Shipping Time (wks)} * (\text{Qty}/\text{MTBF})$$

where:

QTY = The number of SRUs for every site within the depots' responsibility including spares within each site.

MTBF = Factory Specifications which can be obtained from Minnetonka

EXCEPTION: For 350mg disks, the results of a failure with regard to service impact, it is suggested the end result of this calculation (Spare Level), be multiplied by 1.5 to ensure sufficient stock.

2.3.4 Power Feed and Fusing Requirements

2.3.5 Current Drain Information

2.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

The AUS30 configuration is for Telecom Australia SCP and is required for In-Service use. It follows the SCP29 configuration (as used for Telecom Canada) closely, but with the necessary modifications to match the Australian requirement.

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2.4.1 Required Software Packages and Interdependencies

2.4.1.1 DMS-SCP Software

Provide the following software feature packages for the SCP-TP DMS equipment:

Package	Title

NTX960AB	DMS - SUPERNODE BASIC (UPG.OF NTX960AA)
NTXA55AA	SCP BASE
NTXA56AA	DVI MODE MAINTENANCE
NTX041AB	CCS7 - MTP/SCCP(UPG.OF NTX041AA)
NTX048AA	SYNCHRONIZATION
NTX056AA	ENHANCED ADMINISTRATION
NTX074AA	DISK DATA STORAGE SYSTEM
NTX167AB	CCS7 - TRUNK SIGNALING(UPG. OF NTX167AA)
NTX270AA	NEW PERIPHERAL MAINTENANCE PACKAGE
NTX292AB	ENHANCED SECURITY WITH PASSWORD ENCRYPTION
NTX550AA	CCS7 - TRANSACTION SERVICE SUPPORT
NTX901AA	LOCAL FEATURES I

2.4.1.2 DVS Software

Software for the DVS equipment has not been assigned into feature packages due to the customized nature of the DMS-SCP product. DMS-SCP DVS software loads should be requested directly from V.O. Software Production, Dept 7Q43/S645 Meriline.

2.4.2 Software Usage Restrictions

Allocation of Program Resource Units (PRUs) Into APs

Software for the DNC systems is partitioned into Program Resource Units (PRUs). Specific PRUs must be loaded into each Application/Primary/File Processor.

2.4.3 Memory Provisioning

To determine the amount of memory required for the DMS- Core, use the MEMCALC program.

2.5 Real Time Impact

Refer to SEL 90-04-032 for Capacity Provisioning Guidelines for the DMS-SCP.

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3.0 ECM485 - Meridian Digital Network Interconnect (MDNI)

3.1 Overview

The Meridian Digital Network Interconnect (MDNI) is a facility for organizing the interconnection of the junctor face ports of Network Modules in a given plane. It consists of a Meridian cabinet on which is mounted Network Junctor Connecting (NJC) Panels. Flexible arrangement of the junctor connections is provided by means of standard provisionable patch cords.

3.2 Hardware Provisioning

3.2.1 Hardware Usage Restrictions

Initial application for the MDNI is the Japan NTT market.

3.2.2 Hardware Dependencies

3.2.2.1 P and C Side Port Requirements

3.2.2.2 DMS BUS Port Requirements

Not applicable

3.2.2.3 Circuits Per Card

3.2.2.4 Discrimination Numbering

3.2.3 Provisioning Considerations

When the Meridian Digital Network Interconnect (MDNI) is not employed, the cabinetized DMS system is limited to a maximum of 10 networks with fixed network cabling. The MDNI permits the system to expand to a maximum of 28 networks with flexible re-configuration via patch cords.

One MDNI cabinet is required for each 16 Network Modules (NM) per plane. Offices whose ultimate network size will not exceed 8 networks per plane and where floor space is at a premium may combine juncctors of both planes on the same MDNI cabinet.

The NTNX97AA MDNI houses up to sixteen (16) NTNX97AB Network Junctor Connecting (NJC) Panels in a Meridian cabinet configuration.

Provide one (1) NJC Panel per plane for NTNX40AA-type network. Note that each NTNX40AA Meridian Cabinet Network Module houses two dual-plane networks or four planes total. Four-position crossover patch cords are selected by length according to the running distance between the two ports which are to be interconnected.

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3.2.4 Office Layout Information

Not applicable. The front of the NJC Panels faces the rear of the MDNI cabinet. Cabling enters from below and is routed to the front of the cabinet where it terminates on the appropriate connector, numbered C00 to C15, on the rear of each NJC Panel.

The connectors are wired internally in pairs to eight terminal strips on the front of the NJC Panel (rear of the cabinet); C00 and C 1 are wired to Terminal Strip 0 (TS00), C02 and C03 are wired to TS01, and so forth up to TS07.

Each Terminal Strip has eight columns of four pins. A junctor port occupies one column of pins. Junctor ports are numbered from left to right as viewed from the front of the NJC Panel. Thus, TS00 contains junctor ports 0-7, TS01 contains junctor ports 8-15, and so forth up to TS07 (ports 56-63).

Four-position crossover patch cords are used to interconnect one junctor port to another as required. Patch cords running between MDNI cabinets are routed through an opening in the side of the cabinet at the rear (hence the rear-facing panels).

The MDNI should be located as close as possible to the network cabinets. If future office expansion is anticipated, ensure space is allowed for additional MDNI cabinets to allow all MDNI to be located beside each other in the lineup.

3.2.5 Traffic Tables

Not applicable.

3.3 Product/System Specification

3.3.1 Physical Characteristics

The MDNI is housed in a standard size Meridian cabinet.

3.3.2 EMI/Earthquake Information

The Meridian Cabinet DNI is NOT EMI compliant and should not be equipped in an EMI office.

For resistance to earthquake damage, Anchor Kits are required. When installing cabinet in ATC Zone 6 or 7, NEBS Zone 4 or UBC Zone R, provision NTN2540 kit for slab-type flooring or NTN2578 for computer flooring.

In non-earthquake zones, a Frame Mounting Kit is sufficient. Provision NTN2579 kit for slab-type flooring or NTN2580 for computer flooring.

3.3.3 Sparing Information

Standard sparing algorithms apply.

3.3.4 Power Feed and Fusing Requirements

3.3.5 Current Drain Information

3.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

3.4.1 Required Software Packages and Interdependencies

No software packages are required in support of the MDNI.

3.4.2 Software Usage Restrictions

3.4.3 Memory Provisioning

Not applicable.

3.5 Real Time Impact

Chapter 19

TRAFFIC ENGINEERING

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1.0 ECM497 - Simplified Traffic Provisioning

1.1 Overview

This document provides the worksheets for provisioning DMS equipment based on traffic levels. Refer to ECM590 for the latest traffic tables. These ECMs are intended to provide System Application Engineers the ability to manually check and verify the quantities of Series 2 Peripheral Module equipment supplied to meet a given customer order and for use in incorporating the traffic rules into the automated provisioning process. Following the procedure in this ECM will ensure the performance and capacity requirements of the customer order will be met or exceeded in most cases. Exceptions should be referred to System Engineering.

The simplified traffic methodology consists of a group of customer questions which define the specific requirements to be engineered and a group of rules/calculations that determine the equipment required to satisfy the customer requirements. For offices that cannot be configured using this document, refer to System Engineering.

The simplified traffic methodology uses High Day Busy Hour (HDBH) engineering in calculations for the peripherals. Traffic tables are provided in ECM590 to support these calculations.

The configuration determined through traffic analysis should be checked from a Real Time perspective by using the Real::Time tool on the FACET application.

Worksheet Inputs and Outputs

Worksheets are provided for most peripheral and remote types and determine the number of links required for host and/or peripheral side access. For ISDN modules, the number of D-Channel Handlers is also calculated. Office traffic criteria (Grade of Service, HDBH to ABSBH ratio, etc.) are required for all calculations. The following summarizes the additional inputs required for each worksheet and the outputs that will be provided:

1. LCM

Inputs: # Lines, Percentage Fill
Outputs: # LCMs and DS30As to LGC/LTC/RCC/RCC2
 : # DS0s to Packet Handler per LCM
 : Total CCS

2. RLCM/OPM

Inputs: # Lines, Percentage Fill
Outputs: # DS1s to LGC/LTC/RCC/RCC2
 : # DS0s to Packet Handler
 : Total CCS

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3. LCME

Inputs: # Lines, Percentage Fill
Outputs: # LCMEs and DS30As to LGCI/LTCI/RCCI/RCC2
: # DCHs and DS0s to Packet Handler per LCME
: Total CCS

4. Subscriber Module SLC96 - Remote (SMS-R)

Inputs: # Type 1,2 and 3 SLC96s (with Protection)
: # Type 1,2 and 3 SLC96s (without Protection)
: # Lines per SLC96 and CCS per Line
: # Specials per SLC96
: % Intra at Remote Site
Outputs: # SLC96s per SMS-R
: # SMS-Rs and DS30As to Remote per SMS-R
: # DS1s for Specials off SMS-R

5. Mono RCC or RCCI

(For RCC, all LCME and ISDN inputs equal zero)

Inputs: # Host Ports for Subtending Modules
: (All inputs are taken from worksheets 1-5)
Outputs: # Host Links and Host Traffic
: # DCHs and DS0s to Packet Handler per RCC

6. Dual RCC or RCCI

(For RCC, all LCME and ISDN inputs equal zero)

Inputs: # Host Ports for Subtending Modules
: (All inputs are taken from worksheets 1-5)
Outputs: # Host Links and Host Traffic
: # DCHs and DS0s to Packet Handler per RCC
: # Interlinks

7. Mono RCC2

Inputs: # Host Ports for Subtending Modules
: (All inputs are taken from worksheets 1-5)
Outputs: # Host Links and Host Traffic
: # DCHs and DS0s to Packet Handler per RCC2

8. Dual RCC2

Inputs: # Host Ports for Subtending Modules
: (All inputs are taken from worksheets 1-5)
Outputs: # Host Links and Host Traffic
: # DCHs and DS0s to Packet Handler per RCC2
: # Interlinks

9. LGC

Inputs: # Host Links and Traffic for Subtending Modules
: CMR usage
Outputs: # LGCs and DS30s to Network per LGC

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10. LTC

Inputs: # Host Links for all Subtending Modules

Outputs: # LTCs and DS30s to Network per LTC

11. Common LGCI/LTCI (NT6X44 Time Switch)

(For applications requiring NT6X44 based controllers:
Several will be identical and the remaining one will
be different.

This worksheet handles the common units.)

Inputs: # Host Links for all Subtending Modules

Outputs: # LGCI/LTCI and DS30s to Network per LGCI/LTCI

: # DCHs and DS0s to Packet Handler per LGCI/LTCI

12. Residual LGCI/LTCI (NT6X44 Time Switch)

(For applications requiring NT6X44 based controllers:
Several will be identical and the remaining one will
be different.

This worksheet handles the residual unit.)

Inputs: # Host Links for all Subtending Modules

Outputs: # DS30s to Network per LGCI/LTCI

: # DCHs and DS0s to Packet Handler per LGCI/LTCI

13. Common LGCI/LTCI (NTAX78 Enhanced Time Switch)

(For applications requiring NTAX78 based controllers:
Several will be identical and the remaining one will
be different.

This worksheet handles the common units.)

Inputs: # Host Links for all Subtending Modules

Outputs: # LGCI/LTCI and DS30s to Network per LGCI/LTCI

: # DCHs and DS0s to Packet Handler per LGCI/LTCI

14. Residual LGCI/LTCI (NTAX78 Enhanced Time Switch)

(For applications requiring NTAX78 based controllers:
Several will be identical and the remaining one will
be different.

This worksheet handles the residual unit.)

Inputs: # Host Links for all Subtending Modules

Outputs: # DS30s to Network per LGCI/LTCI

: # DCHs and DS0s to Packet Handler per LGCI/LTCI

15. MF Digital Trunk Controller (DTC)

Inputs: # non-Common Channel Signaling Links for LEC

: # non-Common Channel Signaling Links for IEC

: # Looparound Trunks

Outputs: # DTCs (LEC and IEC)

16. SS7 Digital Trunk Controller (DTC7)

Inputs: # Common Channel Signaling Links for LEC

: # Common Channel Signaling Links for IEC

: # Common Channel Signaling Links for Wireless

: # SS7 InterWorking Trunks (IWTs)

Outputs: # DTC7s (LEC and IEC)

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17. Digital Trunk Controller ISDN (DTCI)
 - Inputs: # PRI Links for LEC
 - : # PRI Links for IEC
 - : # PRI InterWorking Trunks (IWTs)
 - Outputs: # DTCIs (LEC and IEC)
18. Dialable Wideband Service (DTCI/DTC7)
 - Inputs: # H0 Subscribers w/Low-Med-High Hold Time
 - : # H11 Subscribers w/Low-Med-High Hold Time
 - : Avg. Call Attempts per Subscriber
 - : Avg. Holding Time per Subscriber
 - : % Intra for Dialable Wideband Calls
 - Outputs: # DS30s to Network per DTCI/DTC7
 - : # Additional DTCIs
 - : # Additional DTC7s
19. MultiFrequency Receiver (MFR) Calculations
 - Inputs: Avg. MF Receiver Holding Time, Avg. Calls/Trunk
 - Outputs: # MF Receiver Circuits and Cards
20. DigiTone Receiver (DTR) Calculations
 - Inputs: Avg. DT Receiver Holding Time
 - Outputs: # DT Receiver Circuits and Cards
21. Universal Tone Receiver (UTR) Calculations
 - Inputs: Avg. MF-UTR Holding Time, Avg. Calls/Trunk
 - Outputs: # UTR Circuits and Cards
22. Receiver Off Hook (ROH) Calculations
 - Inputs: ROH Holding Time, Total # Originating Calls
 - Outputs: # ROH Circuits and Cards
23. Conference Circuit Calculations
 - Inputs: Avg. Holding Time and # Calls by Call Type
 - Outputs: # Conference Circuits and Cards
24. Enhanced Subscriber Module Access (ESMA)
 - Inputs: # RDTs and Links per RDT
 - : # ICBs and Links per ICB
 - : # Bbs and Dds per RDT
 - : # Lines per RDT/ICB and % ISDN Penetration
 - : CCS/Line and HDBH/ABSBH Ratio
 - : RDT or ESMA Concentrating?
 - Outputs: # RDTs and ICBs per ESMA
 - : # ESMAs and DS30s to Network per ESMA
 - : # DCHs and DS0s to Packet Handler per ESMA
25. Subscriber Module Access (SMA)
 - Inputs: # RDTs and Links per RDT
 - : # Bbs, Bds, and Dds per RDT
 - : # Switched Channels per RDT

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Outputs: # RDTs per SMA
: # SMAs and DS30s to Network per SMA
: # DCHs and DS0s to Packet Handler per SMA

26. Subscriber Module Urban ISDN (SMUI)

Inputs: # RCUs and Links per RCU
: # Bbs, Bds, and Dds per RCU
: # Switched Channels and Specials per RCU
Outputs: # RCUs per SMUI
: # SMUIs and DS30s to Network per SMUI
: # DCHs and DS0s to Packet Handler per SMUI

27. Subscriber Module Urban (SMU)

Inputs: # RCUs and Links per RCU
: # Switched Channels and Specials per RCU
Outputs: # RCUs per SMU
: # SMUs and DS30s to Network per SMU

28. Network Modules

Inputs: Total Network Ports Required
: Total CCS for Lines and Trunks (Host & Remote)
: Total CCS for Service Circuits (Host & Remote)
Outputs: Number of Network Modules needed

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

The following information is provided to clarify the basis used for provisioning and the restrictions that must be used:

LGC/LTC P-Side Configuration

When provisioning the P-Side of an LGC/LTC, the P-Side ports can be configured for a maximum of two (2) RSCs if the following conditions are met:

- 1) 2 RSCs from a single configuration
- 2) 1 RSC from a dual configuration and 1 RSC from a single configuration.
- 3) Traffic, Real Time and software Nodal requirements do not exceed the recommended engineering limits.

In addition, the remaining P-Side ports can be configured for RLCMs, OPMs and/or LCMs if the Traffic, Real Time and software Nodal requirements do not exceed the recommended engineering limits.

An LGC/LTC can support a maximum of two RSC-S controllers, provided Real Time and nodal limits are not exceeded. The LGC/LTC has 43

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messaging channels available for subtending processors (LCMs,ESA,RMM,etc) which limits modules off the RCC2. See the following section for more information regarding counting nodes.

RSC P-Side Configuration

When provisioning the P-Side of an RSC, the P-Side ports can be configured for the following maximums if the Traffic, Real Time and software Nodal requirements do not exceed the recommended engineering limits:

- 1) Maximum of 9 LCMs (using 2 links per LCM)
- 2) Maximum of 4 DS1s for PBX Trunking and/or 4 DS1s for CDO Trunking.
- 3) Maximum of 9 non-ESA RLCM/OPMs using two links per module.
- 4) Any combination of the above not to exceed the stated individual maximums

A host LGC/LTC can support a maximum software datafilling of 18 Peripheral side (P-Side) software nodes. (BCS22 and lower)

A host LGC/LTC can support a maximum software datafilling of 62 software nodes. (BCS23 to BCS32)

A host LGC/LTC can support a maximum software datafilling of 68 software nodes. (BCS33 and higher)

A node is defined as follows:

Host LCMs, remote LCMs, RMMs, RCC, RLCM, OPM,
ESA processor (for the RLCM or OPM),
SMS-R, RCUs and dummy software nodes

An example of counting software nodes follows;

A host LGC configured with two (2) host LCMs, one (1) RLCM, one (1) OPM and one (1) RSC (remotes configured below) would constitute a total of 15 software nodes.

- The host LCMs would constitute two (2) software nodes.
- A RLCM configured with one (1) RMM and ESA processor would constitute three (3) software nodes.
- An OPM configured with one (1) RMM would constitute two (2) software nodes.
- A RSC configured with one (1) RCC, two (2) RMMs and five (5) LCMs would constitute eight (8) software nodes.

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(1) Traffic from Community Dial Office (CDO) trunks (Dynamic trunks) is assumed to stay at the remote site and does not utilize host links. The CCS value used for all lines that terminate on the same controller as the CDO trunks must include line to CDO traffic.

CDO Dynamic trunks off a RSC - A maximum of four (4) DS1 CDO Dynamic trunks will be supported.

(2) Traffic from Private Branch Exchange (PBX) trunks (Dynamic trunks) is divided between the host and remote based on customer input.

PBX Dynamic trunks off a RSC - A maximum of four (4) DS1 PBX Dynamic trunks will be supported.

(3) The total number of P-Side RCC ports to support RLCM/OPM lines and CDO, PBX Dynamic trunks in any combination, while maintaining individual maximums, must not exceed eighteen (18) ports.

(4) Dual RCC configurations must have traffic balanced as evenly as possible across both RCCs. Dual RCCs interfacing an odd number of LCMs must have a balanced traffic capacity across both RCCs by either adding a LCM to share traffic loads or distributing the Line Cards evenly to promote a balanced traffic capacity. This includes any RLCM/OPM that is "remoted" or CDO/PBX Digital Dynamic Trunks off the RCCs.

(5) Minimum traffic on Host links is the total traffic less the intra traffic derated by a factor of 0.96. All call types (whether intra or non-intra) will require call set up using the Host links.

(6) All "input" information must be provided on a per site basis for each type configuration. All "input" information must be Telco specified.

(7) All line card types are spread evenly across all equipped line drawers as possible. This will avoid any "lumping" of a particular line card type in any one line drawer or LCM.

(8) POTS wired lines are defined as line cards used for the following functions:

- Single Party - NT6X17-- (A type Line Cards)
- Two Party - NT6X18-- (B type Line Cards)
- Four Party - NT6X18-- (B type Line Cards)
- Eight Party - NT6X18-- (B type Line Cards)
- Coin Lines - NT6X18-- (B type Line Cards)
- PBX Lines - NT6X18-- (B type Line Cards)

Meridian Digital Centrex (MDC) wired lines are defined as line cards used for the following functions:

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MDC Business Lines - NT6X17-- (A type Line Cards)
MDC Business Lines - NT6X18-- (B type Line Cards)
Business Sets - NT6X21-- (C type Line Cards)
Message Waiting - NT6X19-- (E type Line Cards)

DATAPATH wired lines are defined as line card used for the following function:

Data Unit - NT6X71-- (D type Line Cards)

IBERT wired lines are defined as line card used for the following function:

IBERT Unit - NT6X99-- (Integrated Bit Error Rate Test Card)

DIALAN lines are defined as line cards used for the following function:

DIALAN - NT6X76-- (L type Line Card) for Data portion
- NT6X17-- (A type Line Card) for Voice portion

The voice portion of full DIALAN service is included in the MDC category since DIALAN service can be provided with or without the voice/MDC portion.

LCM Physical Configuration Calculation

POTS + MDC + DATAPATH + IBERT + DIALAN + 48V PwrCnvt +
MessWait + AttCon = T

LCM = T/Number of slots to be used per LCM

Where:

POTS = (qty of A + B type Line cards) defined for POTS use

MDC = (qty of A + B + C + E Line Cards) defined for MDC use
(includes voice portion of DIALAN)

DATAPATH = 2*(qty of D type Line Cards) defined for DATAPATH use

IBERT = 2*(qty of Ibert Line Cards)

DIALAN = Z*(qty of L type Line Cards) defined for DIALAN use

Where: Z=2 if using NT6X76AC/AD or data is = or < 10% of lines
Z=3 if using NT6X76AA and data penetration is > 10%.

+48V PwrCnvt = 2*(qty of NT6X23AA (+48V Power Converters))

MessWait = 2*(qty of NT6X20AA (Message Waiting Converters))

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AttCon = 3*(quantity of Attendant Consoles)

Message Channels in Line Concentrating Modules

Since the channels used for messaging between a Line Concentrating Module and the controller are not available for line traffic, the user should be aware of the number of channels dedicated to this use. The following information is provided for that reason.

The DS30A links from an LCM to its controller include two channels (and 16) that are used for maintenance functions. This leaves thirty available channels per link. The first two links from the LCM to the controller must use two additional channels for messaging. Channel 1 of each link is used for this function, leaving 29 channels per link available for call processing. Subsequent links have all thirty channels available for call processing. The existing traffic tables were made conservative enough so that these channels were not a significant factor. The area that must be clarified is that, when using channels for dedicated service (Datapath, for example), these channels are not available. While the existing traffic tables are valid, the maximum number of simultaneously-available channels is as follows:

2 links from LCM to XPM : 58
3 links from LCM to XPM : 88
4 links from LCM to XPM : 118
5 links from LCM to XPM : 148
6 links from LCM to XPM : 178

The same concept applies to RLCM/OPMs, except that the numbers change since these remotes use DS1 facilities. The first two links from the RLCM/OPM to the controller use two channels for messaging, leaving only twenty-three channels for call processing. Subsequent links have all 24 channels available for call processing. The existing traffic tables do take this into account and are still valid but again, the maximum number of dedicated services should be clarified. Therefore, the channel count for simultaneously-available channels in RLCM/OPM is as follows:

2 links from RLCM/OPM to XPM : 46
3 links from RLCM/OPM to XPM : 70
4 links from RLCM/OPM to XPM : 94
5 links from RLCM/OPM to XPM : 118
6 links from RLCM/OPM to XPM : 142

RSC-S P-Side Configuration

The RSC-S has up to 46 DS1 ports available on its P-Side, but a maximum of twenty of these may be used for CDO and PBX trunks and SMS-R Specials. The remaining DS1s may home RLCMs, and OPMs.

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Worksheets provided herein will determine the number of DS30A and DS1 ports required to support a specified line/trunk application. Table H (RSC-S Provisioning and Configuration) in section EMA14-08-000 of the Engineering Manual must then be referenced to find a valid hardware configuration to terminate the required number of links and trunks.

ISDN Configuration Restrictions

It is assumed that RLCM/OPMs will NOT home to LGCI/RCCI.

It is assumed all host trunks will terminate to a DTC. Thus LTCs will be used only to interface RCC/RCC2s with the trunking feature.

It is assumed that the RCCI and RCC2 will home to an LGC or LTC, rather than an LGCI/LTCI due to the increased capacity available to the LGC/LTC.

The LGC/LTC which is acting as host to an RCCI/RCC2 must have 64KB clear channel capability. This is accomplished by equipping NT6X50AB DS1 circuit packs.

The maximum number of LTID per DCH circuit pack is restricted to 511.

SMS-R Provisioning Assumptions and Considerations

- A maximum of six SLC96s (any mode) per SMS-R is allowed.
- All special services are non-switched Specials and are hairpin connections off the SMS-R P-Side.
- All special services using DS1 facility off the SMS-R P-Side are assumed to go to either the RSC-S or a cross-connect.
- All special services going to the RSC-S are assumed to go to the host.
- A maximum of 2 DS1 P-Side (SMS-R) ports is allowed for Special services going to the RSC-S.
- A blocking level of 0.5% (HDBH scenario) is assigned to the SMS-R.
- The SLC96 Mode II is assumed to be provisioned at a blocking level of 0.5% (HDBH scenario).
- A maximum of 20 DS1 P-Side ports (RSC-S) is allowed for CDO trunks, PBX trunks, or DS1 Specials from SMS-Rs.

Enhanced Subscriber Module Access - CPM Based (ESMA)

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The ESMA is a CPM based peripheral controller that provides the interface between the DMS and the DS1 Fed S/DMS AccessNode Remote Fiber Terminal (DFA-RFT). The ESMA supports simultaneously the multivendor interface TR303 TMC for generic RDTs and the single vendor interface TR303 CSC for proprietary RDTs. The ESMA also supports Integrated Channel Banks in NA008 and higher.

Subscriber Module Access (SMA)

The Subscriber Module Access (SMA) is an XPM module that provides the interface between the DMS and the S/DMS AccessNode. The AccessNode refers to the Remote Fiber Terminal (RFT) and Fiber Central Office Terminal (FCOT) pair.

Dialable Wideband Service (DWS)

Dialable Wideband Service is a multi-rate, circuit-mode service aimed at satisfying end-user needs for flexible wideband connectivity in the switched network. It offers a dialable, on-demand, Real Time switched service that allows the user to establish network connections with rates as high as 1.536 Mbps (24 DS0s). The rate is selectable on a per-call basis.

Dialable Wideband Service (DWS) utilizes a PRI ISDN trunk on a DTCI for connection of the Customer Premise Equipment to the DMS switch and trunks on a DTC7 for the InterToll connections. Both the DTCI and DTC7 must be equipped with the Enhanced Timeswitch to support DWS and the ENET is required to maintain the correct order of DS0s.

Wideband connections between two customers off the same DMS are referred to as "Intra" connections and do not require InterToll trunks. Such a connection does not require DTC7 facilities. The rules support this type of connection as well as intra-LATA connections between Equal Access End Offices and via Access Tandems.

The Dialable Wideband Service rules are based on the following assumptions:

- Only H0 (6 DS0s) and H11 (24 DS0s) are currently supported.
- For the DTCI, each trunk group requires a DS0 for a D-Channel.
- The DTCI and DTC7 are assumed to be colocated.
- All channels which comprise an instance of a wideband termination must be located on the same physical carrier facility (a single DS1) and in the same trunk group.
- Dialable Wideband Service engineering is based on 1% HDBH blocking levels.

The following are recommended DWS engineering practices:

- All trunk members located on a common physical interface should be members of the same trunk group.

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- All trunk groups which support wideband service should utilize multiple physical interfaces (DS1s).

Line Trunk Controller ISDN (LTCI)

The LTCI peripheral combines the capabilities of the LGCI and DTCI. This allows for a mixture of BRI and PRI on the same peripheral; however, it is recommended that the PRI trunks be provisioned on DTCIs because of the traffic associated with BRI.

A PRI trunk is typically assumed to have (1) D channel supporting 2 B channels, but depending on the customer application, () D channels (includes spare) may support up to 478 B channels. For provisioning purposes, 1 PRI trunk is assumed to equal 24 dedicated channels. The BRI rules are documented in the worksheets for the LGCI/LTCI. The PRI trunks can be added to unused P-Side ports of the LTCI; however, 24 channels per PRI trunk must be included in the LTCI links calculation before verifying that the switched channels do not exceed the 480 maximum.

1.2.2 Hardware Dependencies

This document addresses the traffic component of provisioning and assumes hardware will be provisioned based on the applicable API/ECM.

1.2.2.1 P and C Side Port Requirements

Not Applicable.

1.2.2.2 DMS BUS Port Requirements

Not Applicable.

1.2.2.3 Circuits Per Card

Not Applicable.

1.2.2.4 Discrimination Numbering

Not Applicable.

1.2.3 Provisioning Considerations

The Simplified Traffic method supports several ABSBH and HDBH values for Incoming Matching Loss. For applications where the required overall office Matching Loss is not provided, contact System Engineering.

When completing the worksheets, results may be obtained that exceed the allowable limits for the module being considered. This will be noted by an appropriate comment (for example, "if > x, Dual

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RCC" or "if > y, deload"). The engineer must reallocate lines or peripherals to provide a less-demanding load on the controller and recalculate until a configuration which falls within the limits is found.

1.2.3.1 DMS System Configuration

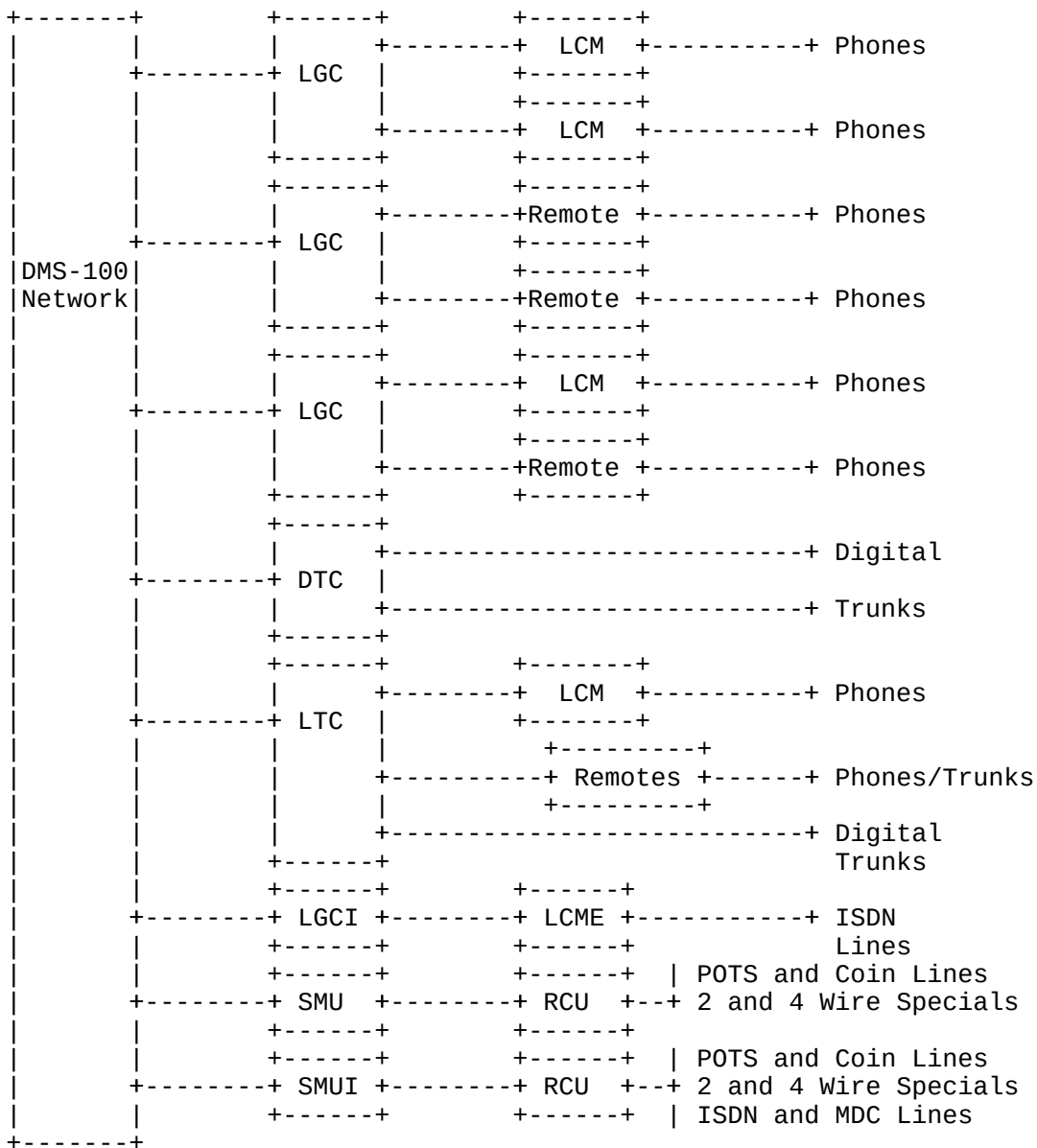


Figure 1. DMS SYSTEM ARCHITECTURE

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1.2.3.2 Line Control Device Limitations

Line Control Device (LCD) is the general name used in the DMS for a physical peripheral device that directly supports subscriber lines. This section will define the devices and the limits that can be assigned. The line peripherals, along with the table in which they are found, are listed below:

- IDT - Integrated Digital Terminal - RDTINV
(includes ICB)
- LCM - Line Concentrating Module - LCMINV
- LCME - Line Concentrating Module Enhanced - LCMINV
- LDT - Line Appearance on a Digital Trunk - LDTINV
- LM - Line Module - LMINV
- LRU - Line Resource Unit - LRUINV
- OPM - Outside Plant Module - LCMINV
- RCS - Remote Concentrator SLC-96 - RCSINV
- RCT - Remote Concentrator DMS-1R - RCTINV
- RCU - Remote Concentrator DMS-1U - RCUINV
- RDT - Remote Digital Terminal - RDTINV
- RLCM - Remote Line Concentrating Module - LCMINV
- RLM - Remote Line Module - LMINV
- VSR - VSRINV (International use only)

LCDs are also used to support 'virtual lines', referred to as Virtual IDs, that are associated with Electronic Business Sets (EBS) and Integrated System Digital Network (ISDN) sets. Up to 1024 Virtual IDs compose a single LCD. For an average office, it is recommended that 5 Virtual IDs be assumed per business set or ISDN set; however, Virtual IDs are assigned to EBS and ISDN sets as follows:

- 1) One for each directory number
- 2) One for EACH of the following features:

- CWT - Call Waiting
- RAG - Ring Again
- ICM - Intercom
- GIC - Group Intercom
- AUL - Automatic Line
- CAG - Call Agent (ACD)
- CLSUP - Calling Line Supervisor (ACD)

- 3) One if the set has ANY of the following keys:

- CFW - Call Forwarding
- MSB - Make Set Busy
- MWT - Message Waiting
- QTD - Query Time and Date
- SPS - Speed Call Short

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SPL - Speed Call Long
EMK - Emergency Key
AAB - Auto Call Back
MMI - Man Machine Interface
TME - Terminal Management Key
AUD - Auto Dial
INSPECT - Inspect Key
ACDNR - ACD Not Ready
UCDLG - UCD Login

Line Control Device Limitations					
	Max + Line	Min LCDs for	Max LCDs for	Total + LCDs	
	Peripherals	Virtual IDs	Virtual IDs	(See Note)	
Pre-BCS28	200	54	185	255	
BCS28/29	255	N/A	185	255	
BCS30 (NT40)	255	N/A	185	255	
BCS30 (SN Only)	511 (SLC96) 255 (other)	N/A	441	1000	
NA008	511 (SLC96) 1000 (ICB) 255 (other)	N/A	441	1000	

Note: It is recommended that an office be provisioned only
to within 5 of the total LCD limit.
Total + LCDs = + Line Peripherals + (+ Virtual IDs/1024)

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1.2.3.3 ISDN Terminology

- D - 16Kbps channel. Supports up to 8 terminals.
- Dd - 4:1 multiplexed channel (64Kbps)
- Bb - High speed packet data (nailed up connection)
- Bd - Statistically multiplexed D-Channel packet data
- U-type - ISDN long line (one slot line card)
- S/T type - ISDN short line (two slot line card)
- 2B+D - Two 64Kbps B-Channels and one 16Kbps D-Channel. The B channels can be either PCM voice, switched data or packet data. The D-Channel must be packet data.
- 1B+D - One 64Kbps B-Channel and one 16Kbps D-Channel. This configuration is not supported in this document.

1.2.3.4 ISDN Channel Routing

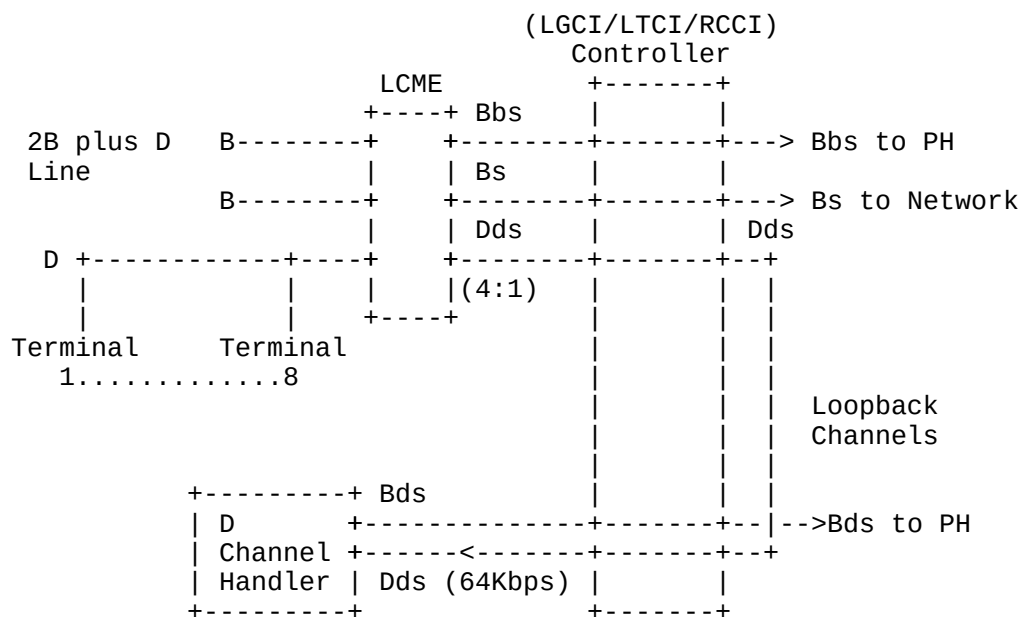


Figure 2. ISDN CHANNEL ROUTING (C-Side Packet Configuration)

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1.2.3.5 DMS100 Provisioning Rules (Simplified Version)

Grade of Service Inputs

QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q1	Blocking (IML) ABSBH (Host - 1A11.3) (Remote - 1A10.10)	0.003, 0.005, 0.007, 0.01, 0.02 default: 0.02	_____
Q2	Blocking (IML) HDBH (Host - 1A11.4) (Remote - 1A10.11)	0.03, 0.05, 0.07, 0.1, 0.2 default: 0.05	_____
Q3	HDBH/ABSBH Ratio (Host - 1A10.2.2) (Remote - 1A10.6)	1.1, 1.15, 1.2, 1.3 default: 1.2	_____

General Line Inputs

For Host, RSC-S, and RSCI, specify line quantities in the LCM and LCME columns. For RSC, RLCM, and OPM, specify line quantities only in the LCM column.

Note: When engineering LGCIs with the NT6X44 Time Switch and the NTAX78 Enhanced Time Switch in the same office, the requirements should be calculated separately because the LCME inputs and calculations are being shared for simplification.

QUEST.	PARAMETER	RANGE	LCM	LCME
-----	-----	-----	-----	-----
Q5	# POTS Lines (Host - 5A10) (Remote - 5A9)	input	_____	_____
Q6	# Coin Lines (Host - 5A10) (Remote - 5A9)	input	_____	XXXXXX
Q7	# MDC Lines (non P-Phone) (Include DIALAN Voice) (Host - 5A10) (Remote - 5A9)	input	_____	_____
Q7p	# MDC Lines (P-Phone only) (Host - 5A10) (Remote - 5A9)	input	_____	_____

QUEST.	PARAMETER	RANGE	LCM	LCME
Q8	# Datapath Lines (Host - 5A10) (Remote - 5A9)	input	_____	_____
Q9	# DIALAN Lines (Include Data only) (Host - 5A10) (Remote - 5A9)	input	_____	_____

Note: The maximum number of data units (Datapath + DIALAN) per DMS is 32,000. Q8 + Q9 must equal or be less than 32,000.

Q10	# ISDN U-Type Lines (2B+D) (Host - 5A10) (Remote - 5A9)	input	_____	_____

Note: For NA007 and later, U-Type ISDN lines are supported on non-ISDN remotes when equipped with an ISDN Line Drawer.

Q11	# ISDN T-Type Lines (Host - 5A10) (Remote - 5A9)	input	XXXXXX _____	

Note: There is a maximum of 32,704 Logical Terminal Identifiers per DMS, 16,352 of which may be used for D-Channel packets. Each ISDN device requires one LTID. Therefore, the maximum number of ISDN lines is defined by the following:

$(2 * (Q10 + Q11)) + (Q22 * (Q10 + Q11))$ must be $<$ or $=$ 32,704.
AND
 $(Q22 * (Q10 + Q11))$ must be $<$ or $=$ 16,352

General Traffic Inputs

QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q12	Wtd. Avg. CCS (ABSBH) (all non-ISDN Lines) (Host - 5A4.1) (Remote - 5A4.1)	0 to 36 default: 3.0	_____
Q17	Wtd. Avg. CCS per B-Channel (ABSBH) (Host - 5A4.6) (Remote - 5A4.6)	0 to 36 default: 6.0	_____
Q18	% Intra (of Originating) (Host - 5A3.7) (Remote - 1A10.4)	0 to 90 default: 20 (40 for Remotes)	_____
Q19	% Calls with Concurrent Feature Activation (Host - Not Applicable) (Remote - 5A3.11)	0 to 100 default: 20	_____
Q20	% PM Line Fill (Host - 5A11.3) (Remote - 5A5.1)	45 to 100 default: 100	_____

Note: This entry may be used to adjust line module
fill for Real Time or administrative purposes.

Note: When engineering dual configurations, entry Q20
may be used to balance and maximize line capacity
by adjusting the percentage fill as follows:

1. Initially, set Q20 = desired fill and proceed.
2. If result is a dual configuration with more host
links and line modules off one controller than
the other, do the following:
 - 3a. POTS office - $(R19/640)*100 = X$
Use X-1 for Q20 and recalculate.
 - 3b. ISDN office - $(R51/480)*100 = X$
Use X-1 for Q20 and recalculate.

The results after 3a or 3b should be balanced with
the maximum possible lines.

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QUEST.	PARAMETER	RANGE	INPUT
Q20a	Avg. Holding Time per Call in Seconds (ABSBH) (Host - 5A3.11) (Remote - 5A4.7)	20 to 300 default: 150	_____
Q21	# LAPB/X25 Terminal Devices (Bbs) off LCMEs (Host - 5A50.7) (Remote - 5A35.3)	0 to 360 default: 0	_____
Q21a	# LAPB/X25 Terminal Devices (Bbs) off LCMs/RLCMs/OPMs (Host - Not Applicable) (Remote - 5A35.4)	0 to 360 default: 0	_____
Q22	Avg. # LAPD/X25 Terminal Devices per Line (Host - 5A50.5) (Remote - 5A35.2)	0 to 8 default: 0	_____
Q23	Avg. FPS per LAPD/X25 Terminal Device (Host - 5A50.4) (Remote - 5A35.1)	0 to 0.7 default: 0.4	_____
Note: Q22*Q23 should not exceed 0.7 FPS. This number is under evaluation. If R66*Q22*Q23 exceeds the capacity of the DCH (50 FPS) or the EDCH (72 FPS), the DCH will fail. Assuming R66=100 and Q22=1 implies that Q23 should not exceed 0.7 for the EDCH.			
Q24	LGC with Concentration (Host - 5A60.6) (Remote - Not Applicable)	yes or no default: yes	_____
Q29	Non-Blocking ISDN Lines (Host - 5A50.17) (Remote - 5A35.7)	yes or no default: no	_____
Q30	# X.75/X.75' Trunks (Host - 6A42.1) (Remote - Not Applicable)	0 to 360 default: 0	_____
Q31	Avg. DPPS per Trunk (Host - 6A42.1.1) (Remote - Not Applicable)	0 to 75 default: 25% of Bb+Bd traffic	_____

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QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q32	Avg. DPPS per LAPB/X25 Terminal Device (Host - 5A50.7.2) (Remote - 5A35.6)	0 to 75 default: 9	_____
Q33	STAT_MUX Ratio (Host - 5A50.20.2) (Remote - 5A35.10)	1 to 64 default: 64	_____
Q34	P-Phone Sets with Addon (LCME only) (Host - 5A50.19) (Remote - 5A35.9)	yes or no default: no	_____
Q35	Avg. # MAXKEYS Defined per ISDN Set. (Host - 5A50.18) (Remote - 5A35.8)	1 to 64 default: 9	_____

CMR Inputs

QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q36	% Class Feat. Penetration (LCM only)	0 to 100 default: 0	_____
Q37	BCLID Service Deployed	yes or no default: no	_____
Q38	Avg. VSLE Call Attempts per Line	0.2 to 0.4 default: 0.2	_____
Q38a	Avg. CALLOG Call Attempts per Line	0.8 to 1.6 default: 0.8	_____
Q39	Avg. VSLE Entries per Line	1 to 31 default: 10	_____
Q39a	Avg. CALLOG Entries per Line	1 to 31 default: 10	_____

LEC Trunk Inputs

QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q25	# CDO Trunks off Remotes (Host - Not Applicable) (Remote - 6A5.4)	0 to 480 (up to 96 for RSC) default: 0	_____
Q26	# PBX Trunks off Remotes (Host - Not Applicable) (Remote - 6A5.4)	0 to 480 (up to 96 for RSC) default: 0	_____
Q26a	# non-Common Channel Signaling Links (DS1) for LEC (Host - 6A20.1) (Remote - Not Applicable)	0 to 5120 default: 0	_____
Q26b	# Common Channel Signaling Links (DS1) for LEC (Host - 6A20.3) (Remote - Not Applicable)	0 to 5120 default: 0	_____
Q26c	# PRI Links (DS1) for LEC (Host - 6A20.4) (Remote - Not Applicable)	0 to 5120 default: 0	_____
Q26d	# TOPS Looparound Links (DS1) (Host - 6A1.6) (Remote - Not Applicable)	0 to 5120 default: 0	_____
Q27	Avg. CCS per Trunk (ABSBH) (Host - 6A1.5) (Remote - 6A5.1*Q27a/100)	0 to 36 default: 20 (For RSC-S, Q27 = 25)	_____
Q27a	Avg. Holding Time (sec.) per Trunk (ABSBH) (Host - 6A5.3) (Remote - Q27*100/6A5.1)	20 to 3600 default: 180	_____
Q28	% PBX Traffic Remaining at RSC-S (Host - Not Applicable) (Remote - 6A5.4)	0 to 100 default: 100	_____

IEC Trunk Inputs

QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q26e	# non-Common Channel Signaling Links (DS1) for IEC (Host - 6A20.1.1) (Remote - Not Applicable)	0 to 5120 default: 0	_____
Q26f	# Common Channel Signaling Links (DS1) for IEC (Host - 6A20.3.1) (Remote - Not Applicable)	0 to 5120 default: 0	_____
Q26g	# PRI Links (DS1) for IEC (Host - 6A20.4.1) (Remote - Not Applicable)	0 to 5120 default: 0	_____

DMS500 Trunk Inputs

QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q26h	# SS7 Interworking Trunks (DS1) between the DMS100 and DMS250 Logical Sides of the switch. (Host - 6A20.3.3) (Remote - Not Applicable)	0 to 5120 default: 0	_____
Q26i	# PRI Interworking Trunks (DS1) between the DMS100 and DMS250 Logical Sides of the switch. (Host - TBD) (Remote - Not Applicable)	0 to 5120 default: 0	_____

Note: The Interworking Trunks can be CCS7 and/or PRI (DTCI/LTCI).
Either type of IWT is supported regardless of application.
PRI might want to be used when interworking tie trunks
between PBXs; however, the switch does protocol conversion.

DMS100 Wireless Trunk Inputs

QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q26j	# Wireless Network Trunks (DS1) (Host - TBD) (Remote - Not Applicable)	0 to 5120 default: 0	_____

Note: Nortel recommends that all wireless network trunks be looped around to the wireline side of the switch.

Q26k	# SS7 Interworking Trunks (DS1) between the Wireline and Wireless Logical Sides of the switch. (Host - TBD) (Remote - Not Applicable)	0 to 5120 default: 0	_____

DWS Inputs

QUEST.	PARAMETER	RANGE	INPUT
Q14a	# H0 (6 DS0s) Subscriber Groups with Low Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	input default: 0	_____
Q14b	# H0 (6 DS0s) Subscriber Groups with Medium Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	input default: 0	_____
Q14c	# H0 (6 DS0s) Subscriber Groups with High Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	input default: 0	_____
Q14d	# H11 (24 DS0s) Subscriber Groups with Low Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	input default: 0	_____
Q14e	# H11 (24 DS0s) Subscriber Groups with Medium Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	input default: 0	_____
Q14f	# H11 (24 DS0s) Subscriber Groups with High Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	input default: 0	_____
Q15a	Avg. Call/Attempts per Hour for H0 Subscriber w/Low Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	0 to 20 default: 0	_____

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QUEST.	PARAMETER	RANGE	INPUT
Q15b	Avg. Call/Attempts per Hour for H0 Subscriber w/Medium Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	0 to 5 default: 0	_____
Q15c	Avg. Call/Attempts per Hour for H0 Subscriber w/High Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	0 to 1 default: 0	_____
Q15d	Avg. Call/Attempts per Hour for H11 Subscriber w/Low Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	0 to 20 default: 0	_____
Q15e	Avg. Call/Attempts per Hour for H11 Subscriber w/Medium Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	0 to 5 default: 0	_____
Q15f	Avg. Call/Attempts per Hour for H11 Subscriber w/High Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	0 to 1 default: 0	_____
Q16a	Avg. Holding Time Seconds for H0 Subscriber w/Low Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	0 to 179 default: 60	_____

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QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q16b	Avg. Holding Time Seconds for H0 Subscriber w/Medium Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	180 to 1199 default: 180	_____
Q16c	Avg. Holding Time Seconds for H0 Subscriber w/High Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	1200 to 3600 default: 1200	_____
Q16d	Avg. Holding Time Seconds for H11 Subscriber w/Low Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	60 to 180 default: 60	_____
Q16e	Avg. Holding Time Seconds for H11 Subscriber w/Medium Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	180 to 1199 default: 180	_____
Q16f	Avg. Holding Time Seconds for H11 Subscriber w/High Holding Time (Host - 6A20.8.1) (Remote - Not Applicable)	1200 to 3600 default: 1200	_____
Q18a	% Avg. Intra Traffic for H0 and H11 (of Originating) (Host - 6A20.8.2) (Remote - Not Applicable)	0 to 80 default: 20	_____

SMS-R Inputs

QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q4a	# SLC96 Mode I with Protection Link (Host - 1A17) (Remote - 6A5.4)	input default: 0	_____
Q4b	# SLC96 Mode II with Protection Link (Host - 1A17) (Remote - 6A5.4)	input default: 0	_____
Q4c	# SLC96 Mode III with Protection Link (Host - 1A17) (Remote - 6A5.4)	input default: 0	_____
Q4d	# SLC96 Mode I without Protection Link (Host - 1A17) (Remote - 6A5.4)	input default: 0	_____
Q4e	# SLC96 Mode II without Protection Link (Host - 1A17) (Remote - 6A5.4)	input default: 0	_____
Q4f	# SLC96 Mode III without Protection Link (Host - 1A17) (Remote - 6A5.4)	input default: 0	_____
Q5a	# Switched Lines (Host - 1A17) (Remote - 6A5.4)	0 to 96 default: 0	_____
Q6a	Avg. CCS per Line for SLC96s (ABSBH) (Host - 1A17) (Remote - 6A5.4)	0 to 36 default: 3	_____

QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q7a	# Special Service Lines per SLC96 to RCC2 (Host - Not Applicable) (Remote - 6A5.4)	0 to 96 default: 0	_____
Q8a	# Special Service Lines per SLC96 to Cross-Connect (Host - Not Applicable) (Remote - 6A5.4)	0 to 96 default: 0	_____
Q10e	% Intra Traffic at RCC2 for SLC96s (of originating) (Host - Not Applicable) (Remote - 6A5.4)	0 to 100 default: 100	_____

ESMA Inputs

Remote Interface Table			
Host - 1A19		Remote - Not Applicable	
Column Number	000	...	255
Device Type	RDT	ICB	...
+ Links (Q40)	0 to 28 default: 0	0 to 1 default: 0	
+ Bbs (Q41)	0 to 192 default: 0	XXXXXXXXXXXX XXXXXXXXXXXX	
+ Dds (Q42)	0 to 192 default: 0	XXXXXXXXXXXX XXXXXXXXXXXX	

Remote Interface Table			
Host - 1A17		Remote - Not Applicable	
Column Number	000	...	255
+ Lines (Q45)	input default: 0	0 to 24 default: 0	
+ ISDN (Q46)	0 to 100 default: 0	XXXXXXXXXXXX XXXXXXXXXXXX	
CCS per Line (Q47)	0 to 72 default: 3	0 to 36 default: 3	
HD/ABS Ratio (Q48)	1.1, 1.15, 1.2, 1.3 default: 1.2	1.1, 1.15, 1.2, 1.3 default: 1.2	
Concentrating RDT (Q49)	Yes or No default: No	XXXXXXXXXXXX XXXXXXXXXXXX	

QUEST.	PARAMETER	RANGE	INPUT
Q50	ESMA with Concentration (Host - 5A75.9.2) (Remote - Not Applicable)	yes or no default: yes	_____

SMA Inputs

QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q60	# RDTs (Host - 1A19) (Remote - Not Applicable)	input default: 0	_____
Q61	# Links per RDT (Host - 1A19) (Remote - Not Applicable)	0 to 20 default: 0	_____
Q62	# LAPB (Bbs) per RDT (Host - 1A19) (Remote - Not Applicable)	0 to 192 default: 0	_____
Q63	# LAPD/X25 (Bds) per RDT (Host - 1A19) (Remote - Not Applicable)	0 to 192 default: 0	_____
Q64	# Dds per RDT (Host - 1A19) (Remote - Not Applicable)	0 to 192 default: 0	_____
Q65	# Switched Channels per RDT (Host - 1A19) (Remote - Not Applicable)	0 to 192 default: 0	_____

SMUI Inputs

QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q70	# RCUs (Host - 1A19) (Remote - Not Applicable)	input default: 0	_____
Q71	# Links per RCU (Host - 1A19) (Remote - Not Applicable)	0 to 8 default: 0	_____
Q72	# LAPB (Bbs) per RCU (Host - 1A19) (Remote - Not Applicable)	0 to 192 default: 0	_____
Q73	# LAPD/X25 (Bds) per RCU (Host - 1A19) (Remote - Not Applicable)	0 to 192 default: 0	_____
Q74	# Dds per RCU (Host - 1A19) (Remote - Not Applicable)	0 to 192 default: 0	_____
Q75	# Switched Channels per RCU (Host - 1A19) (Remote - Not Applicable)	0 to 192 default: 0	_____
Q76	# 2 & 4 Wire Specials per RCU (non-Switched) (Host - 1A19) (Remote - Not Applicable)	0 to 528 default: 0	_____

SMU Inputs

QUEST.	PARAMETER	RANGE	INPUT
-----	-----	-----	-----
Q80	# RCUs (Host - 1A19) (Remote - Not Applicable)	input default: 0	_____
Q81	# Links per RCU (Host - 1A19) (Remote - Not Applicable)	0 to 8 default: 0	_____
Q82	# Switched Channels per RCU (Host - 1A19) (Remote - Not Applicable)	0 to 192 default: 0	_____
Q83	# 2 & 4 Wire Specials per RCU (non-Switched) (Host - 1A19) (Remote - Not Applicable)	0 to 528 default: 0	_____

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DMS100 Preliminary Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R1	# non-ISDN Lines on LCMs/RLCMs/OPMs	$Q5+Q6+Q7+Q7p+Q8+Q9$ (LCM column only)	_____
R1a	# non-ISDN Lines on LCMEs	$Q5+Q6+Q7+Q7p+Q8+Q9$ (LCME column only)	_____
R2	# non-ISDN Slots on LCMs/RLCMs/OPMs	$Q5+Q6+Q7+Q7p+2(Q8+Q9)$ (LCM column only)	_____
R2a	# non-ISDN Slots on LCMEs	$Q5+Q6+Q7+Q7p+2(Q8+Q9)$ (LCME column only)	_____
R2b	# non-ISDN Line/Slot Ratio on LCMs/RLCMs/OPMs	$R1/R2$	_____
R3	# ISDN Lines on LCMs/RLCMs/OPMs	$Q10$ (LCM column only)	_____
R3a	# ISDN Lines on LCMEs	$Q10+Q11$ (LCME column only)	_____
R4	# ISDN Slots on LCMs/RLCMs/OPMs	$Q10$ (LCM column only)	_____
R4a	# ISDN Slots on LCMEs	$Q10+(2*Q11)$ (LCME column only)	_____
R5	Wtd. Call Attempts per non-ISDN Line (ABSBH)	$(Q12*100)/Q20a$	_____
R8	Wtd. CCS/ISDN Line (ABSBH)	$((2*R3a-Q21)*Q17)/R3a$	_____
R10	% Intra (Corrected)	$Q18(1-Q19/100)$ (round up)	_____

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RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R11	# CD0 DS1 Trunks	$Q25/24$ (round up)	_____
R12	# PBX DS1 Trunks	$Q26/24$ (round up)	_____
R13	CCS CD0 Trunks (HDBH)	$Q3*Q25*Q27$	_____
R14	CCS PBX Trunks (HDBH)	$Q3*Q26*Q27$	_____
R16	XDBs per ISDN Set	(if $1 \leq Q35 < 10$, $R16=1$) (if $10 \leq Q35 < 30$, $R16=2$) (if $30 \leq Q35 < 50$, $R16=3$) (if $50 \leq Q35 \leq 64$, $R16=4$)	_____
R16a	XDBs per P-Phone Set	(if $Q34 = \text{no}$, $R16a=2$) (if $Q34 = \text{yes}$, $R16a=4$)	_____
R16b	Avg. XDB Resources per Line	$(Q5+Q7+Q8+Q9)+(Q7p*R16a)$ $+2*R16(Q10+Q11)/(Q5+Q7+Q7p$ $+Q8+Q9+Q10+Q11)$ (LCME column only) (round up)	_____
R17	# non-ISDN Line Drawers	$R2/(64*Q20/100)$ (round up)	_____
R17a	# ISDN Line Drawers	$R4/(28*Q20/100)$ (round up)	_____
R17b	# ISDN Lines per ILD	$R3/R17a$ (round up)	_____
R17c	# Bbs per ILD	$Q21a/R17a$ (round up)	_____
R17d	# Bds per ILD	$R17b*Q22/Q33$ (round up) (if > 2 , deload)	_____
R17e	# ISDN Lines (non-Bb) per ILD	$(R3-Q21a/2)/R17a$ (round up)	_____
R17f	Total CCS per ILD	$2*R17e*Q17*Q3$	_____

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LCM Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R18	# Total LCMs	$\text{Max}((R17+R17a)/10, R17a/2)$	_____
R18a	# LCMs with 2 ILDs	(if $R17a/R18 > 1$, $R17a-R18$)	_____
Note: If $R18a > 6$, reduce $R18a$ by 1 and increase $R18b$ by 2. This is to avoid getting 8 ISDN Line Drawers on one RCC and 6 on the other RCC because 7 is the maximum per controller.			
R18b	# LCMs with 1 ILD	(if $R17a/R18 \leq 1$, $R17a$, $R17a-2*R18a$)	_____
R18c	# LCMs with 0 ILDs	$R18-R18a-R18b$	_____
R19	# non-ISDN Slots on all LCMs with 0 ILDs	$\text{Min}(R2, R18c*(640*Q20/100))$ (round up)	_____
R19a	# non-ISDN Slots per LCM with 0 ILDs	$R19/R18c$ (round up)	_____
R19b	# non-ISDN Lines per LCM with 0 ILDs	$R19a*R2b$ (round up)	_____
R19c	Total CCS per LCM with 0 ILDs (HDBH)	$R19b*Q12*Q3$	_____
R19d	# Switched Channels per LCM with 0 ILDs	Table 1 ($R19c, 0.01$)	_____
R19da	# Switched Channels per LCM with 0 ILDs (adjusted)	$\text{Min}(R19d, R19b)$	_____
R19e	# DS30A Links per LCM with 0 ILDs	$(R19da+2)/30$ (round up) (if > 6 , deload) (minimum 2)	_____

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RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R20	# non-ISDN Slots on all LCMs with 1 ILD	$\text{Min}(\text{Max}(0, R2-R19), R18b \cdot (576 \cdot Q20/100))$ (round up)	_____
R20a	# non-ISDN Slots per LCM with 1 ILD	$R20/R18b$ (round up)	_____
R20b	# non-ISDN Lines per LCM with 1 ILD	$R20a \cdot R2b$ (round up)	_____
R20c	Total CCS per LCM with 1 ILD (HDBH)	$R20b \cdot Q12 \cdot Q3 + R17f$	_____
R20d	# Switched Channels per LCM with 1 ILD	Table 1 (R20c, 0.01)	_____
R20da	# Switched Channels per LCM with 1 ILD (adjusted)	$\text{Min}(R20d, R20b + ((2 \cdot R17b) - R17c))$	_____
R20e	# DS0s to Packet Handler per LCM with 1 ILD	$R17c + R17d$	_____
R20f	# DS30A Links per LCM with 1 ILD	$(R20da + R20e + 4)/30$ (round up) (if > 6, deload) (minimum 2)	_____

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RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R21	# non-ISDN Slots on all LCMs with 2 ILDs	(if R18a=0,0,Max(0,R2-R20))	_____
R21a	# non-ISDN Slots per LCM with 2 ILDs	R21/R18a (round up)	_____
R21b	# non-ISDN Lines per LCM with 2 ILDs	R21a*R2b (round up)	_____
R21c	Total CCS per LCM with 2 ILDs (HDBH)	R21b*Q12*Q3+2*R17f	_____
R21d	# Switched Channels per LCM with 2 ILDs	Table 1 (R21c,0.01)	_____
R21da	# Switched Channels per LCM with 2 ILDs (adjusted)	Min(R21d, R21b+2*((2*R17b)-R17c))	_____
R21e	# DS0s to Packet Handler per LCM with 2 ILDs	2*(R17c+R17d)	_____
R21f	# DS30A Links per LCM with 2 ILDs	(R21da+R21e+6)/30 (round up) (if > 6, deload) (minimum 2)	_____

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RLCM/OPM Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R40	# RLCMs/OPMs	$\text{Max}((R17+R17a)/10, R17a/2)$ (if > 1, deload)	_____
R41	Total CCS per RLCM/OPM (HDBH)	$R1*Q12*Q3+R17a*R17f$	_____
R42	# Switched Channels per RLCM/OPM	Table 2A (R41,R10) (if % IAO not in Table, use lower number)	_____
Note: If the CCS exceeds the maximum value in the 2 link table, skip to the 3 link table. Continue to skip to a higher table until the CCS does not exceed the maximum value in the table. Deload if more than 6 links is required.			
R42a	# Switched Channels per RLCM/OPM (adjusted)	$\text{Min}(R42,$ $R1+R17a*((2*R17b)-R17c))$	_____
R43	# DS0s to Packet Handler per RLCM/OPM	$R17a*(R17c+R17d)$	_____
R44	# DS1 Links per RLCM/OPM	$(R42a+R43+R17a*2+6)/24$ (round up) (if > 6, deload) (minimum 2)	_____
Note: If $R44 > \#$ links used in the final R42 table lookup, repeat R42 through R44 using the appropriate table in R42.			
R45	CCS Host Links (HDBH)	$R41*(1-0.84*R10/100)$	_____

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LCME Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R49	Maximum Lines per LCME	$480 * Q20 / 100$ (round down)	_____

Note: If Q29 = yes, set R49 = to the maximum number of non-blocking ISDN lines for the appropriate application.

|
|

LCME/LGCI (w/o ETS) = Minimum(191, $480 * Q20 / 100$)
 LCME/LGCI (w/ ETS) = Minimum(239, $480 * Q20 / 100$)
 LCME/RCC2 (w/EDC) = Minimum(190, $480 * Q20 / 100$)
 LCME/RCC2 (wo/EDC) = Minimum(191, $480 * Q20 / 100$)

R50	# LCMEs	$(R2a + R4a) / R49$ (round up)	_____
R51	# Lines per LCME	$(R1a + R3a) / R50$ (round up)	_____
R52	# ISDN Lines per LCME	$R3a / R50$ (round up)	_____
R53	# non-ISDN Lines per LCME (non-Coin)	$R1a / R50$ (round up)	_____
R54	# D-Channels per LCME	$R3a / 4 / R50$ (round up)	_____
R55	# LAPB/X25 Terminal Devices per LCME (Bbs)	$Q21 / R50$ (round up)	_____
R57	Total CCS per LCME (HDBH)	$(R52 * R8 + R53 * Q12) * Q3$	_____
R58	LCME Switched Channels	Table 1 (R57, 0.04)	_____

Note: If LCME is hanging off of the RSC-S, use the 1% tables instead of the 4% tables. If Q29 = yes, set $R58 = (2 * R52) + R53 - R55$.

RULE	PARAMETER	CALCULATION	RESULT
R59	LCME Switched Channels (adjusted)	Min(R58, (2*R52)+R53-R55) (if > table value, deload)	_____

+-----+			
	Maximum LCME Switched Channels		
	(based on XDBs only)		
+-----+			
	BCS36 to	NA006 and	
	NA005	higher	
+-----+			
R16b = 1	743	1423	
+-----+			
R16b = 2	371	711	
+-----+			
R16b = 3	247	474	
+-----+			
R16b = 4	185	355	
+-----+			
R16b = 5	147	284	
+-----+			
R16b = 6	123	237	
+-----+			
R16b = 7	105	203	
+-----+			
R16b = 8	92	177	
+-----+			

Note: The value in the above table should be divided by the number of LCMEs per LGCI to determine the maximum switched channels per LCME.

R60	LCME Host Channels	R59+R54+R55+2	_____
R61	Final Links per LCME	R60/30 (round up) (if > 18, deload) (minimum 2)	_____

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DCH/DS0s to Packet Handler per LCME

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R65	# DCHs per LCME (Excludes Spare)	$(R54 + ((R3a * Q22) / R50) / Q33) / 31$ (round up) (if > 9, deload)	_____
R66	# ISDN Lines per DCH	$R3a / R50 / R65$ (round up)	_____
R67	Check DCH Load in FPS	$(R66 * Q22 * Q23) / X$ (if > 1, deload)	_____
Note: X=72 FPS for EDCHs and X=50 FPS for DCHs. Always assume a default of 72 FPS for initial ISDN orders OR extensions in NA006 and higher.			
R68	Check DCH Load in # LTIDs (Max LTIDs/DCH = 511)	$2 * R66 + R66 * Q22$ (if > 511, deload)	_____
R69	# LAPD/X25 (Bds) per DCH	$(R66 * Q22) / Q33$ (round up)	_____
R70	# Dds per DCH	$R66 / 4$ (round up)	_____

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SMS-R Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R12z	# SLC96s	$Q4a+Q4b+Q4c+Q4d+Q4e+Q4f$	_____
R13z	# Links for all SLC96s	$Q4a*5+Q4d*4+Q4b*3+Q4e*2+Q4c*3+Q4f*2$	_____
R14z	# SMS-R required (Max of 6 SLC96s/SMS-R)	$R13z/20$ (round up) (balance load)	_____
R20z	# DS1 Digroup for Specials to RCC2	$Q7a/24$ (round up) (if > 2, deload)	_____
R20v	# DS1 Digroup for Specials to Cross-Connect	$Q8a/24$ (round up)	_____
R21z	Check SMS-R P-Side Links	$R20z+R20v+R13z$ (if > 20, deload)	_____
R26z	CCS total per SMS-R (HDBH)	$(R12z/R14z)*Q5a*Q6a*Q3$	_____
R28z	# C-Side Switched Channels per SMS-R Type (HDBH)	Table 1 (R26z, 0.005)	_____
Note: For SMS modules, use 3% instead of 0.5%.			
R29z	# C-Side Links per SMS-R	$(R28z+2)/30$ (round up) (if > 4, deload) (minimum 3)	_____
R30z	# Loopback SMS-R C-Side Channels	$(Q7a+Q8a)*2$	_____
R31z	Check # C-Side Channels per SMS-R	$R30z+(R29z*30)$ (if > 480, deload)	_____

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Mono RCC Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R75	# DS30As for LCMs	$R18c * R19e + R18b * R20f + R18a * R21f$	_____
R75x	# DS30As for LCMEs	$R61 * R50$	_____
R75y	Total # DS30As	$R75 + R75x$ (if > 18, Dual RCC)	_____
R76	# DS1s for RLCMs and OPMs	$Sum(R44)$ (if > 18, Dual RCC)	_____
R77	# DS1s for CD0 and PBX	$R11 + R12$ (if > 8, Dual RCC)	_____
R78	# DCHs per RCC (Includes Spare)	$R50 * R65$ (if > 0, add 1 for spare) (if > 10, Dual RCC)	_____
R79	Check P-Side Ports	$R75y + R76 + R77 + R78$ (if > 18, Dual RCC)	_____
R80	# DS0s to Packet Handler per RCC	$R50 * (R55 + R65 * R69) + R18b * R20e + R18a * R21e + Sum(R43)$	_____
R81	# ILDs	$Sum(R17a)$ (if > 7, Dual RCC)	_____

Note: Sum applies to all ILDs subtending the RCC on LCMs, RLCMs, and OPMs.

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RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R82	Total CCS (HDBH)	$(R18c * R19c + R18b * R20c + R18a * R21c + \text{Sum}(R45) + R50 * R57 + R13 + R14)$	_____
R83	Intra CCS (HDBH)	$(R18c * R19c + R18b * R20c + R18a * R21c + R50 * R57) - R13 * (.50) * R10 / 100 + R13$	_____
R84	Host CCS (HDBH)	$R82 - (2 * R83 * 0.96)$	_____
R85	# Host Switched Channels	Table 1 (R84, 0.03)	_____
R86	# Host Links	$(R85 + R80 + 2) / 24$ (round up) (if > 16, Dual RCC) (minimum 3)	_____
R87	# C-Side Loopback Channels	$2 * R70 * (R78 - 1)$	_____
R88	# C-Side Intra Channels	$2 * (\text{Table 1 (R83, 0.01)})$	_____
R89	Check C-Side Channels	$(R77 + R86) * 24 + R87 + R88$ (if > 494, Dual RCC)	_____

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Dual RCC Calculations

RULE	PARAMETER	CALCULATION	RCC#1	RCC#2
-----	-----	-----	-----	-----
R95	# LCMs with 0 ILDs per RCC	R18c/2 (balance load)	_____	_____
R96	# LCMs with 1 ILD per RCC	R18b/2 (balance load)	_____	_____
R97	# LCMs with 2 ILDs per RCC	R18a/2 (balance load)	_____	_____
R98	# ILDs per RCC	Sum(R17a) (if > 7, Col. RCC)	_____	_____

Note: Sum applies to all ILDs subtending each RCC on LCMs,
RLCMs, and OPMs.

R101	# LCMEs per RCC	R50/2 (balance load)	_____	_____
R102	# DS1s for CD0 per RCC	R11/2 (balance load)	_____	_____
R103	# DS1s for PBX per RCC	R12/2 (balance load)	_____	_____
R104	# DS30As for LCMs per RCC	R95*R19e+R96*R20f+ R97*R21f	_____	_____
R104x	# DS30As for LCMEs per RCC	R61*R101	_____	_____
R104y	Total # DS30As per RCC	R104+R104x (if > 18, Col. RCC)	_____	_____
R105	# DS1s for RLCMs and OPMs per RCC	Sum(R44) (if > 18, Col. RCC)	_____	_____

Note: Sum applies to the RLCMs/OPMs on each RCC separately.

R106	# DS1s for CD0 and PBX per RCC	R102+R103 (if > 8, Col. RCC)	_____	_____

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RULE	PARAMETER	CALCULATION	RCC#1	RCC#2
-----	-----	-----	-----	-----
R107	# DCHs per RCC (Includes Spare)	$R101 * R65$ (if > 0, add 1 for spare) (if > 10, Col. RCC)	_____	_____
R108	Check P-Side Ports per RCC	$R104y + R105 + R106 + R107$ (if > 18, Col. RCC)	_____	_____
R109	# DS0s to Packet Handler per RCC	$R101 * (R55 + (R65 * R69)) +$ $R96 * R20e + R97 * R21e +$ Sum(R43)	_____	_____

Note: Sum applies to the RLCMs/OPMs on each RCC separately.

R112	Total CCS (HDBH) per RCC	$(R95 * R19c + R96 * R20c +$ $R97 * R21c + \text{Sum}(R45) +$ $R101 * R57) +$ $(R13 * R102 / R11) +$ $(R14 * R103 / R12)$	_____	_____

Note: Sum applies to the RLCMs/OPMs on each RCC separately.

R113	IA0/Inter CCS (HDBH) per RCC	$((R95 * R19c + R96 * R20c +$ $R97 * R21c + R101 * R57) -$ $(R13 * R102 / R11) * (.50) *$ $(R10 / 100) +$ $(R13 * R102 / R11)$	_____	_____
R114	Total Host CCS (HDBH) per RCC	$R112 - (2 * R113 * 0.96)$	_____	_____
R115	# DS1 C-Side Interlinks per RCC	(Table 1 (X, 0.01) + 2)/24 (round up) (minimum 2) (maximum 14) (if R11=0, X=R113/2) (if R11>0, X=R113)	_____	_____

Note: Use higher of RCC 1 or RCC 2 for both.

R116	# Host Switched Channels per RCC	Table 1 (R114, 0.03)	_____	_____

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RULE	PARAMETER	CALCULATION	RCC#1	RCC#2
-----	-----	-----	-----	-----
R117	# Host Links per RCC	$(R116+R109+2)/24$ (round up) (if > 14, Col. RCC) (minimum 3)	_____	_____
R118	# C-Side Loopback Channels per RCC	$2*R70*(R107-1)$	_____	_____
R119	# C-Side Intra Channels per RCC	Table 1 (R113,0.01)	_____	_____
R119b	Check C-Side Channels per RCC	$(R106+R117+R115)*24$ +R118+R119 (if > 494, Col. RCC)	_____	_____

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Mono RCC2 Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R75a	# DS30As for LCMs	$R18c * R19e + R18b * R20f + R18a * R21f$	_____
R75b	# DS30As for SMS-Rs	$R14z * R29z$	_____
R75c	# DS30As for LCMEs	$R61 * R50$	_____
R75d	Total # DS30As	$R75a + R75b + R75c$ (if > 30, Dual RCC2)	_____
R76a	# DS1s for RLCMs and OPMs	$\text{Sum}(R44)$ (if > 46, Dual RCC2)	_____
R77a	# DS1s for CD0, PBX, and Specials from SMS-Rs	$R11 + R12 + \text{Sum}(R20z)$ (if > 20, Dual RCC2)	_____
R78a	# DCHs per RCC2 (Includes Spare)	$R50 * R65$ (if > 0, add 1 for spare) (if > 10, Dual RCC2)	_____
R79a	Check P-Side Ports	$R75d + R76a + R77a + R78a$ (if > 52, Dual RCC2)	_____
R80a	# DS0s to Packet Handler per RCC2	$R50 * (R55 + R65 * R69) + R18b * R20e + R18a * R21e + \text{Sum}(R43)$	_____
R81a	# ILDs	$\text{Sum}(R17a)$ (if > 7, Dual RCC2)	_____

Note: Sum applies to all ILDs subtending the RCC2 on LCMs, RLCMs, and OPMs.

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RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R82a	Total CCS (HDBH)	$R18c * R19c + R18b * R20c +$ $R18a * R21c + \text{Sum}(R26z) +$ $\text{Sum}(R45) +$ $R50 * R57) + R13 + R14 +$ $(\text{Sum}(Q7a) * 27.69 * Q3)$ $(\text{if} > X, \text{Dual RCC2})$	_____

Note: In NA004 and higher, $X=27000$, else $X=17300$ because the number of available Call Header Blocks (CHBs) has been increased from 512 to 800 in NA004.

R82c	CCS Intra (of Originating) for SMS-Rs (HDBH)	$\text{Sum}(R26z) * ((0.50) * (Q10e/100))$	_____
R83a	Intra CCS (HDBH)	$((R18c * R19c + R18b * R20c +$ $R18a * R21c + R50 * R57) -$ $R13) * (.50) * (R10/100) +$ $R13 + R82c$	_____

Note: All special services from SLC96s connected to the RCC2 are assumed to go to the host.

R84a	Host CCS (HDBH)	$R82a - (2 * R83a * 0.96)$	_____
R85a	# Host Switched Channels	Table 1 (R84a, 0.03)	_____
R86a	# Host Links	$(R85a + R80a + 2) / 24$ $(\text{if} > 16, \text{Dual RCC2})$ $(\text{minimum } 2)$	_____

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Dual RCC2 Calculations

RULE	PARAMETER	CALCULATION	RCC2#1	RCC2#2
-----	-----	-----	-----	-----
R95a	# LCMs with 0 ILDs per RCC2	R18c/2 (balance load)	_____	_____
R96a	# LCMs with 1 ILD per RCC2	R18b/2 (balance load)	_____	_____
R97a	# LCMs with 2 ILDs per RCC2	R18a/2 (balance load)	_____	_____
R98a	# ILDs per RCC2	Sum(R17a) (if > 7, Col. RCC2)	_____	_____
Note: Sum applies to all ILDs subtending each RCC2 on LCMs, RLCMs, and OPMs.				
R101a	# LCMEs per RCC2	R50/2 (balance load)	_____	_____
R102a	# DS1s for CD0 per RCC2	R11/2 (balance load)	_____	_____
R103a	# DS1s for PBX per RCC2	R12/2 (balance load)	_____	_____
R103b	# DS1s for Specials per RCC2	Sum(R20z)/2 (balance load)	_____	_____
R104a	# DS30As for LCMs per RCC2	R95a*R19e+R96a*R20f+ R97a*R21f	_____	_____

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RULE	PARAMETER	CALCULATION	RCC2#1	RCC2#2
-----	-----	-----	-----	-----
R104b	# DS30As for SMS-Rs per RCC2	Sum(R29z)	_____	_____

Note: The sum refers to all SMS-Rs that are connected to one
RCC2 of the dual RCC2 configuration.

R104c	# DS30As for LCMEs per RCC2	R61*R101a	_____	_____
R104d	Total # DS30As per RCC2	R104a+R104b+R104c (if > 30, Col. RCC2)	_____	_____
R105a	# DS1s for RLCMs and OPMs per RCC2	Sum(R44) (if > 46, Col. RCC2)	_____	_____

Note: Sum applies to the RLCMs/OPMs on each RCC2 separately.

R106a	# DS1s for CD0, PBX, and Special Services per RCC2	R102a+R103a+R103b (if > 20, Col. RCC2)	_____	_____
R107a	# DCHs per RCC2 (Includes Spare)	R101a*R65 (if > 0, add 1 for spare) (if > 10, Col. RCC2)	_____	_____
R108a	Check P-Side Ports per RCC2	R104d+R105a+R106a+ R107a (if > 52, Col. RCC2)	_____	_____

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RULE	PARAMETER	CALCULATION	RCC2#1	RCC2#2
-----	-----	-----	-----	-----
R109a	# DS0s to Packet Handler per RCC2	$R101a * (R55 + R65 * R69) +$ $R96a * R20e + R97a * R21e +$ Sum(R43)	_____	_____

Note: Sum applies to the RLCMs/OPMs on each RCC2 separately.

R112a	Total CCS (HDBH) per RCC2	$(R95a * R19c + R96a * R20c +$ $R97a * R21c + \text{Sum}(R26z) +$ Sum(R45) + $R101a * R57) +$ $R13 * R102a / R11 +$ $R14 * R103a / R12 +$ $(\text{Sum}(Q7a) * 27.69 * Q3)$ (if > X, Col. RCC2)	_____	_____

Note: In NA004 and higher, X=27000, else X=17300 because
the number of available Call Header Blocks (CHBs)
has been increased from 512 to 800 in NA004.

Note: Sum applies to the SMS-Rs and RLCMs/OPMs on each
RCC2 separately.

R112c	CCS Intra for all SMS-Rs per RCC2	$\text{Sum}(R26z) * ((0.50) * (Q10e / 100))$	_____	_____

Note: The sum refers to all SMS-Rs per RCC2.

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RULE	PARAMETER	CALCULATION	RCC2#1	RCC2#2
-----	-----	-----	-----	-----
R113a	Intra/Inter CCS (HDBH) per RCC2	$((R95a * R19c + R96a * R20c + R97a * R21c + R101a * R57) - (R13 * R102a / R11) - (R14 * Q28 / 100) * (R103a / R12)) * (.50 * (R10 / 100)) + (R13 * R102a / R11) + (R14 * (Q28 / 100) * (R103a / R12) + R112c$	_____	_____
R114a	Total Host CCS (HDBH) per RCC2	$R112a - (2 * R113a * 0.96)$	_____	_____
R115a	# DS1 P-Side Interlinks per RCC2	$(Table\ 1\ (X, 0.01) + 2) / 24$ (round up) (minimum 2) (maximum 14) (if R11=0, X=R113a/2) (if R11>0, X=R113a)	_____	_____
Note: Use higher of RCC2 #1 and RCC2 #2 for both RCC2s.				
R116a	# Host Switched Channels per RCC2	Table 1 (R114a, 0.03)	_____	_____
R117a	# Host Links per RCC2	$(R116a + R109a + 2) / 24$ (round up) (if > 16, Col. RCC2) (minimum 2)	_____	_____
R119a	Check P-Side Ports per RCC2	$R108a + R115a$ (if > 52, Col. RCC2)	_____	_____

LGC Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R120	# Links for Host LCMs	$R18c * R19e$	_____
R121	# DS1s for RLCMs and OPMs	$\text{Sum}(R44)$	_____
R122	# DS0s to Packet Handler	$\text{Sum}(R43)$	_____
R123	# DS1s for Mono RCC	$\text{Sum}(R86)$ (sites without CD0 or PBX)	_____
R124	# DS1s for Dual RCC	$\text{Sum}(R117)$ (sites without CD0 or PBX)	_____
R123a	# DS1s for Mono RCC2	$\text{Sum}(R86a)$ (sites without CD0 or PBX)	_____
R124a	# DS1s for Dual RCC2	$\text{Sum}(R117a)$ (sites without CD0 or PBX)	_____
R125	# LGC P-Side Ports	$R120 + R121 + R123 + R124 + R123a + R124a$	_____
R126	# LGCs Required	$R125 / 20$ (round up)	_____
Note: If Q24 = no, divide by 16 instead of 20.			
R127	Total CCS per LGC	$(R18c * R19c + \text{Sum}(R41)) / R126$	_____
R127a	# Switched Channels per LGC	Table 1 ($R127, 0.03$)	_____
R127c	# DS30 Links per LGC	$((R123 + R124 + R123a + R124a) * 24 + R122) / R126 + R127a / 30$ (round up) (if > 16, deload) (minimum 3)	_____

Note: Links can not be split between controllers.

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RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R127d	Total Lines with CLASS	$(Q5+Q7)*Q36/100$	_____
R127e	Total CMR Traffic per LGC	$(R127d/R126)*0.5* R5*Q3*0.2$ $+R5*Q3*0.87*(Q12/(36-Q12))$ $+Q38*0.2*Q39$ $+Q38a*0.2*Q39a''/100$	_____
R127g	Number of CMR Modems per LGC	Table 1 (R127e,0.001) (if > 31, deload)	_____

Note: If Q37 = yes, add 5 modems to R127g.

LTC Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R128	# Ports for Residual LCMs (if any)	input	_____
R129	# Ports for Residual RLCMs (if any)	input	_____
R130	# Ports for Residual OPMs (if any)	input	_____
R131	# Ports for Residual Mono RCC (if any)	input	_____
R132	# Ports for Residual Dual RCC (if any)	input	_____
R131a	# Ports for Residual Mono RCC2 (if any)	input	_____
R132a	# Ports for Residual Dual RCC2 (if any)	input	_____
R133	# Links Mono RCC	Sum(R86) (sites with CD0 or PBX)	_____
R134	# Links Dual RCC	Sum(R117) (sites with CD0 or PBX)	_____
R133a	# Links Mono RCC2	Sum(R86a) (sites with CD0 or PBX)	_____
R134a	# Links Dual RCC2	Sum(R117a) (sites with CD0 or PBX)	_____
R135	Total # P-Side Ports Required	R128+R129+R130+R131+R132+ R133+R134+R131a+R132a+ R133a+R134a	_____
R136	# LTCs Required	R135/20 (round up)	_____

Note: If Dual RCC or RCC2, provide minimum of two LGCs or LTCs.

| Common LGCI/LTCI with NT6X44 Time Switch
 | (1 to n per Central Office)

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R140	# Ports/LCME_DCH (Excludes Spare)	R61+R65 (if > 19, deload LCMEs)	_____
R150	# LCME_DCH/LGCI (Excludes Spare)	19/R140 (round down)	_____
Note: If R150 > R50, set R150 = R50.			
R151	# DCHs/LGCI (Excludes Spare)	R150*R65 (if > 9, deload)	_____
R152	# DS0s to Packet Handler per LGCI	R150*(R55+(R69*R65))	_____
R153	# Loopback LGCI C-Side Channels	2*R70*R151	_____
R154	# LGCI Links	(R150*(R60-R54-R55-2)+ R152)/30 (round up) (if > 16, deload) (minimum 3)	_____
R155	# LGCI C-Side Channels	R150*(R60-R54-R55-2)+ R153+R152 (if > 480, deload)	_____
R156	# LGCIs	R50/R150 (round down)	_____
R157	# ISDN Lines per LGCI	R150*R52 (if > 480, deload)	_____

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Residual LGCI/LTCI with NT6X44 Time Switch

(Maximum of 1 per Central Office)

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R170	# LCME_DCH/LGCI (Excludes Spare)	$R50 - (R150 * R156)$	_____
R171	# DCHs/LGCI (Excludes Spare)	$R170 * R65$ (if > 9, deload)	_____
R172	# DS0s to Packet Handler per LGCI	$R170 * (R55 + (R69 * R65))$	_____
R173	# Loopback LGCI C-Side Channels	$2 * R70 * R171$	_____
R174	# LGCI Links	$(R170 * (R60 - R54 - R55 - 2) + R172) / 30$ (round up) (if > 16, deload) (minimum 3)	_____
R175	# LGCI C-Side Channels	$R170 * (R60 - R54 - R55 - 2) + R173 + R172$ (if > 480, deload)	_____
R176g	# ISDN Lines per LGCI	$R150 * R52$ (if > 480, deload)	_____

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Common LGCI/LTCI with NTAX78 Enhanced Time Switch (ETS)
(1 to n per Central Office)

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R150a	# LCME/LGCI	$20/R61$ (round down)	_____
Note: If $R150a > R50$, set $R150a = R50$.			
R151a	# DCHs/LGCI (Excludes Spare)	$R150a * R65$ (if > 9 , deload)	_____
R152a	# DS0s to Packet Handler per LGCI	$R150a * (R55 + (R69 * R65))$	_____
R154a	# LGCI C-Side Channels	$R150a * (R60 - R54 - R55 - 2) + R152a$ (if > 480 , deload)	_____
R155a	# LGCI Links	$R154a / 30$ (round up) (minimum 3)	_____
R156a	# LGCIs	$R50 / R150a$ (round down)	_____
R157a	# ISDN Lines per LGCI	$R150a * R52$ (if > 640 , deload)	_____

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Residual LGCI/LTCI with NTAX78 Enhanced Time Switch (ETS)
 (Maximum of 1 per Central Office)

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R170a	# LCME/LGCI	$R50 - (R150a * R156a)$	_____
R171a	# DCHs/LGCI (Excludes Spare)	$R170a * R65$ (if > 9, deload)	_____
R172a	# DS0s to Packet Handler per LGCI	$R170a * (R55 + (R69 * R65))$	_____
R173a	# LGCI C-Side Channels	$R170a * (R60 - R54 - R55 - 2) +$ R172a (if > 480, deload)	_____
R174a	# LGCI Links	$R173a / 30$ (round up) (minimum 3)	_____
R175a	# ISDN Lines per LGCI	$R170a * R52$ (if > 640, deload)	_____

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DTC (MF) Calculations

Beginning in NCS06, the LEC and IEC DS1s can be consolidated on the same DTCs.

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R176	# MF DS1 Links for LEC	$Q26a + Q26d$	_____
R177	# DTCs (MF) for LEC	$R176 / 20$ (round up)	_____
R176a	# MF DS1 Links for IEC	$Q26e$ (round up)	_____
R177a	# DTCs (MF) for IEC	$R176a / 20$ (round up)	_____

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DTC7 Calculations

Beginning in NCS06, the LEC and IEC DS1s can be consolidated on the same DTC7s. The LEC and Wireless DS1s can be consolidated on the same DTC7s in any software release. The Selector Bank Subsystem (SBS) DS1s should be provided on dedicated DTC7s. The DS1s from each SBS should be spread over as many DTC7s as possible (minimum 2) for reliability.

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R178	# SS7 DS1 Links for LEC	$Q26b + Q26h + Q26k$	_____
R179	# DTC7s for LEC	$R178 / 20$ (round up)	_____
R178a	# SS7 DS1 Links for IEC	$Q26f + Q26h$ (round up)	_____
R179a	# DTC7s for IEC	$R178a / 20$ (round up)	_____
R178e	# SS7 DS1 Links for Wireless	$Q26j + Q26k$ (round up)	_____
R179e	# DTC7s for Wireless	$R178e / 20$ (round up)	_____

DTCI Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R178b	# PRI Links for LEC	$Q26c + Q26i$ (round up)	_____
R179b	# DTCIs for LEC	$R178b / 20$ (round up)	_____
R178c	# PRI Links for IEC	$Q26g + Q26i$ (round up)	_____
R179c	# DTCIs for IEC	$R178c / 20$ (round up)	_____

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DWS Calculations (DTCI/DTC7)

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R1w	Wtd. CCS (ABSBH) for all H0 (6 DS0s) Calls	$(6 * (Q14a * Q15a * Q16a +$ $Q14b * Q15b * Q16b +$ $Q14c * Q15c * Q16c)) / 100$	_____
R2w	Wtd. CCS (ABSBH) for all H11 (24 DS0s) Calls	$(24 * (Q14d * Q15d * Q16d +$ $Q14e * Q15e * Q16e +$ $Q14f * Q15f * Q16f)) / 100$	_____
R3w	Total CCS (ABSBH) for all H0 and H11 Calls	R1w+R2w	_____
R4w	Total CCS (HDBH) for all H0 and H11 Calls	R3w*Q3	_____
R5w	Total CCS (HDBH) for all H0 and H11 Calls on DTC7	$R4w(1 - Q18a/100)$	_____
R6w	% CCS for all H0 (6 DS0s) of Total CCS	$(R1w/R3w) * 100$	_____
R7w	% CCS for all H11 (24 DS0s) of Total CCS	$(R2w/R3w) * 100$	_____
R10w	# D-Channels for all H0 Subscriber Groups	$Q14a + Q14b + Q14c$	_____
R11w	# DS1 links for all H0 (6 DS0s) Calls	$Q14a + Q14b + Q14c$	_____
R12w	# D-Channels for all H11 Subscriber Groups	$Q14d + Q14e + Q14f$	_____

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RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R13w	# DS1 Links for all H11 (24 DS0s) Calls (Excluding D-Channels)	$Q14d+Q14e+Q14f$	_____
R14w	# DTCI Supporting H0 and H11 Subscribers only (Including D-Channels)	$(R11w+R12w+R13w)/20$ (round up)	_____
R15w	# DS1 Links per DTCI Supporting H0 and H11	$(R11w+R12w+R13w)/R14w$ (round up)	_____
R16w	# DS30 Links per DTCI Supporting H0 and H11	$((R11w/R14w)*6)+$ $((R13w/R14w)*24))/30$ (round up) (minimum 4)	_____
R30w	# DS1 Links for Calls with H0 and H11 Traffic	Table 9 (R5w, Q2, R6w) (if % H0 not in Table, use next lower number)	_____
R31w	# DTC7 Supporting H0 and H11 Subscribers only	$R30w/20$ (round up)	_____
R32w	# DS1s per DTC7 Supporting H0 and H11 Subscribers only	$R30w/R31w$ (round up)	_____
R33w	# DS30 links per DTC7 Supporting H0 and H11 Subscribers	$(R32w*24)/30$ (round up) (minimum 4)	_____
R34w	# ISUP Trunks to Support all H0 and H11 Traffic	$R30w*24$	_____

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MultiFrequency Receiver Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R180	Weighted Avg. MF Receiver Holding Time (secs)	input or see Table 6 to calculate	_____
R181	Avg. Calls/Trunk (ABSBH)	$Q27*100/Q27a$	_____
R182	Total CCS (ABSBH)	$((R176+R176a)*24)*R181*0.5*R180/100$	_____
R183	# MF Receivers (ABSBH)	Table 5 (R182,P0.01)	_____
R184	# MF Receiver Cards	$R183/4$ (round up)	_____

DigiTone Receiver Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R190	Weighted Avg. DT Receiver Holding Time (secs)	input or see Table 7 to calculate	_____
R191	Total CCS (ABSBH)	$R1*R5*0.5*R190/100$	_____
R192	Total CCS (HDBH)	$R191*Q3$	_____
R193	# DT Receivers (HDBH)	Table 5 (R192,P0.05)	_____
R194	# DT Receiver Cards	$R193/4$ (round up)	_____

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Universal Tone Receiver Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R200	Weighted Avg. MF-UTR Holding Time (secs)	input or see Table 6 to calculate	_____
R201	Avg. Calls/Trunk (ABSBH)	$Q27 \cdot 100 / Q27a$	_____
R202	Total MF-UTR CCS per DTC (ABSBH)	$((((R176 + R176a) \cdot 24) / (R177 + R177a)) \cdot R201 \cdot 0.5 \cdot R200) / 100$	_____
R203	# MF-UTR Circuits per DTC (ABSBH)	Table 5 (R202, P0.01) (if > 60, deload)	_____
R204	# MF-UTR Cards per DTC	$R203 / 15$ (round up)	_____
R205	Weighted Avg. DT-UTR Holding Time (secs)	input or see Table 7 to calculate	_____
R206	Total DT-UTR CCS per LGC (ABSBH)	$(R1 / R126 \cdot R5 \cdot 0.5 \cdot R205) / 100$	_____
R207	Total DT-UTR CCS per LGC (HDBH)	$R206 \cdot Q3$	_____
R208	# DT-UTR Circuits per LGC (HDBH)	Table 5 (R207, P0.05) (if > 60, deload)	_____
R209	# DT-UTR Cards per LGC	$R208 / 15$ (round up)	_____
R210	Total MF-UTR and DT-UTR CCS per LTC (HDBH)	$R202 + R207$	_____
R211	# MF-UTR and DT-UTR Circuits per LTC (HDBH)	Table 5 (R210, P0.05) (if > 60, deload)	_____
R212	# MF-UTR and DT-UTR Cards per LTC	$R211 / 15$ (round up)	_____

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Receiver Off Hook (ROH) Tone Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R220	Total # Originating Calls (ABSBH) (Excluding False Attempts)	$R1 \cdot R5 \cdot 0.5$	_____
R221	Determine # Originating Calls Requiring ROH Tone (Assuming 1% of Originating Calls)	$R220 \cdot 0.01$	_____
R222	ROH Holding Time (secs)	input default: 60	_____
R223	Total ROH CCS (ABSBH)	$R221 \cdot R222 / 100$	_____
R224	# ROH Tone Circuits	Table 5 (R223, P0.01)	_____
R225	# ROH Tone Cards	$R224 / 12$	_____

Conference Circuit Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R226	# Calls by Call Type	input	_____
R227	Weighted Avg. Holding Time by Call Type (secs)	input	_____
R228	Total CCS (ABSBH) by Call Type	$(R226 \cdot R227) / 100$	_____
R229	# Conference Circuits (ABSBH)	Table 5 (R228, P0.001)	_____
R230	# 6-Port Conference Circuit Cards	$R229 / 2$	_____

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ESMA Calculations

The rules in this section loop through the columns associated with Q40 through Q48. Assign the device in column 000 to the first ESMA. If the device is successfully assigned to the ESMA, try the device in the next column on the first ESMA. If a deload condition occurs when other devices are already assigned to the ESMA, try the next ESMA (add one if no more exist). Repeat until all devices are assigned to the ESMAs or one device will not fit on one ESMA. If a deload condition occurs when no other devices are assigned to the ESMA, reduce the traffic on the device. In this section, "Sum" applies to all RDTs and ICBs proposed against a single ESMA unless otherwise specified.

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R500	# ISDN Lines on ESMA	Sum(Q45*Q46/100) (round up) (if > 480, deload)	_____
R501	# Bds	Sum((R500*Q22)/Q33) (round up)	_____
R502	# DCHs on ESMA (Excludes Spare)	(Sum(Q42)+R501)/31 (round up) (if > X, deload)	_____
Note: X = 9 when 1 to 5 RDTs are assigned to the ESMA. X = 7 when 6 RDTs are assigned to the ESMA. X = 3 when 7 RDTs are assigned to the ESMA.			
R503	# P-Side Ports on ESMA	Sum(Q40)+R502+1 (if > 48, deload)	_____
R504	# DS0s to Packet Handler per ESMA	Sum(Q41)+R501	_____
R505	Total Traffic (HDBH)	Sum(Q45*Q47*Q48)	_____
R506	Links per ESMA (if Q50 = no)	(Sum(Q40)*24+R501- (R500/4))/30 (round up) (if > 16, deload) (minimum 3)	_____

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R507	ESMA Switched Channels (if Q50 = yes)	Table 1 (R505,0.04)	_____

Note: If Q49 = yes for any assigned RDT, use the 3% column instead of the 4%.

R508	Links per ESMA (if Q50 = yes)	(R507+R504)/30 (round up) (minimum 3) (if > 16, deload)	_____
R509	# RDTs per ESMA	Sum(# RDTs) (if > X and ISDN, deload) (if > 8, deload)	_____

Note: X = 5 in NA004 to NA007. X = 7 in NA008 and higher.

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SMA Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R124f	# DCHs per AN (Excludes Spare)	$(Q64+Q63)/31$ (round up)	_____
R125f	# Ports per AN_DCH (Excludes Spare)	$\text{Sum}(Q61+2*R124f)$ (round up) (if > 18, deload)	_____
R126f	Max # AN_DCH per SMA (Excludes Spare)	$18/R125f$ (round down) (Max 5 ISDN ANs) (Max 8 non-ISDN ANs)	_____
R126fb	Final # AN_DCH per SMA (Excludes Spare)	$\text{Min}(Q60, R126f)$ (balance load)	_____
R127f	# DCHs per SMA (Excludes Spare)	$R126fb*R124f$ (if > 3, deload)	_____
R128f	# DS0s to Packet Handler per SMA	$R126fb*(Q62+Q63)$	_____
R129f	# Loopback SMA C-Side Channels	$2*R126fb*Q64$ (round up)	_____
R131f	# C-Side Switched Channels per SMA	$R126fb*Q65$ (if > 480, deload)	_____
R132f	# Links per SMA	$(R131f+R128f)/30$ (round up) (if > 16, deload) (minimum 3)	_____
R133f	Check SMA C-Side channels	$R129f+(R132f*30)$ (if > 480, deload)	_____
R134f	# SMA Modules	$Q60/R126fb$ (round up)	_____

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SMUI Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R21x	# DCHs per RCU (Excludes Spare)	$(Q74+Q73)/31$ (round up) (if > 3, deload)	_____
R25x	# LAPD/X25 (Bds) per DCH	$Q73/R21x$	_____
R125b	# Ports per RCU_DCH (Excludes Spare and Side Door Trunks)	$Q71+2*R21x$ (if > 18, deload RCUs)	_____
R126b	Max # RCU_DCH per SMUI (Excludes Spare)	$18/R125b$ (round down) (balance load)	_____
R127b	Final # RCU_DCH per SMUI (Excludes Spare)	$\text{Min}(Q70, R126b)$ (balance load)	_____
R128b	# DS1 Digroups for Side Door Trunks	$(R127b*Q76)/24$ (round up)	_____
R129b	# DCHs per SMUI (Excludes Spare)	$R127b*((Q74+Q73)/31)$	_____
R130b	# DS0s to Packet Handler per SMUI	$R127b*(Q72+Q73)$	_____
R131b	# Loopback SMUI C-Side Channels	$2*R127b*(Q74+Q76)$ (round up)	_____
R132b	# C-Side Switched Channels per SMUI	$R127b*Q75$ (if > 480, deload)	_____
R133b	# Links per SMUI	$(R132b+R130b)/30$ (round up) (if > 16, deload) (minimum 3)	_____
R134b	Check SMUI C-Side Channels	$R131b+(R133b*30)$ (if > 480, deload)	_____
R135b	# SMUI Modules	$Q70/R127b$ (round up)	_____

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SMU Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R126x	Max # RCU per SMU	$20/Q81$ (round down) (balance load)	_____
R127x	Final # RCU per SMU	$\text{Min}(Q80, R126x)$ (balance load)	_____
R128x	# DS1 Digroups for Side Door Trunks	$(R127x \cdot Q83)/24$ (round up)	_____
R129x	Check P-Side Ports per SMU	$Q81 \cdot R127x + R128x$ (if > 20, deload)	_____
R130x	# Loopback SMU C-Side Channels	$2 \cdot R127x \cdot Q83$	_____
R131x	# C-Side Switched Channels per SMU	$R127x \cdot Q82$ (if > 480, deload)	_____
R132x	# Links per SMU	$R131x/30$ (round up) (if > 16, deload) (minimum 3)	_____
R133x	Check SMU C-Side Channels	$R130x + (R132x \cdot 30)$ (if > 480, deload)	_____
R134x	# SMU Modules	$Q80/R127x$ (round up)	_____

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Packet Handler Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R73	# XLIU Channels Required	$R152 * R156 + R172 +$ $R152a * R156a + R172a +$ $R128f * R134f + \text{Sum}(R504) +$ $\text{Sum}(R80) + \text{Sum}(R80a) +$ $\text{Sum}(R109) + \text{Sum}(R109a) +$ $R122 + R130b * Q80 + Q30$ (if > 360, deload)	_____

Note: The sum refers to the sum over all sites. Add in R109 and R109a values from each controller.

R74	# X.25 XLIUs (based on channels)	$(R73 - Q30) / 31$ (round up)	_____
R74a	# X.75 XLIUs (Based on channels)	$Q30 / 31$ (round up)	_____

Note: In BCS36 and higher, mixed X.25 and X.75 XLIUs are supported. In order to minimize XLIUs, add Q30 to the numerator of R74 and set R74a=0.

R90	# X.25 XLIUs (Based on links)	$(Q21 + R3a * Q22) / 512$ (round up)	_____

Note: In BCS36 and higher, mixed X.25 and X.75 XLIUs are supported. In order to minimize XLIUs, add Q30 to the numerator of R90.

R91	# X.25 XLIUs (Based on DPPS)	$(R3a * Q22 * Q23 + Q21 * Q32) / 160$ (round up)	_____
R91a	# X.75 XLIUs (Based on DPPS)	$(Q30 * Q31) / 160$ (round up)	_____

Note: In BCS36 and higher, mixed X.25 and X.75 XLIUs are supported. In order to minimize XLIUs, add Q21*Q32 to the numerator of R91 and set R91a=0.

R91b	Total X.25 XLIUs	$\text{Max}(R74, R90, R91)$	_____
R91c	Total X.75 XLIUs	$\text{Max}(R74a, R91a)$	_____

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R92	# NIUs (Based on Channels)	$R73/120$ (round up)	_____
R93	# NIUs (Based on XLIUs)	$(R91b+R91c)/10$ (round up)	_____
R94	# NIUs (# LIS Shelves)	$\text{Max}(R92, R93)$ (round up)	_____

Network Module (NM) Calculations

RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R240	Total Ports Required for Maintenance Trunk Modules (MTM), DCMs and TM8s	input	_____
R241	Total Ports Required for LGCs	input	_____
R242	Total Ports Required for LTCs	input	_____
R243	Total Ports Required for LGCIs and LTCIs	input	_____
R244	Total Ports Required for DTCs and DTCIs	input	_____
R244a	Total Ports Required for MS6Bs, MS7Bs and all Subscriber Carrier Modules (SMU, SMA, etc.)	input	_____
R245	Total Network Ports Required	R240+R241+R242+ R243+R244+R244a	_____
R246	# Network Modules (Physical Requirement)	R245/64	_____
R250	Total 2W CCS for Lines (Host/Remote - ABSBH)	input	_____
R251	Total 2W CCS for Trunks (Host/Remote - ABSBH)	input	_____
R252	Total 2W CCS for all service circuits except UTRs (ABSBH)	input	_____

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RULE	PARAMETER	CALCULATION	RESULT
-----	-----	-----	-----
R253	Total 2W CCS (ABSBH)	R250+R251+R252	_____
R254	Total 2W CCS (HDBH)	R253*Q3	_____
R255	# Network Modules (ABSBH) (Traffic Requirement)	Table 3A/3B (R253,0.001)	_____
R256	# Network Modules (HDBH) (Traffic Requirement)	Table 3A/3B (R254,0.01)	_____
R257	# Network Modules (Final Requirement)	Max(R246,R255,R256)	_____

1.2.4 Office Layout Information

Not Applicable.

1.2.5 Traffic Tables

Refer to ECM590 for the latest traffic tables.

1.3 Product/System Specification

1.3.1 Physical Characteristics

Not Applicable.

1.3.2 EMI/Earthquake Information

Not Applicable.

1.3.3 Sparing Information

Not Applicable.

1.3.4 Power Feed and Fusing Requirements

Not Applicable.

1.3.5 Current Drain Information

Not Applicable.

1.4 Software Provisioning

Not Applicable.

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1.4.1 Required Software Packages and Interdependencies

Not Applicable.

1.4.2 Software Usage Restrictions

Not Applicable.

1.4.3 Memory Provisioning

Not Applicable.

1.5 Real Time Impact

Not Applicable.

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2.0 ECM590 - DMS100F Traffic Tables

2.1 Overview

This ECM contains all of the traffic tables required to engineer the DMS100 Family of products.

Refer to ECM497 for the simplified traffic provisioning rules.

2.2 Service Standards

These standards specify the Delay and Matching Loss criteria service objectives for Local (Class 5) and Toll switching systems recommended by Northern Telecom. Explicit objectives are given for the Average Busy Season Busy Hour (ABSBH) and High Day Busy Hour (HDBH)

The standard has been developed taking into account both the performance aspects of switching systems and the service expectations of customers. The following three areas of traffic engineering related activities are impacted by design standards:

„ Switch Administration - Switch administration will ensure that service provided meets these traffic standards using servicing techniques.

„ Switch Provisioning - Initial switch implementation as well as switch extensions are engineered to meet given traffic service objectives. These service standards performance levels will be used in determination of switch capacities.

„ Switch Performance - The Delay and Matching Loss design standard performance levels will be used as a point of reference in the development of performance requirement standards which specifies Northern Telecom's performance requirements recommendations for the design and development of new switching systems.

2.2.1 Busy Hour Criteria

Provisioning of traffic sensitive components is based on service criteria and traffic intensity (Load) or on call attempts as a function of service relations. In engineering the facilities, the derived load versus service restrictions should be as accurate as possible. These functions should be verified by simulation and appropriate measurements on systems in service.

The traffic capacity tables that form the basis for equipment provisioning give the load or call volumes that can be handled by different equipment quantities, while attaining a fixed service criterion during an indicated period of time (Busy Hour). Selection of the Busy Hour is critical, because this is the period

during a year for which the traffic load or call attempts should be forecast. In some cases, provisioning is based on the most limiting of two or three expected loads in different periods of time (i.e. ABSBH, 10HDBH, and HDBH) with a different service criterion. The purpose of this is to ensure adequate performance under both normal and peak load conditions.

2.2.2 Types of Service Criteria

Blocking Loss (Matching Loss Criteria)

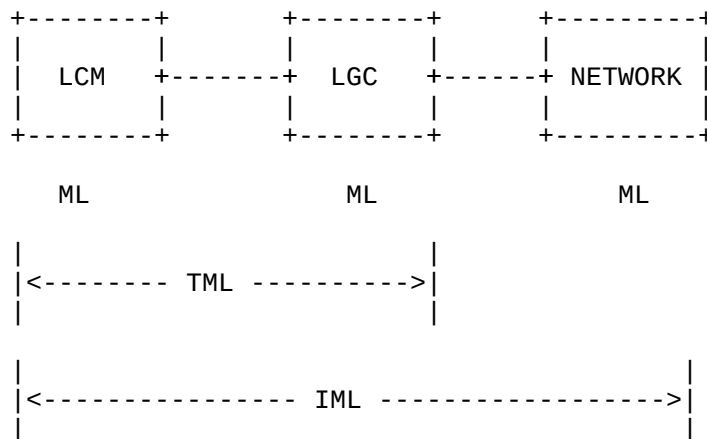
Blocking Loss occurs when a call arrives for service and all servers (service circuits, network paths, etc.) are busy. Blocking is measured as the fraction of all calls attempted that are lost.

Delay Criteria

Delay occurs when a call finds all servers (service circuits, software resources, etc.) busy and the call is queued until it defects or a server becomes idle. Delay is usually measured as the fraction of call attempts that are delayed greater than a specified criteria (i.e. Delay > 3 seconds or Delay > 1 Holding Time).

Terminating Matching Loss (TML)

The DMS100F is provisioned in modular sections, with each module having its own component of Matching Loss. Incoming Matching Loss (IML) is the linear addition of the Matching Loss allotted to component parts. Terminating Matching Loss (TML) is the IML portion allocated to Peripheral Modules (PM) (i.e. LCM/LGC, RLCM/LGC, OPM/LGC, LCM/RCC etc.) (see figure below).



2.2.3 Definitions

Busy Hour (BH)

In a business day, the peak 60 minute period (not necessarily a clock hour) when the largest volume of traffic is handled.

Time Consistent Busy Hour (TCBH)

The busy hour may vary from one day to another. In order to engineer the switching equipment, the hour of day which consistently has the highest average load over the study period is determined. This hour is called the Time Consistent Busy Hour.

Busy Season (BS)

Three selected months (not necessarily consecutive) each containing 20 consecutive business days that have the highest average business day traffic in the TCBH is termed the Busy Season. It should be noted that the same hour is used for each month.

Average Busy Season Busy Hour (ABSBH)

The measured busy hour traffic, averaged across the business days of the busy season is termed the Average Busy Season Busy Hour (ABSBH) load.

Ten High Day Busy Hour (10HDBH)

Traffic Data are processed all year. From this data the average of the ten highest days busy hour load (excluding holiday traffic e.g. Mother's Day and abnormal traffic e.g. Snow Storms) is cal-

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culated. This is termed the Ten High Day Busy Hour Load. The 1 HDBH may not be the same busy hour as that calculated for the ABSBH.

Note that a 10HDBH performance standard is not based directly on the 10HDBH load. Such a standard is the (unweighted) average service expected for the relevant 10 busy hours. Since virtually all load/service relations are convex functions, this means that traffic engineering for the 10HDBH must include a "day-to-day variation" allowance, (i.e. a reduction in the capacity that would be cited to meet a single-hour service objective. This same remark applies to ABSBH service standard and capacities.

High Day Busy Hour (HDBH)

The one day among the 10HDBH Loads that has the highest traffic during the busy hour is designated the High Day Busy Hour.

Call Types

Calls processed by Local (Class 5) and Toll switching systems other than test calls are categorized as follows:

„ Originating Terminating - These are calls which originate from and are terminated to customer lines within the same switch. These are also called intra-office calls.

„ Originating Outgoing - These are calls which originate from the customer lines served by the switch but have a terminating destination external to that switch. These are also called interoffice calls.

„ Incoming Terminating - These calls originate from sources external to the switch and are destined for termination on customer lines within this switch

„ Incoming Outgoing - These calls have originating sources and terminating destinations which are external to the switch. These connections are also called tandem calls and involve a minimum of three switching systems.

2.2.4 Criteria at Normal Operating Conditions

Service standards specified in Chapter 2 will apply when there are no overload controls in effect and all load-related equipment is in service. Traffic engineering information will be provided to permit telcos to order DMS100 systems that will handle smaller traffic loads while meeting service standard objectives.

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2.2.5 Criteria Under Overload Conditions

Overload is defined as a condition in which the DMS100 family of switching systems exceeds High Day Busy Hour performance requirements because its call processing resources are exhausted. This condition can be caused by the exhaust of:

- „ Real Time of the Processor
- „ Switching Network Overloads
- „ Peripheral Units Overload
- „ Inadequate Provision of Service Circuits

A DMS100 Family office is designed and configured to handle a defined amount of traffic with defined characteristics. If the designed load is exceeded, some of the traffic must be delayed or blocked. The exact effect depends on the nature of the overload. The design intent is that any part of the equipment that is offered more than its rated load should continue to operate at or near its rated capacity. The excess load should be delayed or blocked in an orderly way. The presence of excess load should not cause throughput degradation or outage.

Types of Overload

Overload may be manifested in any of four main areas:

- a) Shortage of tone receivers
- b) Shortage of speech paths
- c) Shortage of processing capacity in one or more peripherals
- d) Limits on global system capacity

The Central Control (CC), as the focus of all switching activity in the DMS100, effectively determines the ultimate system capacity and hence requires overload protection in order that the system does not experience throughput degradation or outage in the presence of excess load.

2.3 Grade of Service Specifications

The Office Grade of Service is defined as being a component of the office service quality, qualifying the normal office reaction to traffic variations in the ideal situation in which the Office is completely fault and trouble free. Therefore, to establish a standard basis of equipment provisioning, it is necessary to devise a measure of service to quantify the inconvenience suffered by the subscribers as a result of blocking. The definition of inconvenience depends on how the system deals with calls which encounter blocking. In a loss system, busy tone is immediately returned to the calling subscriber who must replace his receiver

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before trying again, whereas in a delay system, the calling subscriber can wait, possibly for a limited time, during which, he is immediately connected when the facility (i.e. service circuits) becomes available. The subscriber is only considered to be inconvenienced if the delay exceeds some maximum tolerable value. DMS100 family design apply a mixture of loss (matching loss) and delay criteria.

Standard grades of service have usually been arrived at on the basis of judgement and experience, the idea being to achieve the best service obtainable with the technology available at reasonable cost. These standards should not be too inflexible, and may need to be reviewed from time to time in light of technical developments.

2.3.1 Dial Tone Delay (DTD) GOS Objectives

DMS100 Local		

Criteria	ABSBH	HDBH
-----	-----	-----
DTD > 3 sec	1.5%	20%

Note: Switches are to be provisioned to the more constraining of either ABSBH or HDBH load levels.

DTD is a measure of the time it takes a switch to return dial tone to an originating subscriber after the subscriber goes off-hook. The receipt of dial tone indicates the system is ready to receive the subscribers keyed digits.

In DMS100 Local the following times are major contributions to Dial Tone Delays:

- „ Peripheral module response time to subscriber off-hook.
- „ Time to process the request for service by the peripheral processor.
- „ Time required to connect the receiver and tone source

These times are cumulative and the system design provides for a total dial tone connect time that is within the dial tone delay standards as specified above.

Note that blocked dial tone occurs when the customer line circuit cannot access any digit receiver because of network congestion, particularly in the peripheral module front end concentrator.

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2.3.2 Incoming Start to Dial Delay (ISDD) GOS Specification

	DMS100 Local		DMS200 Toll	
	-----		-----	
Criteria	ABSBH	HDBH	10HDBH	HDBH
ISDD > 3 sec	1.5%	20%	8%	20%

Note: Switches are to be provisioned to the more constraining of either ABSBH or HDBH for Local and 10HDBH or HDBH for Toll load levels.

When attempts are allowed to queue, interoffice receivers (MF) are subject to interoffice receiver (IR) delay criterion, expressed as the probability that all MF receivers are busy when a call arrives. Generally, the dial tone delay standards apply to incoming start to dial delay as well.

Receiver circuits are engineered so that Call Processing Delay constitutes the major component of DTD and ISDD in a central control (Real Time) limited system.

2.3.3 Matching Loss G.O.S.

	DMS100 LOCAL		

Criteria	ABSBH	HDBH	
-----	-----	-----	
		Current	Recommended
Incoming Matching Loss (IML)	2%	20%	5%
Outgoing Matching Loss (OML)	1%	20%	5%
Intra Office Matching Loss	2%	20%	5%

	DMS200 Toll/Tandem	

Criteria	10HDBH	HDBH
Tandem Matching Loss (TAML)	0.5%	2%

Note: „ For Local applications the IML is the limiting factor

„ For Toll applications the TAML is the limiting factor

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- " For Local/Toll applications the more stringent of the IML and/or TML is the limiting factor.
- " The TELCO may wish to specify different GOS for their unique operating environment.

Matching loss is defined as the situation where no network path exists between an incoming or originating call and a free customer line or suitable outgoing trunk. Matching loss can be classified by the type of call being processed by the switching technology employed. In general it is classified as follows:

" INCOMING MATCHING LOSS (IML) This term is used in conjunction with incoming terminating calls only.

" OUTGOING MATCHING LOSS (OML) This term is used in conjunction with originating-outgoing calls only.

" INTRA OFFICE MATCHING LOSS (IAML) This term is used in conjunction with originating-terminating calls only.

" TANDEM MATCHING LOSS (TAML) This term is used in conjunction with incoming-outgoing calls only.

In general, all matching loss calls take up to two trials to find a suitable path through the network, i.e., All paths are in effect "point to group" between the originating channel and the terminating channel.

2.3.4 Service Circuits GOS Objectives

With the exception of receivers (i.e. Digitone, MF and UTR), occupancy on individual groups of service circuits (i.e. tone circuits, conference circuits, announcement circuits, etc) is limited to 80 percent on an ABSBH load level basis, and 90 percent on a HDBH load level basis. For large groups of service circuits, the occupancy limit is expected to be the limiting factor. For smaller groups of service circuits, the criteria listed below provide the basis for service circuit delay and blocking requirements. In general, the quantities of these system components are engineered to cause minimal blocking. This helps to ensure that processing requirements per call do not increase significantly under peak load conditions.

The service circuits GOS based on blocking criteria are as follows:

Service Circuit	Criteria	ABSBH	HDBH
-----	-----	-----	-----

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Announcement Circuits	BLOCKING	1%	5%
Tone Circuits	BLOCKING	1%	5%
Conference Circuits	BLOCKING	0.1%	5%

2.3.5 Receiver GOS Objectives

In all cases, occupancy on individual groups of receiver circuits (i.e. digitone, MF, and UTR) is limited to 75 percent on a HDBH load level basis. The requirements are expected to be controlling requirements for groups of receiver circuits over approximately 35 receivers (i.e. pool of digitone and/or MF). For groups of receiver circuits smaller than 35 receivers the following criteria provide the basis for receiver circuit delay and blocking requirements.

The receiver circuits GOS based on blocking and delay criteria are as follows:

Service Circuit -----	Criteria -----	ABSBH -----	HDBH -----
DTMF Receiver	DTD > 0 sec	1%	5%
	DTD > 3 sec	0.1%	1.0%
MF Receiver	DTD > 0 sec	1%	5%
	DTD > 3 sec	0.1%	1.0%
UTR Receiver	DTD > 0 sec	1%	5%
	DTD > 3 sec	0.1%	1.0%

2.4 Description of PM Traffic Characteristics

2.4.1 Line Concentrating Module (LCM)

The LCM provides an interface between analog line facilities and the internal switching system. It converts analog to digital and digital to analog signals and multiplexes the digital signals into a 2.56 mb/sec rate for transmission to the LGC via DS-30A links. The LCM provides concentration of 640 analog subscriber lines to between 6 and 180 speech channels (that is, 2 to 6 DS-30A links) to the LGC. Six hundred thirty-nine (639) lines are available for subscriber use, and one line is used for testing.

2.4.2 Remote Line Concentrating Module (RLCM)

The RLCM is a remote LCM connected to a host LGC or RSC via a minimum of two and a maximum of six DS-1 links. During normal non-ESA operation, the RCLM will support all of the subscriber line features that are possible to assign to lines at a host LCM.

2.4.3 Outside Plant Module (OPM)

The OPM is an RLCM housed in an environmentally controlled cabinet. Features and configurations of the OPM are the same as those for RLCM. Additionally, the OPM provides commercial ac power inlet, rectifiers, batteries, an environmental control system, and equipment for the termination, protection and powering of associated DS-1 pairs.

2.4.4 Remote Cluster Controller (RCC)

The RSC is an LGC based peripheral, remotely connected to an LGC when supporting lines only, and to an LTC when supporting lines and trunks, via 2-16 DS-1 C-side host links. A variable set of loopback channels are available for intra-calling. The RSC supports up to 20 links, which may be configured to provide various combinations of DS-30A links (LCMs, RMMs) and/or DS-1 links (RLCMs, OPMs, CDO trunking and PBX trunking). The RSC, when supporting lines only, has the ability to interface up to 5760 lines in low traffic applications (2.8 CCS/line).

2.4.5 Dual Remote Cluster Controller (DRCC)

The DRCC is two RCC connected to each other via inter DS-1 links. The DRCC, when supporting lines only, has the ability to interface up to 11,520 lines in low traffic applications (2.8 ccs/line).

2.4.6 Line Group Controller (LGC)

The LGC is designed to support the LCM and the family of remotes based on the LCM equipment. The LGC interfaces up to 16 DS-30 C-side ports spread over as many as 16 network modules. The 16 DS-30 C-side ports are accessible by 20 DS-30A p-side ports. Further, since the DTC and LGC employ a common architecture, it is possible to interface the 16 DS-30 C-side ports with a combination of DS-30A and DS-1 P-side ports up to a combined total of 20 P-side ports.

2.4.7 Digital Trunk Controller (DTC)

The DTC interfaces between digital trunks carried over DS-1 links and the DS-30 links used internally in DMS100 between the PMs and each plane of the duplicated networks. Hence, no concentration exists in the DTC.

2.4.8 Line Trunk Controller (LTC)

The LTC is designed to support a subset of both LGC and DTC functions. The LTC interfaces to the DMS network through a minimum of three to a maximum of 16 DS-30 ports. These 16 DS-30 ports are accessible to a maximum of 20 DS-30A ports or 20 DS-1 ports. The

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DS-30A ports support LCMs. The DS-1 ports support digital carrier facilities, RLCMs, and RSCs.

2.5 The Provisioning Methodology

Teletraffic provisioning represents the initial stage only of designing a DMS100 Order. The outcome from this stage will generally comprise a first estimate of the quantity of each type of peripheral required to meet the Customer Order, and specification of the inter-module Link design to be adopted for the Office. The procedure also identifies the quantity of external DS-1 Links which must be provisioned from a Remote to the Host.

Inter-Module Link Design

The link designs referred to in this document are those between Line Concentrating Modules (LCM) or equivalent and the LGC, also the links between the LGC and the Network. In general the selection of a Link configuration for an Office, particularly LCM - LGC links, is a "once in a lifetime" selection which is then maintained in the Office for its entire operational life. This is due in the most part to the high administrative costs prevalent in most Telcos in dealing with variance and the high cost of rearranging live equipment with the attendant possibility of service interruptions.

External DS-1 Links from Remote Peripherals on the other hand are generally provisioned for the Office Design period only. These links usually have a relatively high incremental provisioning cost together with high annual maintenance charges which preclude Telcos from provisioning for longer periods.

It is critical to ascertain that the order details employed in the initial design of the Office are also indicative of the Office utilization throughout its anticipated service life. If this is not the case, it should be brought to the attention of the Telco prior to deciding the final Office link configurations.

Re-Dimensioning Peripheral Modules

If other limitations are identified in the subsequent provisioning steps, such as LGC peripheral processor Real Time, the general response is to deload the affected component by a calculated percentage of lines. The Worksheets in ECM497 have included a factor designated the % PM Line Fill. Wiring fills of less than 100% are often specified by Customers to ensure that there is some capacity available to perform load-balancing. It is recommended that the Wiring Fill applicable to the Office at its End-of-Service Life period should be calculated, based on an estimate of the increase in forecast customer traffic per line over the period, if available from the Telco.

Concentrating & non-Concentrating LGC

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NORTEL's preferred method of provisioning is the Concentrating LGC due to the superior performance attainable; however, non-Concentrating LGCs are widely used at present and will continue to be supported. The method to be used will be at the discretion of the Customer.

Spread of Lines and Trunks Across PM

In general, DMS100F assumes that lines and trunks will be spread evenly across the Peripheral modules. This is effected by spreading the lines by Class of Service across the PMs and by monitoring LCM link traffic to identify and correct significant imbalances.

Similarly remotes should be spread across LGC as evenly as possible, commencing with Dual-RSC with Trunking, Dual RSC, RSC with trunking, RSC and then RLCM, starting with the remote with the highest host-bound traffic in each case. No more than two RSC should be homed on a single LGC/LTC. If it is necessary to pair RSC on the same host XPM, Dual-RSC should not be paired. The pairing should be confined to the smallest RSCs and they should be grouped according to the support of RSC trunking except where this is unavoidable.

Customer Orders with a significant proportion of Remotes do not readily allow estimation of the number of LGCs/LTCs required at the Host by arithmetical means. This is due to the combinations which can arise leading to an indeterminate number of spare p-side ports at the Host LGC/LTC. To overcome this, a graphical approach to allocation of first rank peripherals to XPM is advocated.

2.6 Hardware Provisioning

2.6.1 Hardware Usage Restrictions

Not applicable.

2.6.2 Hardware Dependencies

Not applicable.

2.6.2.1 P and C Side Port Requirements

Not applicable.

2.6.2.2 DMS BUS Port Requirements

Not applicable.

2.6.2.3 Circuits Per Card

Not applicable.

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2.6.2.4 Discrimination Numbering

Not applicable.

2.6.3 Provisioning Considerations

Refer to ECM497 for the simplified traffic provisioning rules.

The traffic provisioning methodology is based on achieving the required Grade of Service Blocking criteria as allocated between the individual components of the DMS100 System. Where the Grade of Service Blocking is unspecified or is not the most constraining provisioning criteria, NORTEL recommends component blocking standards commensurate with optimal utilization of the DMS100 System.

For a given office, NORTEL recommends that engineering the provisioning requirements for series II Peripherals (i.e. LCM, RLCM, OPM, RCC, DTC, LGC, and LTC) be met at the projected High Day Busy Hour (HDBH) office Load. Verify Real Time Capacity, as detailed in appropriate NORTEL Documentation, for both the Peripherals and Computing Module (DMS SuperNode) to ensure satisfactory operation at the specified load.

It should be noted that DMS100 designs must satisfy essentially five precepts: Physical requirements, Teletraffic Capacity and Grade of Service criteria, Processor Real Time limits, Software Resources capacity, including total memory requirements, and relevant Administrative criteria (e.g., peripheral image loading).

The steps to simplified provisioning are as follows:

1) Define the overall Incoming Matching Loss (IML) for an office by selecting the following: ABSBH : 0.003, 0.005, 0.007, 0.01, or 0.02 HDBH : 0.03, 0.05, 0.07, 0.1, or 0.2

2) Use the value of the Incoming Matching Loss to provision peripherals by referring to the appropriate traffic table.

2.6.4 Office Layout Information

Not applicable.

2.6.5 Traffic Table Descriptions

Table 1: Generic HDBH Traffic Capacity

Table 1 is a delay/loss table based on carried traffic and infinite sources that is used to determine the number of switched channels required to meet a specified level of blocking for a given CCS. The table ranges from Blocking levels of .1% to 20%. This table is used for a majority of the DMS100 Family of products.

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Table 2A: RLCM/OPM HDBH Traffic Capacity (CCS)

1. Select the appropriate column for the expected percentage (%) Intra office Traffic (e.g. 60%). If the expected percentage (%) is not in the table, use the column for the next lowest percentage.
2. Beginning in the 2 links per RLCM/OPM table, select the number of channels per LCM by choosing the appropriate row that is greater than or equal to the value of CCS per LCM.
3. If the CCS/LCM exceeds the values in the table, move to the next table with an increased number of links per RLCM/OPM.
4. Read the number of channels per LCM from the left side of the table.
5. Add the number of Bbs, Bds, and message channels to the value determined in step #4. There are 2 messaging channels per ISDN Line Drawer and 2 additional channels for RLCM messaging. Divide your answer by 24 channels per link. If the result is greater than the links per RLCM/OPM used in step #3, move to the next table and repeat steps #3 through #5. If number of links is greater than 6, change your configuration to reduce the the CCS/LCM (deload), and then recalculate based on the revised configuration.

Table 2B: IRLCM HDBH Traffic Capacity (CCS)

Table 2B is used in a similar manner to Table 2A, where the Remote site is served by IRLCM utilizing PCM-30 digital spans.

Table 2B defines the HDBH capacity for the International RLCM (IRLCM) version of the Remote Line Concentrating Module. The principal difference between this model and the domestic RLCM is that Host-bound links employ the PCM-30 format. This means that all channels from an LCA port equipped with PCM-30 will go to the Host and none will be available for use as intra- channels. Only unequipped ports provide inter / intra-channels. It should be noted that five (5) and six (6) link IRLCM configurations cannot support intra-switching due to the lack of intra-channels.

Table 3A: DMS100 Local Network Capacities

1. Given a figure for Total Two-way CCS, start with column for ABSBH blocking factor (IML) of .001.
2. Read down this column to find the total two-way CCS figure which is greater than or equal to the required value.
3. Read left to find the number of network modules required
4. Repeat this process using the column for HDBH, IML = .01

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5. The number of network modules required will be the higher of these two figures, or the maximum number of modules according to physical network requirements.

Table 3B: DMS200 Offices and DMS100/200 Toll Offices

1. Use this table in the same way as Table 3A, for DMS200 offices and for DMS100/200 Toll offices or offices combining Local/Toll networks.

Table 4A: Total DRA Traffic (CCS) for NT0X48 Network

Refer to ECM611 for details of DRA provisioning.

Table 4B: Total DRA Traffic (CCS) for NT5X13/8X11 Network

Refer to ECM611 for details of DRA provisioning.

Table 5: Service Circuit Capacity (Poisson Theory)

Table 5 is used to calculate the required servers given total CCS and a blocking level.

Table 6: MF Receiver Holding Time

Table 6 gives average MF receiver holding times for different call types.

Table 7: Digitone Receiver Holding Time

Table 7 gives average digitone receiver holding times for different call types.

Table 8: CMR Modem Holding Times

Table 8 is used for typical modem holding times.

Table 9: DWS ISUP Trunks HDBH (CCS)

Table 9 is used to calculate the required DS-1s to handle the total CCS given a specific H0/H11 load ratio.

Table A: Attendant Console Traffic Capacity

1. Number of consoles = (Traffic offered in CCS/36) + (Value for AWT)
2. Figures to the left of this line represent occupancies greater than 92%.
3. With an upper limit for attendant occupancies of no greater than 92% (or 33.12 CCS per attendant), the number of attendant

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consoles required (for values of attendant console activated CCS/36 to the left of this line) is determined by the following formula:

$$\# \text{ Attendant Consoles} = \frac{\text{Traffic offered in CCS}}{33.12}$$

2.6.6 Traffic Tables

2.6.6.1 Traffic Table Methodology

NORTEL estimates of Peripheral Module Traffic Capacities are based upon computerized mathematical models of each PM, incorporating all of the relevant internal switching arrangements and priorities. The theoretical basis for capacity models employed in DMS100F is the Delay/Loss Model adapted for Infinite Sources in the manner developed by Engset. Assumptions embodied in each PM Model include the number of independent sources, exponential call holding time distributions with a mean of 100 seconds, the ratio of originating calls to terminating calls is 0.55/0.45 . Call originations are queued until a channel to the network is free, whereas calls terminating to the PM are blocked if no free channel exists. The Traffic capacities used are single-hour values except when ABSBH values are quoted, and reference the Carried traffic as opposed to Offered traffic. No account is taken of customer repeat attempt on encountering blocking or on second attempts initiated by the system to locate a free channel.

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2.6.6.2 Table 1: Generic HDBH Traffic Capacity

Generic HDBH Traffic Capacity (.5% to 6%) (Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
4	24	30	37	42	46	50	53
5	39	47	56	62	68	72	76
6	56	65	77	84	91	96	100
7	75	86	99	108	115	121	126
8	94	107	122	132	140	147	153
9	115	129	146	158	166	174	180
1	137	153	171	183	193	201	208
1	159	176	197	210	220	229	236
1	182	201	223	237	248	257	265
1	206	226	249	265	276	286	295
14	230	251	276	292	305	315	324
15	255	277	303	321	334	345	354
16	280	304	331	349	363	374	384
17	305	330	359	378	393	404	415
18	331	357	387	407	422	435	445
19	357	385	416	436	452	465	476
2	384	412	445	466	482	496	507
2	410	440	474	496	513	526	538
2	437	468	503	526	543	557	570
2	464	496	532	556	574	589	601
24	492	524	562	586	605	620	633
25	519	553	592	617	636	651	664
26	547	582	621	647	667	683	696
27	575	611	651	678	698	714	728
28	603	640	682	709	729	746	760
29	631	669	712	740	761	778	792
3	660	698	742	771	792	810	825

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Table 1: Generic HDBH Traffic Capacity (.5% to 6%)
(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
3	688	728	773	802	824	842	857
3	717	757	803	833	856	874	890
3	746	787	834	865	888	906	922
34	775	817	865	896	919	939	955
35	804	847	896	928	952	971	987
36	833	877	927	959	984	1003	1020
37	862	907	958	991	1016	1036	1053
38	891	937	989	1023	1048	1068	1086
39	921	968	1021	1055	1080	1101	1119
4	950	998	1052	1087	1113	1134	1152
4	980	1029	1083	1119	1145	1166	1185
4	1010	1059	1115	1151	1178	1199	1218
4	1040	1090	1146	1183	1210	1232	1251
44	1070	1121	1178	1215	1243	1265	1284
45	1100	1152	1210	1247	1275	1298	1317
46	1130	1182	1242	1279	1308	1331	1350
47	1160	1213	1273	1312	1341	1364	1384
48	1190	1244	1305	1344	1374	1397	1417
49	1221	1275	1337	1377	1406	1430	1451
5	1251	1307	1369	1409	1439	1464	1484
5	1281	1338	1401	1442	1472	1497	1517
5	1312	1369	1433	1474	1505	1530	1551
5	1342	1400	1465	1507	1538	1563	1584
54	1373	1432	1498	1540	1571	1597	1618
55	1404	1463	1530	1572	1604	1630	1652
56	1434	1495	1562	1605	1637	1663	1685
57	1465	1526	1594	1638	1671	1697	1719
58	1496	1558	1627	1671	1704	1730	1753
59	1527	1589	1659	1704	1737	1764	1786
6	1558	1621	1692	1737	1770	1797	1820

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Table 1: Generic HDBH Traffic Capacity (.5% to 6%)
(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
6	1589	1653	1724	1770	1804	1831	1854
6	1620	1685	1757	1803	1837	1865	1888
6	1651	1716	1789	1836	1870	1898	1922
64	1682	1748	1822	1869	1904	1932	1956
65	1714	1780	1854	1902	1937	1966	1989
66	1745	1812	1887	1935	1971	1999	2023
67	1776	1844	1920	1968	2004	2033	2057
68	1807	1876	1952	2001	2038	2067	2091
69	1839	1908	1985	2034	2071	2101	2125
7	1870	1940	2018	2068	2105	2134	2159
7	1902	1972	2051	2101	2138	2168	2193
7	1933	2004	2084	2134	2172	2202	2227
7	1965	2036	2116	2167	2205	2236	2262
74	1996	2069	2149	2201	2239	2270	2296
75	2028	2101	2182	2234	2273	2304	2330
76	2059	2133	2215	2268	2306	2338	2364
77	2091	2165	2248	2301	2340	2372	2398
78	2123	2198	2281	2334	2374	2406	2432
79	2154	2230	2314	2368	2408	2440	2466
8	2186	2262	2347	2401	2442	2474	2501
8	2218	2295	2380	2435	2475	2508	2535
8	2250	2327	2414	2468	2509	2542	2569
8	2282	2360	2447	2502	2543	2576	2603
84	2313	2392	2480	2535	2577	2610	2638
85	2345	2425	2513	2569	2611	2644	2672
86	2377	2457	2546	2603	2645	2678	2706
87	2409	2490	2579	2636	2679	2712	2741
88	2441	2522	2613	2670	2712	2747	2775
89	2473	2555	2646	2704	2746	2781	2809
9	2505	2588	2679	2737	2780	2815	2844

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Table 1: Generic HDBH Traffic Capacity (.5% to 6%)
(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
9	2537	2620	2713	2771	2814	2849	2878
9	2570	2653	2746	2805	2848	2883	2912
9	2602	2686	2779	2838	2882	2918	2947
94	2634	2719	2813	2872	2916	2952	2981
95	2666	2751	2846	2906	2950	2986	3016
96	2698	2784	2879	2940	2985	3020	3050
97	2730	2817	2913	2974	3019	3055	3085
98	2763	2850	2946	3007	3053	3089	3119
99	2795	2883	2980	3041	3087	3123	3154
1 0	2827	2915	3013	3075	3121	3158	3188
1 1	2860	2948	3047	3109	3155	3192	3223
1 2	2892	2981	3080	3143	3189	3226	3257
1 3	2924	3014	3114	3177	3223	3261	3292
1 4	2957	3047	3147	3211	3258	3295	3326
1 5	2989	3080	3181	3244	3292	3329	3361
1 6	3021	3113	3214	3278	3326	3364	3395
1 7	3054	3146	3248	3312	3360	3398	3430
1 8	3086	3179	3282	3346	3394	3433	3465
1 9	3119	3212	3315	3380	3429	3467	3499
1 0	3151	3245	3349	3414	3463	3502	3534
1 1	3184	3278	3382	3448	3497	3536	3568
1 2	3216	3311	3416	3482	3531	3571	3603
1 3	3249	3344	3450	3516	3566	3605	3638
1 4	3281	3377	3483	3550	3600	3640	3672
1 5	3314	3410	3517	3584	3634	3674	3707
1 6	3347	3444	3551	3619	3669	3709	3742
1 7	3379	3477	3585	3653	3703	3743	3776
1 8	3412	3510	3618	3687	3737	3778	3811
1 9	3445	3543	3652	3721	3772	3812	3846
1 0	3477	3576	3686	3755	3806	3847	3881

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Table 1: Generic HDBH Traffic Capacity (.5% to 6%)
(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
1 1	3510	3610	3720	3789	3840	3881	3915
1 2	3543	3643	3753	3823	3875	3916	3950
1 3	3575	3676	3787	3857	3909	3950	3985
1 4	3608	3709	3821	3891	3944	3985	4019
1 5	3641	3743	3855	3926	3978	4020	4054
1 6	3674	3776	3889	3960	4012	4054	4089
1 7	3707	3809	3923	3994	4047	4089	4124
1 8	3739	3843	3956	4028	4081	4123	4159
1 9	3772	3876	3990	4062	4116	4158	4193
1 0	3805	3909	4024	4097	4150	4193	4228
1 1	3838	3943	4058	4131	4185	4227	4263
1 2	3871	3976	4092	4165	4219	4262	4298
1 3	3904	4009	4126	4199	4254	4297	4333
1 4	3937	4043	4160	4234	4288	4331	4367
1 5	3969	4076	4194	4268	4323	4366	4402
1 6	4002	4110	4228	4302	4357	4401	4437
1 7	4035	4143	4262	4336	4392	4436	4472
1 8	4068	4176	4296	4371	4426	4470	4507
1 9	4101	4210	4330	4405	4461	4505	4542
140	4134	4243	4364	4439	4495	4540	4576
141	4167	4277	4398	4474	4530	4574	4611
142	4200	4310	4432	4508	4564	4609	4646
143	4233	4344	4466	4542	4599	4644	4681
144	4266	4377	4500	4577	4634	4679	4716
145	4299	4411	4534	4611	4668	4713	4751
146	4332	4444	4568	4645	4703	4748	4786
147	4365	4478	4602	4680	4737	4783	4821
148	4399	4511	4636	4714	4772	4818	4856
149	4432	4545	4670	4749	4807	4852	4891
150	4465	4579	4704	4783	4841	4887	4925

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Table 1: Generic HDBH Traffic Capacity (.5% to 6%)
(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
151	4498	4612	4738	4817	4876	4922	4960
152	4531	4646	4772	4852	4910	4957	4995
153	4564	4679	4807	4886	4945	4992	5030
154	4597	4713	4841	4921	4980	5026	5065
155	4630	4747	4875	4955	5014	5061	5100
156	4664	4780	4909	4990	5049	5096	5135
157	4697	4814	4943	5024	5084	5131	5170
158	4730	4848	4977	5058	5118	5166	5205
159	4763	4881	5011	5093	5153	5201	5240
160	4796	4915	5046	5127	5188	5236	5275
161	4830	4949	5080	5162	5222	5270	5310
162	4863	4982	5114	5196	5257	5305	5345
163	4896	5016	5148	5231	5292	5340	5380
164	4929	5050	5182	5265	5327	5375	5415
165	4963	5084	5217	5300	5361	5410	5450
166	4996	5117	5251	5334	5396	5445	5485
167	5029	5151	5285	5369	5431	5480	5520
168	5063	5185	5319	5403	5465	5515	5555
169	5096	5219	5353	5438	5500	5549	5590
170	5129	5252	5388	5473	5535	5584	5625
171	5162	5286	5422	5507	5570	5619	5660
172	5196	5320	5456	5542	5604	5654	5695
173	5229	5354	5491	5576	5639	5689	5730
174	5263	5387	5525	5611	5674	5724	5765
175	5296	5421	5559	5645	5709	5759	5800
176	5329	5455	5593	5680	5744	5794	5836
177	5363	5489	5628	5714	5778	5829	5871
178	5396	5523	5662	5749	5813	5864	5906
179	5429	5557	5696	5784	5848	5899	5941
180	5463	5590	5731	5818	5883	5934	5976

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Table 1: Generic HDBH Traffic Capacity (.5% to 6%)
(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
181	5496	5624	5765	5853	5918	5969	6011
182	5530	5658	5799	5888	5952	6004	6046
183	5563	5692	5834	5922	5987	6039	6081
184	5597	5726	5868	5957	6022	6074	6116
185	5630	5760	5902	5991	6057	6109	6151
186	5664	5794	5937	6026	6092	6144	6186
187	5697	5828	5971	6061	6126	6179	6222
188	5731	5862	6005	6095	6161	6214	6257
189	5764	5895	6040	6130	6196	6249	6292
190	5797	5929	6074	6165	6231	6284	6327
191	5831	5963	6109	6199	6266	6319	6362
192	5865	5997	6143	6234	6301	6354	6397
193	5898	6031	6177	6269	6336	6389	6432
194	5932	6065	6212	6303	6370	6424	6467
195	5965	6099	6246	6338	6405	6459	6503
196	5999	6133	6281	6373	6440	6494	6538
197	6032	6167	6315	6407	6475	6529	6573
198	6066	6201	6349	6442	6510	6564	6608
199	6099	6235	6384	6477	6545	6599	6643
2 0	6133	6269	6418	6511	6580	6634	6678
2 1	6167	6303	6453	6546	6615	6669	6713
2 2	6200	6337	6487	6581	6650	6704	6749
2 3	6234	6371	6522	6616	6685	6739	6784
2 4	6267	6405	6556	6650	6719	6774	6819
2 5	6301	6439	6591	6685	6754	6809	6854
2 6	6335	6473	6625	6720	6789	6844	6889
2 7	6368	6507	6660	6755	6824	6879	6925
2 8	6402	6541	6694	6789	6859	6914	6960
2 9	6435	6575	6728	6824	6894	6949	6995
2 0	6469	6609	6763	6859	6929	6984	7030

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Table 1: Generic HDBH Traffic Capacity (.5% to 6%)
(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
2 1	6503	6643	6797	6894	6964	7020	7065
2 2	6536	6677	6832	6928	6999	7055	7101
2 3	6570	6712	6866	6963	7034	7090	7136
2 4	6604	6746	6901	6998	7069	7125	7171
2 5	6637	6780	6936	7033	7104	7160	7206
2 6	6671	6814	6970	7067	7139	7195	7241
2 7	6705	6848	7005	7102	7174	7230	7277
2 8	6739	6882	7039	7137	7209	7265	7312
2 9	6772	6916	7074	7172	7244	7300	7347
2 0	6806	6950	7108	7207	7279	7336	7382
2 1	6840	6984	7143	7241	7314	7371	7418
2 2	6873	7018	7177	7276	7349	7406	7453
2 3	6907	7053	7212	7311	7384	7441	7488
2 4	6941	7087	7246	7346	7419	7476	7523
2 5	6975	7121	7281	7381	7454	7511	7558
2 6	7008	7155	7316	7416	7489	7546	7594
2 7	7042	7189	7350	7450	7524	7581	7629
2 8	7076	7223	7385	7485	7559	7617	7664
2 9	7110	7258	7419	7520	7594	7652	7699
2 0	7144	7292	7454	7555	7629	7687	7735
2 1	7177	7326	7488	7590	7664	7722	7770
2 2	7211	7360	7523	7625	7699	7757	7805
2 3	7245	7394	7558	7659	7734	7792	7841
2 4	7279	7428	7592	7694	7769	7828	7876
2 5	7312	7463	7627	7729	7804	7863	7911
2 6	7346	7497	7661	7764	7839	7898	7946
2 7	7380	7531	7696	7799	7874	7933	7982
2 8	7414	7565	7731	7834	7909	7968	8017
2 9	7448	7599	7765	7869	7944	8003	8052
240	7482	7634	7800	7903	7979	8039	8087

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Table 1: Generic HDBH Traffic Capacity (.5% to 6%)
(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
241	7515	7668	7835	7938	8014	8074	8123
242	7549	7702	7869	7973	8049	8109	8158
243	7583	7736	7904	8008	8084	8144	8193
244	7617	7771	7939	8043	8119	8179	8229
245	7651	7805	7973	8078	8154	8214	8264
246	7685	7839	8008	8113	8189	8250	8299
247	7719	7873	8043	8148	8224	8285	8335
248	7753	7908	8077	8183	8260	8320	8370
249	7786	7942	8112	8217	8295	8355	8405
250	7820	7976	8147	8252	8330	8391	8440
251	7854	8010	8181	8287	8365	8426	8476
252	7888	8045	8216	8322	8400	8461	8511
253	7922	8079	8251	8357	8435	8496	8546
254	7956	8113	8285	8392	8470	8531	8582
255	7990	8148	8320	8427	8505	8567	8617
256	8024	8182	8355	8462	8540	8602	8652
257	8058	8216	8389	8497	8575	8637	8688
258	8092	8250	8424	8532	8610	8672	8723
259	8126	8285	8459	8567	8646	8708	8758
260	8160	8319	8493	8602	8681	8743	8794
261	8193	8353	8528	8637	8716	8778	8829
262	8227	8388	8563	8672	8751	8813	8864
263	8261	8422	8598	8707	8786	8848	8900
264	8295	8456	8632	8741	8821	8884	8935
265	8329	8491	8667	8776	8856	8919	8970
266	8363	8525	8702	8811	8891	8954	9006
267	8397	8559	8736	8846	8927	8989	9041
268	8431	8594	8771	8881	8962	9025	9076
269	8465	8628	8806	8916	8997	9060	9112
270	8499	8662	8841	8951	9032	9095	9147

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(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
271	8533	8697	8875	8986	9067	9130	9183
272	8567	8731	8910	9021	9102	9166	9218
273	8601	8766	8945	9056	9137	9201	9253
274	8635	8800	8980	9091	9172	9236	9289
275	8669	8834	9014	9126	9208	9272	9324
276	8703	8869	9049	9161	9243	9307	9359
277	8737	8903	9084	9196	9278	9342	9395
278	8771	8937	9119	9231	9313	9377	9430
279	8805	8972	9154	9266	9348	9413	9465
280	8839	9006	9188	9301	9383	9448	9501
281	8873	9041	9223	9336	9419	9483	9536
282	8907	9075	9258	9371	9454	9519	9572
283	8942	9109	9293	9406	9489	9554	9607
284	8976	9144	9327	9441	9524	9589	9642
285	9010	9178	9362	9476	9559	9624	9678
286	9044	9213	9397	9511	9594	9660	9713
287	9078	9247	9432	9546	9630	9695	9749
288	9112	9282	9467	9581	9665	9730	9784
289	9146	9316	9501	9616	9700	9766	9819
290	9180	9350	9536	9651	9735	9801	9855
291	9214	9385	9571	9686	9770	9836	9890
292	9248	9419	9606	9721	9806	9871	9926
293	9282	9454	9641	9756	9841	9907	9961
294	9316	9488	9676	9792	9876	9942	9996
295	9350	9523	9710	9827	9911	9977	10032
296	9385	9557	9745	9862	9946	10013	10067
297	9419	9592	9780	9897	9982	10048	10103
298	9453	9626	9815	9932	10017	10083	10138
299	9487	9660	9850	9967	10052	10119	10173
3 0	9521	9695	9884	10002	10087	10154	10209

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Table 1: Generic HDBH Traffic Capacity (.5% to 6%)
(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
3 1	9555	9729	9919	10037	10122	10189	10244
3 2	9589	9764	9954	10072	10158	10225	10280
3 3	9623	9798	9989	10107	10193	10260	10315
3 4	9658	9833	10024	10142	10228	10295	10350
3 5	9692	9867	10059	10177	10263	10331	10386
3 6	9726	9902	10094	10212	10298	10366	10421
3 7	9760	9936	10128	10247	10334	10401	10457
3 8	9794	9971	10163	10282	10369	10437	10492
3 9	9828	10005	10198	10317	10404	10472	10528
3 0	9862	10040	10233	10352	10439	10507	10563
3 1	9897	10074	10268	10388	10475	10543	10598
3 2	9931	10109	10303	10423	10510	10578	10634
3 3	9965	10143	10338	10458	10545	10613	10669
3 4	9999	10178	10372	10493	10580	10649	10705
3 5	10033	10212	10407	10528	10616	10684	10740
3 6	10068	10247	10442	10563	10651	10719	10776
3 7	10102	10281	10477	10598	10686	10755	10811
3 8	10136	10316	10512	10633	10721	10790	10847
3 9	10170	10350	10547	10668	10756	10826	10882
3 0	10204	10385	10582	10703	10792	10861	10917
3 1	10238	10420	10617	10739	10827	10896	10953
3 2	10273	10454	10652	10774	10862	10932	10988
3 3	10307	10489	10686	10809	10898	10967	11024
3 4	10341	10523	10721	10844	10933	11002	11059
3 5	10375	10558	10756	10879	10968	11038	11095
3 6	10410	10592	10791	10914	11003	11073	11130
3 7	10444	10627	10826	10949	11039	11108	11166
3 8	10478	10661	10861	10984	11074	11144	11201
3 9	10512	10696	10896	11019	11109	11179	11237
3 0	10546	10731	10931	11055	11144	11215	11272

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(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
3 1	10581	10765	10966	11090	11180	11250	11307
3 2	10615	10800	11001	11125	11215	11285	11343
3 3	10649	10834	11036	11160	11250	11321	11378
3 4	10683	10869	11071	11195	11285	11356	11414
3 5	10718	10903	11105	11230	11321	11392	11449
3 6	10752	10938	11140	11265	11356	11427	11485
3 7	10786	10973	11175	11300	11391	11462	11520
3 8	10820	11007	11210	11336	11427	11498	11556
3 9	10855	11042	11245	11371	11462	11533	11591
340	10889	11076	11280	11406	11497	11568	11627
341	10923	11111	11315	11441	11532	11604	11662
342	10957	11145	11350	11476	11568	11639	11698
343	10992	11180	11385	11511	11603	11675	11733
344	11026	11215	11420	11546	11638	11710	11769
345	11060	11249	11455	11582	11674	11745	11804
346	11095	11284	11490	11617	11709	11781	11840
347	11129	11319	11525	11652	11744	11816	11875
348	11163	11353	11560	11687	11779	11852	11911
349	11197	11388	11595	11722	11815	11887	11946
350	11232	11422	11630	11757	11850	11923	11982
351	11266	11457	11665	11793	11885	11958	12017
352	11300	11492	11700	11828	11921	11993	12053
353	11335	11526	11735	11863	11956	12029	12088
354	11369	11561	11769	11898	11991	12064	12124
355	11403	11596	11804	11933	12027	12100	12159
356	11438	11630	11839	11968	12062	12135	12195
357	11472	11665	11874	12004	12097	12170	12230
358	11506	11699	11909	12039	12133	12206	12266
359	11541	11734	11944	12074	12168	12241	12301
360	11575	11769	11979	12109	12203	12277	12337

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(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
361	11609	11803	12014	12144	12239	12312	12372
362	11644	11838	12049	12180	12274	12348	12408
363	11678	11873	12084	12215	12309	12383	12443
364	11712	11907	12119	12250	12345	12418	12479
365	11747	11942	12154	12285	12380	12454	12514
366	11781	11977	12189	12320	12415	12489	12550
367	11815	12011	12224	12355	12451	12525	12585
368	11850	12046	12259	12391	12486	12560	12621
369	11884	12081	12294	12426	12521	12596	12656
370	11918	12115	12329	12461	12557	12631	12692
371	11953	12150	12364	12496	12592	12666	12727
372	11987	12185	12399	12531	12627	12702	12763
373	12021	12219	12434	12567	12663	12737	12798
374	12056	12254	12469	12602	12698	12773	12834
375	12090	12289	12504	12637	12733	12808	12869
376	12124	12323	12539	12672	12769	12844	12905
377	12159	12358	12574	12708	12804	12879	12940
378	12193	12393	12609	12743	12839	12915	12976
379	12228	12427	12644	12778	12875	12950	13011
380	12262	12462	12679	12813	12910	12985	13047
381	12296	12497	12714	12848	12945	13021	13083
382	12331	12532	12749	12884	12981	13056	13118
383	12365	12566	12785	12919	13016	13092	13154
384	12400	12601	12820	12954	13051	13127	13189
385	12434	12636	12855	12989	13087	13163	13225
386	12468	12670	12890	13025	13122	13198	13260
387	12503	12705	12925	13060	13157	13234	13296
388	12537	12740	12960	13095	13193	13269	13331
389	12572	12775	12995	13130	13228	13305	13367
390	12606	12809	13030	13165	13264	13340	13402

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(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
391	12640	12844	13065	13201	13299	13376	13438
392	12675	12879	13100	13236	13334	13411	13473
393	12709	12913	13135	13271	13370	13446	13509
394	12744	12948	13170	13306	13405	13482	13545
395	12778	12983	13205	13342	13440	13517	13580
396	12812	13018	13240	13377	13476	13553	13616
397	12847	13052	13275	13412	13511	13588	13651
398	12881	13087	13310	13447	13547	13624	13687
399	12916	13122	13345	13483	13582	13659	13722
4 0	12950	13157	13380	13518	13617	13695	13758
4 1	12985	13191	13415	13553	13653	13730	13793
4 2	13019	13226	13450	13588	13688	13766	13829
4 3	13054	13261	13485	13624	13723	13801	13864
4 4	13088	13296	13521	13659	13759	13837	13900
4 5	13122	13330	13556	13694	13794	13872	13936
4 6	13157	13365	13591	13729	13830	13908	13971
4 7	13191	13400	13626	13765	13865	13943	14007
4 8	13226	13435	13661	13800	13900	13979	14042
4 9	13260	13469	13696	13835	13936	14014	14078
4 0	13295	13504	13731	13870	13971	14050	14113
4 1	13329	13539	13766	13906	14007	14085	14149
4 2	13364	13574	13801	13941	14042	14121	14185
4 3	13398	13608	13836	13976	14077	14156	14220
4 4	13433	13643	13871	14011	14113	14192	14256
4 5	13467	13678	13906	14047	14148	14227	14291
4 6	13501	13713	13941	14082	14184	14263	14327
4 7	13536	13747	13977	14117	14219	14298	14362
4 8	13570	13782	14012	14153	14254	14334	14398
4 9	13605	13817	14047	14188	14290	14369	14433
4 0	13639	13852	14082	14223	14325	14405	14469

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(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
4 1	13674	13887	14117	14258	14361	14440	14505
4 2	13708	13921	14152	14294	14396	14476	14540
4 3	13743	13956	14187	14329	14431	14511	14576
4 4	13777	13991	14222	14364	14467	14547	14611
4 5	13812	14026	14257	14400	14502	14582	14647
4 6	13846	14060	14292	14435	14538	14618	14683
4 7	13881	14095	14328	14470	14573	14653	14718
4 8	13915	14130	14363	14505	14608	14689	14754
4 9	13950	14165	14398	14541	14644	14724	14789
4 0	13984	14200	14433	14576	14679	14760	14825
4 1	14019	14234	14468	14611	14715	14795	14860
4 2	14053	14269	14503	14647	14750	14831	14896
4 3	14088	14304	14538	14682	14785	14866	14932
4 4	14122	14339	14573	14717	14821	14902	14967
4 5	14157	14374	14608	14752	14856	14937	15003
4 6	14191	14409	14644	14788	14892	14973	15038
4 7	14226	14443	14679	14823	14927	15008	15074
4 8	14260	14478	14714	14858	14963	15044	15110
4 9	14295	14513	14749	14894	14998	15079	15145
440	14330	14548	14784	14929	15033	15115	15181
441	14364	14583	14819	14964	15069	15150	15216
442	14399	14617	14854	15000	15104	15186	15252
443	14433	14652	14889	15035	15140	15221	15287
444	14468	14687	14925	15070	15175	15257	15323
445	14502	14722	14960	15105	15211	15292	15359
446	14537	14757	14995	15141	15246	15328	15394
447	14571	14792	15030	15176	15281	15363	15430
448	14606	14826	15065	15211	15317	15399	15465
449	14640	14861	15100	15247	15352	15434	15501
450	14675	14896	15135	15282	15388	15470	15537

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Table 1: Generic HDBH Traffic Capacity (.5% to 6%)
(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
451	14709	14931	15170	15317	15423	15505	15572
452	14744	14966	15206	15353	15459	15541	15608
453	14779	15001	15241	15388	15494	15577	15643
454	14813	15035	15276	15423	15530	15612	15679
455	14848	15070	15311	15459	15565	15648	15715
456	14882	15105	15346	15494	15600	15683	15750
457	14917	15140	15381	15529	15636	15719	15786
458	14951	15175	15417	15565	15671	15754	15821
459	14986	15210	15452	15600	15707	15790	15857
460	15021	15245	15487	15635	15742	15825	15893
461	15055	15279	15522	15671	15778	15861	15928
462	15090	15314	15557	15706	15813	15896	15964
463	15124	15349	15592	15741	15849	15932	16000
464	15159	15384	15627	15777	15884	15967	16035
465	15193	15419	15663	15812	15919	16003	16071
466	15228	15454	15698	15847	15955	16039	16106
467	15263	15489	15733	15883	15990	16074	16142
468	15297	15523	15768	15918	16026	16110	16178
469	15332	15558	15803	15953	16061	16145	16213
470	15366	15593	15838	15989	16097	16181	16249
471	15401	15628	15874	16024	16132	16216	16284
472	15435	15663	15909	16059	16168	16252	16320
473	15470	15698	15944	16095	16203	16287	16356
474	15505	15733	15979	16130	16239	16323	16391
475	15539	15768	16014	16165	16274	16358	16427
476	15574	15802	16049	16201	16310	16394	16463
477	15608	15837	16085	16236	16345	16430	16498
478	15643	15872	16120	16271	16380	16465	16534
479	15678	15907	16155	16307	16416	16501	16569
480	15712	15942	16190	16342	16451	16536	16605

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Table 1: Generic HDBH Traffic Capacity (.5% to 6%)
(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
481	15747	15977	16225	16377	16487	16572	16641
482	15782	16012	16261	16413	16522	16607	16676
483	15816	16047	16296	16448	16558	16643	16712
484	15851	16082	16331	16484	16593	16678	16748
485	15885	16116	16366	16519	16629	16714	16783
486	15920	16151	16401	16554	16664	16750	16819
487	15955	16186	16436	16590	16700	16785	16854
488	15989	16221	16472	16625	16735	16821	16890
489	16024	16256	16507	16660	16771	16856	16926
490	16058	16291	16542	16696	16806	16892	16961
491	16093	16326	16577	16731	16842	16927	16997
492	16128	16361	16612	16766	16877	16963	17033
493	16162	16396	16648	16802	16913	16999	17068
494	16197	16431	16683	16837	16948	17034	17104
495	16232	16465	16718	16872	16984	17070	17139
496	16266	16500	16753	16908	17019	17105	17175
497	16301	16535	16788	16943	17055	17141	17211
498	16336	16570	16824	16979	17090	17176	17246
499	16370	16605	16859	17014	17126	17212	17282
5 0	16405	16640	16894	17049	17161	17248	17318
5 1	16439	16675	16929	17085	17196	17283	17353
5 2	16474	16710	16964	17120	17232	17319	17389
5 3	16509	16745	17000	17155	17267	17354	17425
5 4	16543	16780	17035	17191	17303	17390	17460
5 5	16578	16815	17070	17226	17338	17425	17496
5 6	16613	16850	17105	17262	17374	17461	17531
5 7	16647	16885	17141	17297	17409	17497	17567
5 8	16682	16919	17176	17332	17445	17532	17603
5 9	16717	16954	17211	17368	17480	17568	17638
5 0	16751	16989	17246	17403	17516	17603	17674

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Table 1: Generic HDBH Traffic Capacity (.5% to 6%)
(Carried Load)

CHs	P(0.005)	P(0.01)	P(0.02)	P(0.03)	P(0.04)	P(0.05)	P(0.06)
5 1	16786	17024	17281	17439	17551	17639	17710
5 2	16821	17059	17317	17474	17587	17674	17745
5 3	16855	17094	17352	17509	17622	17710	17781
5 4	16890	17129	17387	17545	17658	17746	17817
5 5	16925	17164	17422	17580	17693	17781	17852
5 6	16959	17199	17458	17615	17729	17817	17888
5 7	16994	17234	17493	17651	17764	17852	17924
5 8	17029	17269	17528	17686	17800	17888	17959
5 9	17063	17304	17563	17722	17835	17924	17995
5 0	17098	17339	17598	17757	17871	17959	18031
5 1	17133	17374	17634	17792	17906	17995	18066
5 2	17167	17409	17669	17828	17942	18030	18102
5 3	17202	17444	17704	17863	17977	18066	18138
5 4	17237	17479	17739	17899	18013	18102	18173
5 5	17271	17513	17775	17934	18048	18137	18209
5 6	17306	17548	17810	17969	18084	18173	18244
5 7	17341	17583	17845	18005	18119	18208	18280
5 8	17376	17618	17880	18040	18155	18244	18316
5 9	17410	17653	17916	18076	18191	18279	18351
5 0	17445	17688	17951	18111	18226	18315	18387
5 1	17480	17723	17986	18146	18262	18351	18423
5 2	17514	17758	18021	18182	18297	18386	18458
5 3	17549	17793	18057	18217	18333	18422	18494
5 4	17584	17828	18092	18253	18368	18457	18530
5 5	17618	17863	18127	18288	18404	18493	18565
5 6	17653	17898	18162	18323	18439	18529	18601
5 7	17688	17933	18198	18359	18475	18564	18637
5 8	17723	17968	18233	18394	18510	18600	18672
5 9	17757	18003	18268	18430	18546	18635	18708
540	17792	18038	18303	18465	18581	18671	18744

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
4	55	58	60	63	77	78	80
5	79	82	85	88	105	107	108
6	104	108	111	115	134	136	138
7	131	135	139	142	164	166	169
8	158	162	167	171	195	197	199
9	186	191	195	200	226	228	231
1	214	219	224	229	257	260	263
1	243	249	254	259	289	292	295
1	272	278	284	289	321	324	327
1	302	309	315	320	354	357	360
14	332	339	345	351	386	389	393
15	362	369	376	382	419	422	426
16	393	400	407	414	452	455	459
17	423	431	439	445	485	489	492
18	454	463	470	477	518	522	526
19	486	494	502	509	551	555	559
2	517	526	534	541	585	589	593
2	548	558	566	573	618	623	627
2	580	590	598	606	652	656	660
2	612	622	630	638	686	690	694
24	644	654	663	671	719	724	728
25	676	686	695	704	753	758	763
26	708	719	728	737	787	792	797
27	740	751	761	770	821	826	831
28	773	784	794	803	855	860	865
29	805	816	826	836	890	895	899
3	838	849	859	869	924	929	934

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
3	870	882	893	902	958	963	968
3	903	915	926	935	992	998	1003
3	936	948	959	969	1027	1032	1037
34	969	981	992	1002	1061	1067	1072
35	1002	1014	1025	1036	1095	1101	1106
36	1034	1047	1059	1069	1130	1136	1141
37	1068	1081	1092	1103	1164	1170	1176
38	1101	1114	1126	1137	1199	1205	1210
39	1134	1147	1159	1170	1234	1239	1245
4	1167	1181	1193	1204	1268	1274	1280
4	1200	1214	1227	1238	1303	1309	1315
4	1234	1248	1260	1272	1337	1344	1349
4	1267	1281	1294	1306	1372	1378	1384
44	1300	1315	1328	1339	1407	1413	1419
45	1334	1348	1362	1373	1442	1448	1454
46	1367	1382	1395	1407	1476	1483	1489
47	1401	1416	1429	1441	1511	1518	1524
48	1434	1450	1463	1476	1546	1553	1559
49	1468	1483	1497	1510	1581	1588	1594
5	1502	1517	1531	1544	1616	1623	1629
5	1535	1551	1565	1578	1651	1657	1664
5	1569	1585	1599	1612	1686	1692	1699
5	1603	1619	1633	1646	1721	1727	1734
54	1637	1653	1667	1681	1756	1762	1769
55	1670	1687	1702	1715	1791	1798	1804
56	1704	1721	1736	1749	1826	1833	1839
57	1738	1755	1770	1783	1861	1868	1874
58	1772	1789	1804	1818	1896	1903	1910
59	1806	1823	1838	1852	1931	1938	1945
6	1840	1857	1873	1887	1966	1973	1980

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
6	1874	1891	1907	1921	2001	2008	2015
6	1908	1925	1941	1955	2036	2043	2050
6	1942	1960	1976	1990	2071	2078	2085
64	1976	1994	2010	2024	2106	2114	2121
65	2010	2028	2044	2059	2141	2149	2156
66	2044	2062	2079	2093	2176	2184	2191
67	2078	2097	2113	2128	2211	2219	2226
68	2112	2131	2148	2162	2247	2254	2262
69	2147	2165	2182	2197	2282	2290	2297
7	2181	2200	2216	2232	2317	2325	2332
7	2215	2234	2251	2266	2352	2360	2368
7	2249	2268	2285	2301	2387	2395	2403
7	2284	2303	2320	2336	2423	2431	2438
74	2318	2337	2355	2370	2458	2466	2473
75	2352	2372	2389	2405	2493	2501	2509
76	2386	2406	2424	2440	2528	2537	2544
77	2421	2441	2458	2474	2564	2572	2580
78	2455	2475	2493	2509	2599	2607	2615
79	2489	2510	2528	2544	2634	2642	2650
8	2524	2544	2562	2578	2670	2678	2686
8	2558	2579	2597	2613	2705	2713	2721
8	2593	2613	2632	2648	2740	2749	2756
8	2627	2648	2666	2683	2775	2784	2792
84	2661	2682	2701	2718	2811	2819	2827
85	2696	2717	2736	2752	2846	2855	2863
86	2730	2752	2770	2787	2882	2890	2898
87	2765	2786	2805	2822	2917	2925	2934
88	2799	2821	2840	2857	2952	2961	2969
89	2834	2855	2875	2892	2988	2996	3004
9	2868	2890	2909	2927	3023	3032	3040

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
9	2903	2925	2944	2962	3058	3067	3075
9	2938	2959	2979	2996	3094	3103	3111
9	2972	2994	3014	3031	3129	3138	3146
94	3007	3029	3049	3066	3165	3173	3182
95	3041	3064	3083	3101	3200	3209	3217
96	3076	3098	3118	3136	3235	3244	3253
97	3110	3133	3153	3171	3271	3280	3288
98	3145	3168	3188	3206	3306	3315	3324
99	3180	3203	3223	3241	3342	3351	3359
1 0	3214	3237	3258	3276	3377	3386	3395
1 1	3249	3272	3293	3311	3413	3422	3430
1 2	3284	3307	3327	3346	3448	3457	3466
1 3	3318	3342	3362	3381	3483	3493	3501
1 4	3353	3377	3397	3416	3519	3528	3537
1 5	3388	3411	3432	3451	3554	3564	3572
1 6	3423	3446	3467	3486	3590	3599	3608
1 7	3457	3481	3502	3521	3625	3635	3644
1 8	3492	3516	3537	3556	3661	3670	3679
1 9	3527	3551	3572	3591	3696	3706	3715
1 0	3561	3586	3607	3626	3732	3741	3750
1 1	3596	3620	3642	3661	3767	3777	3786
1 2	3631	3655	3677	3696	3803	3812	3821
1 3	3666	3690	3712	3731	3838	3848	3857
1 4	3701	3725	3747	3766	3874	3883	3892
1 5	3735	3760	3782	3802	3909	3919	3928
1 6	3770	3795	3817	3837	3945	3955	3964
1 7	3805	3830	3852	3872	3980	3990	3999
1 8	3840	3865	3887	3907	4016	4026	4035
1 9	3875	3900	3922	3942	4052	4061	4070
1 0	3909	3935	3957	3977	4087	4097	4106

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
1 1	3944	3970	3992	4012	4123	4132	4142
1 2	3979	4005	4027	4047	4158	4168	4177
1 3	4014	4040	4062	4083	4194	4204	4213
1 4	4049	4075	4097	4118	4229	4239	4249
1 5	4084	4110	4132	4153	4265	4275	4284
1 6	4119	4145	4167	4188	4300	4310	4320
1 7	4154	4180	4203	4223	4336	4346	4355
1 8	4188	4215	4238	4258	4372	4382	4391
1 9	4223	4250	4273	4294	4407	4417	4427
1 0	4258	4285	4308	4329	4443	4453	4462
1 1	4293	4320	4343	4364	4478	4488	4498
1 2	4328	4355	4378	4399	4514	4524	4534
1 3	4363	4390	4413	4434	4549	4560	4569
1 4	4398	4425	4448	4470	4585	4595	4605
1 5	4433	4460	4484	4505	4621	4631	4641
1 6	4468	4495	4519	4540	4656	4667	4676
1 7	4503	4530	4554	4575	4692	4702	4712
1 8	4538	4565	4589	4610	4727	4738	4748
1 9	4573	4600	4624	4646	4763	4773	4783
140	4608	4635	4659	4681	4799	4809	4819
141	4643	4670	4695	4716	4834	4845	4855
142	4678	4705	4730	4751	4870	4880	4890
143	4713	4740	4765	4787	4906	4916	4926
144	4748	4776	4800	4822	4941	4952	4962
145	4783	4811	4835	4857	4977	4987	4997
146	4818	4846	4870	4893	5012	5023	5033
147	4853	4881	4906	4928	5048	5059	5069
148	4888	4916	4941	4963	5084	5094	5104
149	4923	4951	4976	4998	5119	5130	5140
150	4958	4986	5011	5034	5155	5166	5176

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
151	4993	5021	5047	5069	5191	5201	5211
152	5028	5057	5082	5104	5226	5237	5247
153	5063	5092	5117	5140	5262	5273	5283
154	5098	5127	5152	5175	5298	5308	5318
155	5133	5162	5188	5210	5333	5344	5354
156	5168	5197	5223	5246	5369	5380	5390
157	5203	5232	5258	5281	5405	5415	5426
158	5239	5268	5293	5316	5440	5451	5461
159	5274	5303	5329	5352	5476	5487	5497
160	5309	5338	5364	5387	5512	5522	5533
161	5344	5373	5399	5422	5547	5558	5568
162	5379	5408	5434	5458	5583	5594	5604
163	5414	5444	5470	5493	5619	5630	5640
164	5449	5479	5505	5528	5654	5665	5676
165	5484	5514	5540	5564	5690	5701	5711
166	5519	5549	5576	5599	5726	5737	5747
167	5555	5584	5611	5634	5761	5772	5783
168	5590	5620	5646	5670	5797	5808	5819
169	5625	5655	5681	5705	5833	5844	5854
170	5660	5690	5717	5740	5868	5880	5890
171	5695	5725	5752	5776	5904	5915	5926
172	5730	5761	5787	5811	5940	5951	5961
173	5765	5796	5823	5847	5975	5987	5997
174	5801	5831	5858	5882	6011	6022	6033
175	5836	5866	5893	5917	6047	6058	6069
176	5871	5902	5929	5953	6083	6094	6104
177	5906	5937	5964	5988	6118	6130	6140
178	5941	5972	5999	6024	6154	6165	6176
179	5976	6007	6035	6059	6190	6201	6212
180	6012	6043	6070	6094	6225	6237	6247

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
181	6047	6078	6105	6130	6261	6273	6283
182	6082	6113	6141	6165	6297	6308	6319
183	6117	6148	6176	6201	6333	6344	6355
184	6152	6184	6211	6236	6368	6380	6390
185	6188	6219	6247	6271	6404	6415	6426
186	6223	6254	6282	6307	6440	6451	6462
187	6258	6290	6317	6342	6475	6487	6498
188	6293	6325	6353	6378	6511	6523	6534
189	6328	6360	6388	6413	6547	6558	6569
190	6364	6396	6424	6449	6583	6594	6605
191	6399	6431	6459	6484	6618	6630	6641
192	6434	6466	6494	6519	6654	6666	6677
193	6469	6501	6530	6555	6690	6701	6712
194	6505	6537	6565	6590	6726	6737	6748
195	6540	6572	6601	6626	6761	6773	6784
196	6575	6607	6636	6661	6797	6809	6820
197	6610	6643	6671	6697	6833	6844	6855
198	6646	6678	6707	6732	6868	6880	6891
199	6681	6713	6742	6768	6904	6916	6927
2 0	6716	6749	6778	6803	6940	6952	6963
2 1	6751	6784	6813	6839	6976	6988	6999
2 2	6787	6819	6848	6874	7011	7023	7034
2 3	6822	6855	6884	6910	7047	7059	7070
2 4	6857	6890	6919	6945	7083	7095	7106
2 5	6892	6926	6955	6980	7119	7131	7142
2 6	6928	6961	6990	7016	7154	7166	7178
2 7	6963	6996	7025	7051	7190	7202	7213
2 8	6998	7032	7061	7087	7226	7238	7249
2 9	7034	7067	7096	7122	7262	7274	7285
2 0	7069	7102	7132	7158	7297	7309	7321

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
2 1	7104	7138	7167	7193	7333	7345	7357
2 2	7139	7173	7203	7229	7369	7381	7392
2 3	7175	7208	7238	7264	7405	7417	7428
2 4	7210	7244	7274	7300	7441	7453	7464
2 5	7245	7279	7309	7335	7476	7488	7500
2 6	7281	7315	7344	7371	7512	7524	7536
2 7	7316	7350	7380	7406	7548	7560	7571
2 8	7351	7385	7415	7442	7584	7596	7607
2 9	7387	7421	7451	7477	7619	7632	7643
2 0	7422	7456	7486	7513	7655	7667	7679
2 1	7457	7492	7522	7548	7691	7703	7715
2 2	7493	7527	7557	7584	7727	7739	7750
2 3	7528	7562	7593	7619	7762	7775	7786
2 4	7563	7598	7628	7655	7798	7811	7822
2 5	7599	7633	7664	7691	7834	7846	7858
2 6	7634	7669	7699	7726	7870	7882	7894
2 7	7669	7704	7735	7762	7906	7918	7929
2 8	7705	7739	7770	7797	7941	7954	7965
2 9	7740	7775	7805	7833	7977	7990	8001
2 0	7775	7810	7841	7868	8013	8025	8037
2 1	7811	7846	7876	7904	8049	8061	8073
2 2	7846	7881	7912	7939	8084	8097	8109
2 3	7881	7917	7947	7975	8120	8133	8144
2 4	7917	7952	7983	8010	8156	8169	8180
2 5	7952	7987	8018	8046	8192	8204	8216
2 6	7987	8023	8054	8081	8228	8240	8252
2 7	8023	8058	8089	8117	8263	8276	8288
2 8	8058	8094	8125	8153	8299	8312	8323
2 9	8093	8129	8160	8188	8335	8348	8359
240	8129	8165	8196	8224	8371	8383	8395

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
241	8164	8200	8231	8259	8407	8419	8431
242	8200	8235	8267	8295	8442	8455	8467
243	8235	8271	8302	8330	8478	8491	8503
244	8270	8306	8338	8366	8514	8527	8538
245	8306	8342	8373	8401	8550	8562	8574
246	8341	8377	8409	8437	8586	8598	8610
247	8377	8413	8444	8473	8621	8634	8646
248	8412	8448	8480	8508	8657	8670	8682
249	8447	8484	8515	8544	8693	8706	8718
250	8483	8519	8551	8579	8729	8742	8753
251	8518	8555	8587	8615	8765	8777	8789
252	8553	8590	8622	8650	8800	8813	8825
253	8589	8626	8658	8686	8836	8849	8861
254	8624	8661	8693	8722	8872	8885	8897
255	8660	8696	8729	8757	8908	8921	8933
256	8695	8732	8764	8793	8944	8957	8968
257	8731	8767	8800	8828	8979	8992	9004
258	8766	8803	8835	8864	9015	9028	9040
259	8801	8838	8871	8900	9051	9064	9076
260	8837	8874	8906	8935	9087	9100	9112
261	8872	8909	8942	8971	9123	9136	9148
262	8908	8945	8977	9006	9159	9171	9184
263	8943	8980	9013	9042	9194	9207	9219
264	8978	9016	9049	9077	9230	9243	9255
265	9014	9051	9084	9113	9266	9279	9291
266	9049	9087	9120	9149	9302	9315	9327
267	9085	9122	9155	9184	9338	9351	9363
268	9120	9158	9191	9220	9373	9386	9399
269	9156	9193	9226	9255	9409	9422	9434
270	9191	9229	9262	9291	9445	9458	9470

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
271	9226	9264	9297	9327	9481	9494	9506
272	9262	9300	9333	9362	9517	9530	9542
273	9297	9335	9369	9398	9553	9566	9578
274	9333	9371	9404	9434	9588	9602	9614
275	9368	9406	9440	9469	9624	9637	9650
276	9404	9442	9475	9505	9660	9673	9685
277	9439	9477	9511	9540	9696	9709	9721
278	9475	9513	9546	9576	9732	9745	9757
279	9510	9548	9582	9612	9768	9781	9793
280	9545	9584	9617	9647	9803	9817	9829
281	9581	9619	9653	9683	9839	9852	9865
282	9616	9655	9689	9718	9875	9888	9901
283	9652	9690	9724	9754	9911	9924	9936
284	9687	9726	9760	9790	9947	9960	9972
285	9723	9762	9795	9825	9983	9996	10008
286	9758	9797	9831	9861	10018	10032	10044
287	9794	9833	9867	9897	10054	10068	10080
288	9829	9868	9902	9932	10090	10103	10116
289	9865	9904	9938	9968	10126	10139	10152
290	9900	9939	9973	10003	10162	10175	10188
291	9936	9975	10009	10039	10198	10211	10223
292	9971	10010	10044	10075	10233	10247	10259
293	10007	10046	10080	10110	10269	10283	10295
294	10042	10081	10116	10146	10305	10318	10331
295	10078	10117	10151	10182	10341	10354	10367
296	10113	10152	10187	10217	10377	10390	10403
297	10148	10188	10222	10253	10413	10426	10439
298	10184	10224	10258	10289	10448	10462	10474
299	10219	10259	10294	10324	10484	10498	10510
3 0	10255	10295	10329	10360	10520	10534	10546

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
3 1	10290	10330	10365	10396	10556	10569	10582
3 2	10326	10366	10400	10431	10592	10605	10618
3 3	10361	10401	10436	10467	10628	10641	10654
3 4	10397	10437	10472	10502	10664	10677	10690
3 5	10432	10472	10507	10538	10699	10713	10726
3 6	10468	10508	10543	10574	10735	10749	10761
3 7	10503	10544	10579	10609	10771	10785	10797
3 8	10539	10579	10614	10645	10807	10821	10833
3 9	10574	10615	10650	10681	10843	10856	10869
3 0	10610	10650	10685	10716	10879	10892	10905
3 1	10645	10686	10721	10752	10914	10928	10941
3 2	10681	10721	10757	10788	10950	10964	10977
3 3	10716	10757	10792	10823	10986	11000	11013
3 4	10752	10792	10828	10859	11022	11036	11048
3 5	10787	10828	10863	10895	11058	11072	11084
3 6	10823	10864	10899	10930	11094	11107	11120
3 7	10858	10899	10935	10966	11130	11143	11156
3 8	10894	10935	10970	11002	11165	11179	11192
3 9	10930	10970	11006	11037	11201	11215	11228
3 0	10965	11006	11042	11073	11237	11251	11264
3 1	11001	11042	11077	11109	11273	11287	11300
3 2	11036	11077	11113	11144	11309	11323	11335
3 3	11072	11113	11148	11180	11345	11359	11371
3 4	11107	11148	11184	11216	11381	11394	11407
3 5	11143	11184	11220	11251	11416	11430	11443
3 6	11178	11219	11255	11287	11452	11466	11479
3 7	11214	11255	11291	11323	11488	11502	11515
3 8	11249	11291	11327	11358	11524	11538	11551
3 9	11285	11326	11362	11394	11560	11574	11587
3 0	11320	11362	11398	11430	11596	11610	11623

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
3 1	11356	11397	11434	11465	11632	11646	11658
3 2	11391	11433	11469	11501	11667	11681	11694
3 3	11427	11469	11505	11537	11703	11717	11730
3 4	11462	11504	11540	11573	11739	11753	11766
3 5	11498	11540	11576	11608	11775	11789	11802
3 6	11534	11575	11612	11644	11811	11825	11838
3 7	11569	11611	11647	11680	11847	11861	11874
3 8	11605	11647	11683	11715	11883	11897	11910
3 9	11640	11682	11719	11751	11919	11933	11946
340	11676	11718	11754	11787	11954	11968	11981
341	11711	11753	11790	11822	11990	12004	12017
342	11747	11789	11826	11858	12026	12040	12053
343	11782	11825	11861	11894	12062	12076	12089
344	11818	11860	11897	11929	12098	12112	12125
345	11853	11896	11933	11965	12134	12148	12161
346	11889	11931	11968	12001	12170	12184	12197
347	11925	11967	12004	12037	12205	12220	12233
348	11960	12003	12040	12072	12241	12255	12269
349	11996	12038	12075	12108	12277	12291	12304
350	12031	12074	12111	12144	12313	12327	12340
351	12067	12109	12147	12179	12349	12363	12376
352	12102	12145	12182	12215	12385	12399	12412
353	12138	12181	12218	12251	12421	12435	12448
354	12174	12216	12254	12286	12457	12471	12484
355	12209	12252	12289	12322	12492	12507	12520
356	12245	12288	12325	12358	12528	12543	12556
357	12280	12323	12361	12394	12564	12578	12592
358	12316	12359	12396	12429	12600	12614	12628
359	12351	12394	12432	12465	12636	12650	12663
360	12387	12430	12468	12501	12672	12686	12699

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
361	12422	12466	12503	12536	12708	12722	12735
362	12458	12501	12539	12572	12744	12758	12771
363	12494	12537	12575	12608	12779	12794	12807
364	12529	12573	12610	12644	12815	12830	12843
365	12565	12608	12646	12679	12851	12866	12879
366	12600	12644	12682	12715	12887	12901	12915
367	12636	12679	12717	12751	12923	12937	12951
368	12672	12715	12753	12786	12959	12973	12987
369	12707	12751	12789	12822	12995	13009	13022
370	12743	12786	12824	12858	13031	13045	13058
371	12778	12822	12860	12894	13067	13081	13094
372	12814	12858	12896	12929	13102	13117	13130
373	12849	12893	12931	12965	13138	13153	13166
374	12885	12929	12967	13001	13174	13189	13202
375	12921	12965	13003	13036	13210	13224	13238
376	12956	13000	13038	13072	13246	13260	13274
377	12992	13036	13074	13108	13282	13296	13310
378	13027	13071	13110	13144	13318	13332	13346
379	13063	13107	13145	13179	13354	13368	13381
380	13099	13143	13181	13215	13389	13404	13417
381	13134	13178	13217	13251	13425	13440	13453
382	13170	13214	13253	13286	13461	13476	13489
383	13205	13250	13288	13322	13497	13512	13525
384	13241	13285	13324	13358	13533	13548	13561
385	13277	13321	13360	13394	13569	13583	13597
386	13312	13357	13395	13429	13605	13619	13633
387	13348	13392	13431	13465	13641	13655	13669
388	13383	13428	13467	13501	13677	13691	13705
389	13419	13464	13502	13537	13712	13727	13741
390	13455	13499	13538	13572	13748	13763	13776

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
391	13490	13535	13574	13608	13784	13799	13812
392	13526	13571	13610	13644	13820	13835	13848
393	13561	13606	13645	13679	13856	13871	13884
394	13597	13642	13681	13715	13892	13907	13920
395	13633	13678	13717	13751	13928	13942	13956
396	13668	13713	13752	13787	13964	13978	13992
397	13704	13749	13788	13822	14000	14014	14028
398	13739	13785	13824	13858	14035	14050	14064
399	13775	13820	13859	13894	14071	14086	14100
4 0	13811	13856	13895	13930	14107	14122	14136
4 1	13846	13892	13931	13965	14143	14158	14172
4 2	13882	13927	13967	14001	14179	14194	14207
4 3	13917	13963	14002	14037	14215	14230	14243
4 4	13953	13999	14038	14073	14251	14266	14279
4 5	13989	14034	14074	14108	14287	14301	14315
4 6	14024	14070	14109	14144	14323	14337	14351
4 7	14060	14106	14145	14180	14359	14373	14387
4 8	14096	14141	14181	14216	14394	14409	14423
4 9	14131	14177	14217	14251	14430	14445	14459
4 0	14167	14213	14252	14287	14466	14481	14495
4 1	14202	14248	14288	14323	14502	14517	14531
4 2	14238	14284	14324	14359	14538	14553	14567
4 3	14274	14320	14359	14394	14574	14589	14602
4 4	14309	14355	14395	14430	14610	14625	14638
4 5	14345	14391	14431	14466	14646	14661	14674
4 6	14381	14427	14467	14502	14682	14696	14710
4 7	14416	14462	14502	14537	14718	14732	14746
4 8	14452	14498	14538	14573	14753	14768	14782
4 9	14487	14534	14574	14609	14789	14804	14818
4 0	14523	14569	14609	14645	14825	14840	14854

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
4 1	14559	14605	14645	14680	14861	14876	14890
4 2	14594	14641	14681	14716	14897	14912	14926
4 3	14630	14676	14717	14752	14933	14948	14962
4 4	14666	14712	14752	14788	14969	14984	14998
4 5	14701	14748	14788	14823	15005	15020	15033
4 6	14737	14783	14824	14859	15041	15056	15069
4 7	14773	14819	14859	14895	15077	15091	15105
4 8	14808	14855	14895	14931	15112	15127	15141
4 9	14844	14890	14931	14966	15148	15163	15177
4 0	14879	14926	14967	15002	15184	15199	15213
4 1	14915	14962	15002	15038	15220	15235	15249
4 2	14951	14998	15038	15074	15256	15271	15285
4 3	14986	15033	15074	15109	15292	15307	15321
4 4	15022	15069	15110	15145	15328	15343	15357
4 5	15058	15105	15145	15181	15364	15379	15393
4 6	15093	15140	15181	15217	15400	15415	15429
4 7	15129	15176	15217	15253	15436	15451	15465
4 8	15165	15212	15252	15288	15471	15487	15500
4 9	15200	15247	15288	15324	15507	15522	15536
440	15236	15283	15324	15360	15543	15558	15572
441	15272	15319	15360	15396	15579	15594	15608
442	15307	15354	15395	15431	15615	15630	15644
443	15343	15390	15431	15467	15651	15666	15680
444	15379	15426	15467	15503	15687	15702	15716
445	15414	15462	15503	15539	15723	15738	15752
446	15450	15497	15538	15574	15759	15774	15788
447	15485	15533	15574	15610	15795	15810	15824
448	15521	15569	15610	15646	15831	15846	15860
449	15557	15604	15646	15682	15866	15882	15896
450	15592	15640	15681	15718	15902	15918	15932

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
451	15628	15676	15717	15753	15938	15953	15967
452	15664	15711	15753	15789	15974	15989	16003
453	15699	15747	15789	15825	16010	16025	16039
454	15735	15783	15824	15861	16046	16061	16075
455	15771	15819	15860	15896	16082	16097	16111
456	15806	15854	15896	15932	16118	16133	16147
457	15842	15890	15931	15968	16154	16169	16183
458	15878	15926	15967	16004	16190	16205	16219
459	15913	15961	16003	16039	16226	16241	16255
460	15949	15997	16039	16075	16261	16277	16291
461	15985	16033	16074	16111	16297	16313	16327
462	16020	16068	16110	16147	16333	16349	16363
463	16056	16104	16146	16183	16369	16384	16399
464	16092	16140	16182	16218	16405	16420	16435
465	16127	16176	16217	16254	16441	16456	16470
466	16163	16211	16253	16290	16477	16492	16506
467	16199	16247	16289	16326	16513	16528	16542
468	16234	16283	16325	16361	16549	16564	16578
469	16270	16318	16360	16397	16585	16600	16614
470	16306	16354	16396	16433	16621	16636	16650
471	16341	16390	16432	16469	16656	16672	16686
472	16377	16426	16468	16505	16692	16708	16722
473	16413	16461	16503	16540	16728	16744	16758
474	16448	16497	16539	16576	16764	16780	16794
475	16484	16533	16575	16612	16800	16816	16830
476	16520	16569	16611	16648	16836	16851	16866
477	16555	16604	16646	16684	16872	16887	16902
478	16591	16640	16682	16719	16908	16923	16938
479	16627	16676	16718	16755	16944	16959	16974
480	16662	16711	16754	16791	16980	16995	17009

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
481	16698	16747	16790	16827	17016	17031	17045
482	16734	16783	16825	16862	17052	17067	17081
483	16769	16819	16861	16898	17087	17103	17117
484	16805	16854	16897	16934	17123	17139	17153
485	16841	16890	16933	16970	17159	17175	17189
486	16877	16926	16968	17006	17195	17211	17225
487	16912	16961	17004	17041	17231	17247	17261
488	16948	16997	17040	17077	17267	17283	17297
489	16984	17033	17076	17113	17303	17318	17333
490	17019	17069	17111	17149	17339	17354	17369
491	17055	17104	17147	17185	17375	17390	17405
492	17091	17140	17183	17220	17411	17426	17441
493	17126	17176	17219	17256	17447	17462	17477
494	17162	17212	17254	17292	17483	17498	17513
495	17198	17247	17290	17328	17519	17534	17548
496	17233	17283	17326	17364	17554	17570	17584
497	17269	17319	17362	17399	17590	17606	17620
498	17305	17354	17397	17435	17626	17642	17656
499	17340	17390	17433	17471	17662	17678	17692
5 0	17376	17426	17469	17507	17698	17714	17728
5 1	17412	17462	17505	17543	17734	17750	17764
5 2	17448	17497	17541	17578	17770	17786	17800
5 3	17483	17533	17576	17614	17806	17821	17836
5 4	17519	17569	17612	17650	17842	17857	17872
5 5	17555	17605	17648	17686	17878	17893	17908
5 6	17590	17640	17684	17722	17914	17929	17944
5 7	17626	17676	17719	17757	17950	17965	17980
5 8	17662	17712	17755	17793	17985	18001	18016
5 9	17697	17748	17791	17829	18021	18037	18052
5 0	17733	17783	17827	17865	18057	18073	18087

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Table 1: Generic HDBH Traffic Capacity (7% to 20%)
(Carried Load)

CHs	P(0.07)	P(0.08)	P(0.09)	P(0.1)	P(0.18)	P(0.19)	P(0.2)
5 1	17769	17819	17862	17901	18093	18109	18123
5 2	17804	17855	17898	17936	18129	18145	18159
5 3	17840	17891	17934	17972	18165	18181	18195
5 4	17876	17926	17970	18008	18201	18217	18231
5 5	17912	17962	18006	18044	18237	18253	18267
5 6	17947	17998	18041	18080	18273	18289	18303
5 7	17983	18033	18077	18115	18309	18325	18339
5 8	18019	18069	18113	18151	18345	18360	18375
5 9	18054	18105	18149	18187	18381	18396	18411
5 0	18090	18141	18184	18223	18417	18432	18447
5 1	18126	18176	18220	18259	18453	18468	18483
5 2	18161	18212	18256	18294	18488	18504	18519
5 3	18197	18248	18292	18330	18524	18540	18555
5 4	18233	18284	18328	18366	18560	18576	18591
5 5	18269	18319	18363	18402	18596	18612	18627
5 6	18304	18355	18399	18438	18632	18648	18663
5 7	18340	18391	18435	18473	18668	18684	18698
5 8	18376	18427	18471	18509	18704	18720	18734
5 9	18411	18462	18507	18545	18740	18756	18770
5 0	18447	18498	18542	18581	18776	18792	18806
5 1	18483	18534	18578	18617	18812	18828	18842
5 2	18519	18570	18614	18653	18848	18864	18878
5 3	18554	18605	18650	18688	18884	18899	18914
5 4	18590	18641	18685	18724	18920	18935	18950
5 5	18626	18677	18721	18760	18955	18971	18986
5 6	18661	18713	18757	18796	18991	19007	19022
5 7	18697	18748	18793	18832	19027	19043	19058
5 8	18733	18784	18829	18867	19063	19079	19094
5 9	18769	18820	18864	18903	19099	19115	19130
540	18804	18856	18900	18939	19135	19151	19166

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2.6.6.3 Table 2A: RLCM/OPM HDBH Traffic Capacity (CCS)

Table 2A: RLCM/OPM HDBH Traffic Capacity (CCS)

Links to Host: 2

(Carried Load)

P(0.01)

Host CH	0%	20%	30%	40%	50%	60%	80%
4	30	36	40	45	51	60	91
5	47	56	62	70	81	94	143
6	65	79	88	99	113	132	200
7	86	103	115	129	148	173	262
8	107	129	143	162	185	217	328
9	130	156	174	196	224	262	396
10	153	184	205	230	264	309	467
11	177	213	237	267	306	357	541
12	202	242	270	304	348	407	616
13	227	273	304	342	392	458	693
14	253	304	338	381	436	510	771
15	279	335	373	420	481	562	850
16	305	367	408	460	527	616	931
17	332	399	444	500	573	670	1013
18	359	432	480	541	620	725	1096
19	387	465	517	583	667	780	1180
20	415	499	555	625	715	837	1265
21	442	532	592	666	763	892	1350
22	471	566	629	709	812	949	1436
23	499	600	668	752	861	1007	1524
24	528	635	706	796	911	1065	1611
25	557	669	745	839	961	1123	1699
26	586	705	784	883	1011	1182	1788
27	615	740	823	927	1061	1241	1877
28	645	775	862	971	1112	1300	1966
29	674	811	902	1016	1163	1360	2057
30	704	846	941	1060	1214	1420	2147
31	734	882	981	1105	1265	1479	2237
32	764	918	1021	1150	1317	1540	2328
33	794	954	1061	1196	1369	1601	2420
34	824	990	1101	1241	1420	1661	2511
35	854	1027	1142	1287	1473	1723	2603

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	Host		Percent Intra Traffic					
	CH	0%	20%	30%	40%	50%	60%	80%
	36	885	1063	1183	1333	1526	1784	2694
	37	915	1100	1223	1378	1578	1845	2785
	38	946	1137	1265	1425	1631	1908	2877
	39	977	1174	1306	1471	1684	1970	2967
	40	1008	1211	1347	1518	1738	2032	3056
	41	1038	1248	1388	1564	1790	2094	3144
	42	1069	1285	1429	1610	1843	2155	3230
	43	1101	1323	1472	1658	1898	2219	3318
	44	1131	1360	1512	1704	1950	2281	3401
	45	1163	1398	1555	1751	2005	2345	3485
	46	1194	1435	1597	1799	2059	2408	3568

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Table 2A: RLCM/OPM HDBH Traffic Capacity (CCS)
 Links to Host: 3
 (Carried Load)
 P(0.01)

Host CH	0%	20%	30%	40%	50%	60%	80%
4	30	36	40	45	51	60	91
5	47	56	62	70	81	94	143
6	65	79	88	99	113	132	200
7	86	103	115	129	148	173	262
8	107	129	143	162	185	217	328
9	130	156	174	196	224	262	396
10	153	184	205	230	264	309	467
11	177	213	237	267	306	357	541
12	202	242	270	304	348	407	616
13	227	273	304	342	392	458	693
14	253	304	338	381	436	510	771
15	279	335	373	420	481	562	850
16	305	367	408	460	527	616	930
17	332	399	444	500	573	670	1011
18	359	432	480	541	620	725	1092
19	387	465	517	583	667	780	1172
20	415	499	555	625	715	837	1253
21	442	532	592	666	763	892	1331
22	471	566	629	709	812	949	1408
23	499	600	668	752	861	1007	1485
24	528	635	706	796	911	1065	1559
25	557	669	745	839	961	1123	1630
26	586	705	784	883	1011	1182	1701
27	615	740	823	927	1061	1240	1770
28	645	775	862	971	1112	1299	1837
29	674	811	902	1016	1163	1358	1903
30	704	846	941	1060	1214	1417	1967
31	734	882	981	1105	1265	1476	2029
32	764	918	1021	1150	1317	1536	2092
33	794	954	1061	1196	1368	1595	2153
34	824	990	1101	1241	1420	1653	2212
35	854	1027	1142	1287	1472	1713	2272

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	Host	Percent Intra Traffic						
	CH	0%	20%	30%	40%	50%	60%	80%
	36	885	1063	1183	1333	1525	1772	2330
	37	915	1100	1223	1378	1577	1830	2387
	38	946	1137	1265	1425	1630	1888	2445
	39	977	1174	1306	1471	1683	1947	2502
	40	1008	1211	1347	1518	1735	2004	2558
	41	1038	1248	1388	1564	1787	2061	2613
	42	1069	1285	1429	1610	1840	2117	2667
	43	1101	1323	1472	1658	1893	2174	2723
	44	1131	1360	1512	1703	1945	2229	2776
	45	1163	1398	1555	1751	1998	2285	2831
	46	1194	1435	1597	1798	2051	2340	2885
	47	1226	1473	1639	1845	2103	2395	2938
	48	1257	1511	1681	1893	2156	2449	2991
	49	1288	1548	1722	1939	2208	2502	3044
	50	1320	1587	1765	1987	2260	2556	3096
	51	1352	1625	1807	2035	2312	2609	3149
	52	1383	1663	1849	2082	2364	2662	3201
	53	1415	1700	1891	2129	2415	2713	3252
	54	1447	1739	1934	2177	2467	2766	3304
	55	1479	1777	1977	2225	2518	2817	3356
	56	1510	1816	2019	2272	2569	2869	3407
	57	1543	1854	2063	2320	2621	2920	3458
	58	1575	1893	2106	2368	2672	2971	3510
	59	1607	1931	2148	2415	2721	3021	3560
	60	1639	1970	2191	2464	2772	3072	3611
	61	1672	2009	2235	2512	2823	3123	3662
	62	1704	2048	2278	2559	2872	3172	3712
	63	1735	2086	2320	2606	2921	3221	3761
	64	1768	2125	2364	2654	2972	3271	3812
	65	1801	2165	2408	2702	3022	3321	3862
	66	1833	2203	2450	2749	3070	3370	3911
	67	1865	2242	2493	2796	3118	3418	3960
	68	1898	2282	2537	2844	3168	3467	4010
	69	1931	2321	2581	2892	3217	3516	4060
	70	1963	2359	2623	2938	3264	3563	4108

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Table 2A: RLCM/OPM HDBH Traffic Capacity (CCS)
 Links to Host: 4
 (Carried Load)
 P(0.01)

Host CH	0%	20%	30%	40%	50%	60%	80%
4	30	36	40	45	51	60	91
5	47	56	62	70	81	94	143
6	65	79	88	99	113	132	200
7	86	103	115	129	148	173	262
8	107	129	143	162	185	217	328
9	130	156	174	196	224	262	396
10	153	184	205	230	264	309	467
11	177	213	237	267	306	357	541
12	202	242	270	304	348	407	616
13	227	273	304	342	392	458	693
14	253	304	338	381	436	510	771
15	279	335	373	420	481	562	850
16	305	367	408	460	527	616	930
17	332	399	444	500	573	670	1011
18	359	432	480	541	620	725	1092
19	387	465	517	583	667	780	1172
20	415	499	555	625	715	837	1253
21	442	532	592	666	763	892	1331
22	471	566	629	709	812	949	1408
23	499	600	668	752	861	1007	1485
24	528	635	706	796	911	1065	1559
25	557	669	745	839	961	1123	1630
26	586	705	784	883	1011	1182	1701
27	615	740	823	927	1061	1240	1770
28	645	775	862	971	1112	1299	1837
29	674	811	902	1016	1163	1358	1903
30	704	846	941	1060	1214	1417	1967
31	734	882	981	1105	1265	1476	2029
32	764	918	1021	1150	1317	1536	2092
33	794	954	1061	1196	1368	1595	2152
34	824	990	1101	1241	1420	1653	2212
35	854	1027	1142	1287	1472	1713	2271

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	Host CH	Percent Intra Traffic						
		0%	20%	30%	40%	50%	60%	80%
	36	885	1063	1183	1333	1525	1772	2330
	37	915	1100	1223	1378	1577	1830	2387
	38	946	1137	1265	1425	1630	1888	2445
	39	977	1174	1306	1471	1683	1947	2501
	40	1008	1211	1347	1518	1735	2004	2557
	41	1038	1248	1388	1564	1787	2061	2612
	42	1069	1285	1429	1610	1840	2117	2666
	43	1101	1323	1472	1658	1893	2174	2722
	44	1131	1360	1512	1703	1945	2229	2775
	45	1163	1398	1555	1751	1998	2285	2829
	46	1194	1435	1597	1798	2051	2340	2883
	47	1226	1473	1639	1845	2103	2395	2936
	48	1257	1511	1681	1893	2156	2449	2988
	49	1288	1548	1722	1939	2208	2502	3040
	50	1320	1587	1765	1987	2260	2556	3093
	51	1352	1625	1807	2035	2312	2609	3145
	52	1383	1663	1849	2082	2364	2662	3196
	53	1415	1700	1891	2129	2415	2713	3247
	54	1447	1739	1934	2177	2467	2766	3298
	55	1479	1777	1977	2225	2518	2817	3349
	56	1510	1816	2019	2272	2569	2869	3399
	57	1543	1854	2063	2320	2621	2920	3450
	58	1575	1893	2106	2368	2672	2971	3500
	59	1607	1931	2148	2415	2721	3021	3549
	60	1639	1970	2191	2464	2772	3072	3599
	61	1672	2009	2235	2512	2823	3123	3648
	62	1704	2048	2278	2559	2872	3172	3697
	63	1735	2086	2320	2606	2921	3221	3745
	64	1768	2125	2364	2654	2972	3271	3794
	65	1801	2165	2408	2702	3022	3321	3843
	66	1833	2203	2450	2749	3070	3369	3890
	67	1865	2242	2493	2796	3118	3417	3937
	68	1898	2282	2537	2844	3168	3467	3985
	69	1931	2321	2581	2892	3217	3516	4033
	70	1963	2359	2623	2938	3264	3563	4079

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	Host		Percent Intra Traffic					
	CH	0%	20%	30%	40%	50%	60%	80%
	71	1996	2399	2667	2986	3313	3611	4126
	72	2028	2438	2711	3033	3361	3659	4172
	73	2061	2477	2754	3080	3408	3707	4218
	74	2094	2517	2799	3128	3457	3756	4265
	75	2127	2556	2842	3174	3504	3803	4311
	76	2160	2596	2886	3222	3552	3851	4357
	77	2192	2635	2929	3268	3599	3897	4401
	78	2225	2675	2973	3315	3646	3945	4447
	79	2258	2715	3017	3361	3693	3992	4492
	80	2291	2754	3061	3408	3740	4039	4537
	81	2324	2794	3104	3454	3787	4086	4581
	82	2357	2833	3148	3500	3833	4132	4626
	83	2390	2872	3191	3546	3879	4179	4669
	84	2423	2913	3236	3593	3926	4226	4714
	85	2456	2952	3279	3638	3972	4272	4757
	86	2489	2992	3323	3684	4018	4318	4801
	87	2523	3032	3367	3730	4065	4365	4844
	88	2556	3072	3411	3776	4111	4411	4888
	89	2589	3112	3455	3822	4157	4457	4931
	90	2622	3152	3498	3867	4202	4503	4973
	91	2655	3191	3542	3912	4247	4548	5015
	92	2689	3232	3586	3958	4294	4594	5059
	93	2723	3272	3630	4004	4340	4641	5102
	94	2755	3312	3673	4048	4384	4685	5143

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Table 2A: RLCM/OPM HDBH Traffic Capacity (CCS)
 Links to Host: 5
 (Carried Load)
 P(0.01)

Host CH	0%	20%	30%	40%	50%	60%	80%
4	30	32	34	36	38	40	45
5	47	51	53	56	59	62	70
6	65	71	75	79	83	88	99
7	86	94	98	103	109	115	129
8	107	117	123	129	136	143	162
9	130	142	149	156	164	174	196
10	153	167	175	184	194	205	230
11	177	193	203	213	224	237	267
12	202	220	231	242	255	270	304
13	227	248	260	273	287	304	342
14	253	276	289	304	320	338	381
15	279	304	319	335	353	373	420
16	305	333	349	367	386	408	460
17	332	363	380	399	420	444	500
18	359	392	411	432	455	480	541
19	387	422	443	465	490	517	583
20	415	453	475	499	525	555	625
21	442	483	506	532	560	592	666
22	471	514	539	566	596	629	709
23	499	545	572	600	632	668	752
24	528	577	604	635	669	706	796
25	557	608	637	669	705	745	839
26	586	640	671	705	742	784	883
27	615	672	704	740	779	823	927
28	645	704	738	775	816	862	971
29	674	736	772	811	854	902	1016
30	704	769	805	846	891	941	1060
31	734	801	839	882	929	981	1105
32	764	834	874	918	967	1021	1150
33	794	867	908	954	1005	1061	1195
34	824	899	942	990	1043	1101	1240
35	854	933	977	1027	1081	1142	1286

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	Host	Percent Intra Traffic						
	CH	0%	20%	30%	40%	50%	60%	80%
	36	885	966	1012	1063	1120	1183	1331
	37	915	999	1047	1100	1158	1223	1377
	38	946	1033	1082	1137	1198	1265	1423
	39	977	1066	1118	1174	1237	1306	1469
	40	1008	1100	1153	1211	1276	1347	1515
	41	1038	1134	1188	1248	1314	1388	1561
	42	1069	1167	1223	1285	1353	1429	1606
	43	1101	1202	1259	1323	1393	1471	1653
	44	1131	1235	1294	1360	1432	1512	1698
	45	1163	1269	1330	1398	1472	1554	1745
	46	1194	1304	1366	1435	1512	1596	1791
	47	1226	1338	1402	1473	1551	1638	1837
	48	1257	1372	1438	1511	1591	1680	1883
	49	1288	1406	1474	1548	1631	1722	1929
	50	1320	1441	1510	1587	1671	1764	1975
	51	1352	1476	1547	1625	1711	1806	2021
	52	1383	1510	1583	1663	1751	1848	2067
	53	1415	1544	1619	1700	1791	1890	2112
	54	1447	1579	1655	1739	1831	1932	2158
	55	1479	1614	1692	1777	1871	1975	2204
	56	1510	1649	1728	1816	1912	2017	2249
	57	1543	1684	1765	1854	1953	2060	2295
	58	1575	1720	1802	1893	1993	2103	2341
	59	1607	1754	1838	1931	2033	2145	2385
	60	1639	1790	1876	1970	2074	2188	2431
	61	1672	1825	1913	2009	2115	2231	2477
	62	1704	1860	1949	2048	2156	2273	2521
	63	1735	1895	1986	2086	2196	2315	2565
	64	1768	1930	2023	2125	2237	2358	2611
	65	1801	1966	2061	2165	2278	2401	2656
	66	1833	2001	2097	2203	2319	2443	2700
	67	1865	2036	2134	2242	2359	2485	2744
	68	1898	2072	2172	2281	2401	2528	2789
	69	1931	2108	2210	2321	2442	2572	2834
	70	1963	2143	2246	2359	2482	2613	2878

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	Host		Percent Intra Traffic					
	CH	0%	20%	30%	40%	50%	60%	80%
	71	1996	2179	2283	2398	2523	2656	2922
	72	2028	2214	2321	2437	2564	2698	2966
	73	2061	2250	2358	2476	2605	2741	3010
	74	2094	2286	2396	2517	2647	2784	3055
	75	2127	2322	2433	2556	2688	2826	3098
	76	2160	2358	2471	2596	2730	2869	3143
	77	2192	2393	2508	2634	2770	2911	3186
	78	2225	2430	2546	2674	2811	2954	3230
	79	2258	2466	2584	2714	2853	2997	3273
	80	2291	2502	2622	2753	2894	3039	3317
	81	2324	2538	2659	2792	2935	3081	3360
	82	2357	2573	2697	2832	2976	3123	3403
	83	2390	2609	2734	2871	3017	3165	3446
	84	2423	2646	2773	2911	3059	3208	3490
	85	2456	2681	2810	2950	3099	3249	3533
	86	2489	2718	2848	2990	3141	3292	3576
	87	2523	2754	2886	3030	3182	3334	3620
	88	2556	2790	2924	3070	3223	3377	3663
	89	2589	2827	2962	3109	3264	3419	3706
	90	2622	2863	3000	3149	3305	3460	3748
	91	2655	2899	3038	3188	3346	3502	3791
	92	2689	2936	3076	3229	3388	3545	3835
	93	2723	2972	3115	3269	3430	3587	3878
	94	2755	3008	3152	3308	3470	3628	3920
	95	2789	3045	3191	3348	3511	3670	3963
	96	2822	3081	3229	3388	3552	3712	4006
	97	2856	3118	3267	3428	3593	3754	4048
	98	2889	3154	3305	3468	3634	3796	4091
	99	2923	3191	3344	3508	3676	3838	4134
	100	2956	3227	3382	3548	3717	3879	4176

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	Host	Percent Intra Traffic						
	CH	0%	20%	30%	40%	50%	60%	80%
	101	2989	3263	3420	3587	3757	3920	4218
	102	3023	3300	3458	3627	3798	3962	4261
	103	3057	3337	3497	3667	3840	4004	4303
	104	3090	3374	3535	3707	3881	4046	4346
	105	3124	3410	3574	3747	3922	4087	4388
	106	3157	3447	3612	3787	3962	4128	4430
	107	3192	3484	3651	3827	4004	4171	4473
	108	3225	3521	3689	3867	4044	4212	4515
	109	3259	3558	3728	3907	4086	4254	4558
	110	3292	3594	3765	3946	4126	4294	4599
	111	3327	3632	3805	3988	4168	4337	4642
	112	3360	3668	3843	4027	4208	4377	4683
	113	3394	3706	3882	4067	4249	4419	4726
	114	3428	3742	3920	4107	4290	4460	4768
	115	3461	3779	3959	4147	4330	4501	4810
	116	3496	3816	3998	4187	4371	4543	4852
	117	3530	3853	4037	4227	4412	4584	4895
	118	3564	3891	4075	4268	4453	4626	4937

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Table 2A: RLCM/OPM HDBH Traffic Capacity (CCS)
 Links to Host: 6
 (Carried Load)
 P(0.01)

Host CH	Percent Intra Traffic						
	0%	20%	30%	40%	50%	60%	80%
4	30	32	34	36	38	40	45
5	47	51	53	56	59	62	70
6	65	71	75	79	83	88	99
7	86	94	98	103	109	115	129
8	107	117	123	129	136	143	162
9	130	142	149	156	164	174	196
10	153	167	175	184	194	205	230
11	177	193	203	213	224	237	267
12	202	220	231	242	255	270	304
13	227	248	260	273	287	304	342
14	253	276	289	304	320	338	381
15	279	304	319	335	353	373	420
16	305	333	349	367	386	408	460
17	332	363	380	399	420	444	500
18	359	392	411	432	455	480	541
19	387	422	443	465	490	517	583
20	415	453	475	499	525	555	625
21	442	483	506	532	560	592	666
22	471	514	539	566	596	629	709
23	499	545	572	600	632	668	752
24	528	577	604	635	669	706	796
25	557	608	637	669	705	745	839
26	586	640	671	705	742	784	883
27	615	672	704	740	779	823	927
28	645	704	738	775	816	862	971
29	674	736	772	811	854	902	1015
30	704	769	805	846	891	941	1060
31	734	801	839	882	929	981	1104
32	764	834	874	918	967	1021	1149
33	794	867	908	954	1005	1061	1194
34	824	899	942	990	1043	1101	1239
35	854	933	977	1027	1081	1142	1285

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	Host	Percent Intra Traffic						
	CH	0%	20%	30%	40%	50%	60%	80%
	36	885	966	1012	1063	1120	1183	1330
	37	915	999	1047	1100	1158	1223	1376
	38	946	1033	1082	1137	1198	1265	1421
	39	977	1066	1118	1174	1237	1306	1467
	40	1008	1100	1153	1211	1276	1347	1512
	41	1038	1134	1188	1248	1314	1388	1558
	42	1069	1167	1223	1285	1353	1429	1602
	43	1101	1202	1259	1323	1393	1471	1649
	44	1131	1235	1294	1360	1432	1512	1693
	45	1163	1269	1330	1398	1472	1554	1739
	46	1194	1304	1366	1435	1512	1596	1784
	47	1226	1338	1402	1473	1551	1638	1829
	48	1257	1372	1438	1511	1591	1679	1874
	49	1288	1406	1474	1548	1630	1721	1918
	50	1320	1441	1510	1587	1671	1763	1963
	51	1352	1476	1547	1625	1711	1805	2007
	52	1383	1510	1583	1663	1751	1847	2051
	53	1415	1544	1619	1700	1790	1888	2095
	54	1447	1579	1655	1739	1831	1931	2139
	55	1479	1614	1692	1777	1871	1973	2182
	56	1510	1649	1728	1815	1911	2015	2226
	57	1543	1684	1765	1854	1952	2057	2269
	58	1575	1720	1802	1893	1993	2100	2313
	59	1607	1754	1838	1931	2032	2141	2355
	60	1639	1790	1876	1970	2074	2184	2398
	61	1672	1825	1913	2009	2114	2226	2441
	62	1704	1860	1949	2047	2155	2268	2483
	63	1735	1895	1986	2086	2195	2309	2524
	64	1768	1930	2023	2125	2236	2352	2566
	65	1801	1966	2061	2164	2277	2394	2608
	66	1833	2001	2097	2203	2317	2436	2649
	67	1865	2036	2134	2241	2357	2477	2690
	68	1898	2072	2172	2281	2399	2520	2732
	69	1931	2108	2209	2320	2440	2562	2773
	70	1963	2143	2246	2358	2480	2602	2813

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	Host		Percent Intra Traffic					
	CH	0%	20%	30%	40%	50%	60%	80%
	71	1996	2179	2283	2398	2520	2644	2853
	72	2028	2214	2321	2437	2561	2686	2894
	73	2061	2250	2358	2476	2602	2727	2934
	74	2094	2286	2396	2516	2643	2769	2975
	75	2127	2322	2433	2555	2684	2810	3014
	76	2160	2358	2471	2595	2725	2852	3055
	77	2192	2393	2508	2633	2765	2892	3093
	78	2225	2430	2546	2673	2806	2934	3133
	79	2258	2466	2584	2713	2847	2975	3173
	80	2291	2502	2622	2752	2887	3016	3212
	81	2324	2537	2659	2791	2928	3057	3251
	82	2357	2573	2697	2830	2968	3097	3290
	83	2390	2609	2734	2869	3008	3137	3328
	84	2423	2646	2773	2910	3050	3179	3367
	85	2456	2681	2810	2948	3089	3218	3405
	86	2489	2718	2848	2988	3130	3259	3444
	87	2523	2754	2886	3028	3171	3300	3483
	88	2556	2790	2924	3068	3211	3340	3521
	89	2589	2827	2962	3107	3252	3380	3559
	90	2622	2863	3000	3146	3292	3420	3597
	91	2655	2899	3037	3185	3332	3459	3635
	92	2689	2936	3076	3226	3373	3500	3673
	93	2723	2972	3115	3266	3413	3540	3712
	94	2755	3008	3152	3304	3453	3579	3749
	95	2789	3045	3190	3344	3493	3619	3786
	96	2822	3081	3229	3384	3533	3658	3824
	97	2856	3118	3267	3423	3573	3698	3862
	98	2889	3154	3305	3463	3613	3737	3899
	99	2923	3191	3344	3503	3653	3777	3937
	100	2956	3227	3381	3542	3693	3816	3974

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	Host	Percent Intra Traffic						
	CH	0%	20%	30%	40%	50%	60%	80%
	101	2989	3263	3419	3581	3732	3854	4010
	102	3023	3300	3458	3621	3772	3894	4048
	103	3057	3337	3496	3661	3812	3933	4085
	104	3090	3374	3534	3700	3851	3972	4122
	105	3124	3410	3573	3739	3891	4010	4159
	106	3157	3447	3611	3779	3930	4049	4196
	107	3192	3484	3650	3819	3970	4088	4234
	108	3225	3521	3688	3858	4009	4126	4270
	109	3259	3558	3727	3898	4049	4165	4307
	110	3292	3594	3764	3936	4087	4203	4343
	111	3327	3632	3804	3977	4128	4243	4381
	112	3360	3668	3841	4015	4166	4280	4417
	113	3394	3705	3881	4056	4206	4319	4455
	114	3428	3742	3919	4095	4245	4357	4491
	115	3461	3779	3957	4133	4283	4395	4527
	116	3496	3816	3996	4173	4323	4433	4564
	117	3530	3853	4035	4213	4362	4472	4601
	118	3564	3890	4073	4252	4401	4510	4638
	119	3598	3927	4112	4292	4440	4548	4674
	120	3632	3964	4150	4331	4479	4586	4710
	121	3665	4001	4189	4370	4517	4623	4747
	122	3699	4038	4227	4408	4555	4661	4783
	123	3732	4075	4265	4447	4594	4698	4818
	124	3767	4112	4304	4486	4632	4736	4855
	125	3801	4149	4343	4526	4671	4774	4891
	126	3834	4186	4380	4564	4709	4810	4927
	127	3869	4224	4420	4604	4748	4849	4964
	128	3903	4261	4458	4643	4786	4886	5000
	129	3937	4297	4496	4681	4824	4923	5036
	130	3971	4335	4535	4721	4863	4961	5072

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	Host	Percent Intra Traffic						
	CH	0%	20%	30%	40%	50%	60%	80%
	131	4006	4373	4574	4760	4902	4999	5109
	132	4040	4410	4613	4799	4940	5037	5145
	133	4074	4447	4652	4838	4978	5074	5181
	134	4108	4485	4690	4877	5016	5111	5217
	135	4142	4522	4729	4915	5054	5148	5253
	136	4176	4559	4767	4954	5092	5185	5289
	137	4210	4595	4805	4992	5129	5222	5324
	138	4244	4633	4844	5031	5168	5259	5361
	139	4279	4671	4883	5070	5206	5296	5397
	140	4312	4707	4920	5107	5243	5332	5432
	141	4347	4745	4960	5147	5281	5370	5469
	142	4382	4783	4999	5186	5320	5408	5505

2.6.6.4 Table 2B: IRLCM Traffic Capacity (CCS)

Table 2B: IRLCM Traffic Capacity (CCS)
Links to Host: 2

% Intra	0	10	20	30	40	50	60	70	80
TML									
.001	1436	1541	1663	1808	1982	2196	2464	2806	3243
.005	1561	1675	1807	1965	2153	2385	2676	3047	3499
.010	1625	1743	1881	2045	2241	2482	2784	3169	3625
.015	1665	1787	1928	2096	2297	2544	2854	3246	3704
.019	1691	1813	1957	2127	2332	2582	2896	3293	3752
.020	1696	1819	1963	2134	2339	2591	2906	3304	3762
.025	1721	1846	1992	2165	2373	2628	2948	3351	3809
.030	1742	1868	2016	2192	2402	2660	2983	3390	3848
.040	1776	1905	2056	2235	2449	2712	3041	3453	3912
.050	1804	1935	2088	2270	2487	2754	3088	3504	3962
.060	1827	1960	2115	2299	2519	2790	3127	3547	4006
.070	1847	1982	2139	2324	2547	2820	3161	3584	4041
.080	1865	2001	2150	2346	2571	2847	3191	3616	4073
.090	1881	2018	2178	2366	2593	2871	3217	3645	4100
.100	1896	2033	2194	2384	2613	2892	3241	3670	4125
.190	1985	2130	2298	2497	2735	3026	3388	3825	4274
.200	1993	2137	2306	2506	2745	3036	3399	3837	4285

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Table 2B: IRLCM Traffic Capacity (CCS)
Links to Host: 3

% Intra	0	10	20	30	40	50	60	70	80
TML									
.001	2346	2517	2717	2951	3209	3458	3684	3884	4062
.005	2510	2692	2906	3154	3423	3677	3903	4102	4278
.010	2593	2782	3002	3258	3530	3785	4010	4208	4384
.015	2646	2838	3063	3324	3599	3854	4978	4276	4451
.019	2678	2873	3101	3364	3641	3896	4120	4317	4492
.020	2686	2881	3109	3373	3650	3905	4129	4326	4502
.025	2718	2915	3146	3413	3691	3946	4170	4367	4542
.030	2745	2944	3177	3446	3726	3981	4205	4401	4576
.040	2789	2991	3228	3500	3782	4037	4261	4457	4632
.050	2824	3029	3269	3544	3827	4082	4306	4502	4676
.060	2853	3061	3303	3581	3865	4121	4345	4540	4715
.070	2879	3088	3332	3612	3897	4153	4377	4572	4746
.080	2901	3112	3358	3639	3925	4181	4404	4600	4774
.090	2921	3133	3381	3664	3950	4206	4429	4624	4798
.100	2939	3152	3401	3868	3973	4229	4452	4647	4820
.190	3048	3269	3527	3819	4109	4365	4586	4780	4953
.200	3056	3278	3537	3829	4119	4375	4597	4790	4963

Table 2B: IRLCM Traffic Capacity (CCS)
Links to Host: 4

% Intra	0	10	20	30	40	50	60	70	80
TML									
.001	3286	3524	3778	4009	4219	4423	4616	4789	4927
.005	3483	3735	4001	4238	4454	4664	4862	5031	5163
.010	3583	3843	4113	4352	4571	4783	4982	5149	5277
.015	3647	3911	4184	4425	4646	4860	5058	5224	5349
.019	3685	3952	4228	4470	4692	4907	5105	5270	5394
.020	3694	3961	4237	4480	4702	4917	5116	5280	5403
.025	3732	4002	4280	4523	4747	4963	5161	5324	5447
.030	3764	4036	4316	4560	4785	5001	5200	5362	5483
.040	3816	4092	4375	4620	4846	5064	5262	5423	5542
.050	3858	4137	4421	4667	4895	5113	5311	5471	5589
.060	3893	4174	4459	4708	4936	5156	5354	5513	5630
.070	3922	4206	4493	4741	4971	5191	5389	5547	5663
.080	3948	4233	4522	4771	5001	5222	5419	5577	5692
.090	3971	4258	4547	4797	5028	5249	5446	5603	5717
.100	3992	4280	4570	4821	5052	5273	5470	5626	5740
.190	4116	4413	4708	4962	5196	5419	5614	5767	5877
.200	4125	4423	4718	4972	5207	5430	5625	5777	5887

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Table 2B: IRLCM Traffic Capacity (CCS)
Links to Host: 5

TML	
0.001	4244
0.005	4472
0.010	4587
0.015	4659
0.019	4704
0.020	4714
0.025	4757
0.030	4794
0.040	4853
0.050	4900
0.060	4940
0.070	4973
0.080	5002
0.090	5028
0.100	5051
0.190	5187
0.200	5197

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Table 2B: IRLCM Traffic Capacity (CCS)
Links to Host: 6

TML	
0.001	5215
0.005	5470
0.010	5600
0.015	5681
0.019	5731
0.020	5742
0.025	5790
0.030	5831
0.040	5897
0.050	5949
0.060	5992
0.070	6028
0.080	6060
0.090	6088
0.100	6113
0.190	6260
0.200	6271

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2.6.6.5 Table 3A: DMS100 Local Network Capacities

Table 3A: DMS100 Local Network Capacities
(Two-Way CCS)

NMs	ABSBH 0.1%	HDBH 1%	NMs	ABSBH 0.1%	HDBH 1%
---	-----	-----	---	-----	-----
1	68000	68700	17	1077200	1131900
2	135400	137300	18	1134300	1195100
3	201800	205700	19	1192000	1258000
4	267900	273800	20	1250900	1321400
5	333000	341500	21	1311300	1385800
6	397200	408800	22	1370000	1449900
7	461500	475900	23	1424500	1512700
8	525800	543000	24	1476700	1574100
9	589300	609600	25	1528600	1634300
10	651400	675500	26	1581000	1693900
11	713400	741600	27	1634200	1753500
12	774700	806900	28	1688500	1813500
13	836700	872800	29	1743900	1874100
14	896300	937500	30	1800500	1935600
15	956600	1002000	31	1858200	1998000
16	1018700	1067600	32	1917100	2061400

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2.6.6.6 Table 3B: DMS200 and DMS100/200 Toll and Local/Toll

Table 3B: DMS200 and DMS100/200 Toll and Local/Toll
Network Capacities (Two-Way CCS)

NMs	ABSBH 0.1%	HDBH 1%	NMs	ABSBH 0.1%	HDBH 1%
---	-----	-----	---	-----	-----
1	68400	68900	17	1076100	1127400
2	136600	137700	18	1131100	1188700
3	203800	206400	19	1187200	1249900
4	270700	274800	20	1245000	1312000
5	336500	342700	21	1304700	1375600
6	401300	410100	22	1360400	1438400
7	466100	477200	23	1410400	1498800
8	531000	544300	24	1459400	1556900
9	594800	610800	25	1508700	1613700
10	656700	676300	26	1558800	1670300
11	718200	742000	27	1609900	1727300
12	779000	806600	28	1662200	1785100
13	840700	872100	29	1715800	1843800
14	898900	935600	30	1770700	1903600
15	958400	999200	31	1826900	1964600
16	1020300	1064400	32	1884500	2026800

2.6.6.7 Table 4A: Total DRA Traffic (CCS) for NT0X48 Network

Table 4A: Total DRA Traffic (CCS) for NT0X48 Network

NUMBER OF PORTS DELOADED PER NSG	NUMBER OF DIGITAL BROADCAST ANNOUNCEMENT CHANNELS (CIRCUITS)			
	8	16	24	30
0	480	590	680	740
1	1180	1290	1380	1440
2	1880	1990	2080	2140
3	2580	2690	2780	2840
4	3280	3390	3480	3540
5	3980	4090	4180	4240
6	4680	4790	4880	4940
7	5380	5490	5580	5640

2.6.6.8 Table 4B: Total DRA Traffic (CCS) for NT5X13/8X11
Network

Table 4B: Total DRA Traffic (CCS) for NT5X13/8X11 Network

NUMBER OF PORTS DELOADED PER NSG	NUMBER OF DIGITAL BROADCAST ANNOUNCEMENT CHANNELS (CIRCUITS)			
	8	16	24	30
0	950	1110	1240	1330
1	1650	1810	1940	2030
2	2350	2510	2640	2730
3	3050	3210	3340	3430
4	3750	3910	4040	4130
5	4450	4610	4740	4830
6	5150	5310	5440	5530
7	5850	6010	6140	6230
8	6550	6710	6840	6930
9	7250	7410	7540	7630
10	7950	8110	8240	8330
11	8650	8810	8940	9030
12	9350	9510	9640	9730
13	10050	10210	10340	10430
14	10750	10910	11040	11130
15	11450	11610	11740	11830

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2.6.6.9 Table 5: Service Circuit Capacity (Poisson Theory)

Table 5: Service Circuit Capacity (Poisson Theory)

CIRCUITS	BLOCKING PROBABILITY			
	0.001	0.005	0.010	0.050
1	000	000	000	002
2	002	004	005	013
3	007	012	016	030
4	015	024	030	049
5	027	039	046	071
6	040	055	064	094
7	055	073	084	118
8	071	093	105	143
9	088	113	126	169
10	107	134	149	195
11	126	156	172	222
12	145	178	195	249
13	166	201	220	277
14	187	224	244	305
15	208	248	269	333
16	230	273	294	361
17	253	297	320	390
18	276	322	346	419
19	299	347	373	448
20	322	373	399	477
21	346	399	426	507
22	370	424	453	536
23	395	451	480	566
24	419	477	507	596
25	444	504	535	626
26	469	531	562	656
27	494	558	590	686
28	519	585	618	716
29	545	612	641	747
30	571	640	675	777

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Table 5: Service Circuit Capacity (Poisson Theory)

CIRCUITS	BLOCKING PROBABILITY			
	0.001	0.005	0.010	0.050
31	597	667	703	809
32	624	695	732	840
33	650	723	760	871
34	676	751	789	902
35	703	779	818	933
36	729	807	847	964
37	756	836	878	995
38	783	864	905	1026
39	810	892	935	1057
40	837	921	964	1088
41	865	950	993	1120
42	892	979	1023	1151
43	919	1000	1052	1183
44	947	1036	1082	1214
45	975	1066	1112	1246
46	1003	1095	1142	1277
47	1030	1124	1171	1309
48	1058	1153	1201	1340
49	1086	1183	1231	1372
50	1115	1212	1261	1403

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Table 5: Service Circuit Capacity (Poisson Theory)

CIRCUITS	BLOCKING PROBABILITY			
	0.001	0.005	0.010	0.050
51	1143	1241	1291	1435
52	1171	1271	1322	1467
53	1200	1301	1352	1499
54	1228	1330	1382	1531
55	1256	1360	1412	1563
56	1285	1390	1443	1595
57	1313	1419	1473	1627
58	1342	1449	1504	1659
59	1371	1479	1534	1691
60	1400	1509	1565	1723
61	1428	1539	1595	1755
62	1457	1570	1626	1787
63	1486	1599	1657	1819
64	1516	1630	1687	1851
65	1544	1660	1718	1884
66	1574	1690	1749	1916
67	1603	1721	1780	1948
68	1632	1751	1811	1981
69	1661	1781	1842	2013
70	1691	1812	1873	2046
71	1720	1842	1904	2078
72	1750	1873	1935	2111
73	1779	1903	1966	2143
74	1809	1934	1997	2176
75	1838	1965	2028	2208
76	1868	1995	2059	2241
77	1898	2026	2091	2274
78	1927	2057	2122	2306
79	1957	2088	2153	2339
80	1986	2118	2184	2372

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Table 5: Service Circuit Capacity (Poisson Theory)

CIRCUITS	BLOCKING PROBABILITY			
	0.001	0.005	0.010	0.050
81	2016	2149	2215	2405
82	2046	2180	2247	2437
83	2076	2211	2278	2470
84	2106	2242	2310	2503
85	2136	2273	2341	2536
86	2166	2304	2373	2569
87	2196	2335	2404	2601
88	2226	2366	2436	2634
89	2256	2397	2467	2667
90	2286	2428	2499	2700
91	2317	2459	2530	2733
92	2346	2490	2562	2766
93	2377	2521	2594	2798
94	2407	2553	2625	2831
95	2437	2584	2657	2864
96	2468	2615	2689	2897
97	2498	2646	2721	2930
98	2528	2678	2752	2963
99	2559	2709	2784	2996
100	2589	2740	2816	3029

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Table 5: Service Circuit Capacity (Poisson Theory)

CIRCUITS	BLOCKING PROBABILITY			
	0.001	0.005	0.010	0.050
101	2620	2772	2847	3062
102	2650	2803	2879	3095
103	2681	2834	2910	3128
104	2711	2866	2942	3161
105	2742	2897	2974	3194
106	2772	2929	3006	3227
107	2803	2960	3038	3260
108	2834	2991	3070	3293
109	2864	3023	3102	3326
110	2895	3054	3135	3359
111	2926	3086	3166	3393
112	2956	3118	3198	3426
113	2987	3149	3230	3459
114	3018	3181	3262	3493
115	3049	3212	3294	3526
116	3080	3244	3326	3559
117	3110	3276	3359	3592
118	3141	3307	3391	3625
119	3172	3339	3423	3659
120	3203	3371	3456	3692
121	3234	3402	3488	3725
122	3265	3434	3520	3758
123	3296	3466	3552	3792
124	3327	3498	3584	3825
125	3358	3530	3616	3859
126	3389	3562	3648	3892
127	3420	3594	3681	3925
128	3451	3626	3713	3959
129	3482	3657	3746	3992
130	3513	3689	3778	4026

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Table 5: Service Circuit Capacity (Poisson Theory)

CIRCUITS	BLOCKING PROBABILITY			
	0.001	0.005	0.010	0.050
131	3544	3721	3810	4059
132	3576	3753	3843	4092
133	3607	3785	3875	4126
134	3638	3817	3907	4159
135	3669	3849	3939	4192
136	3700	3881	3972	4226
137	3732	3913	4004	4259
138	3763	3945	4037	4293
139	3794	3977	4070	4327
140	3825	4009	4102	4360
141	3857	4042	4134	4394
142	3888	4074	4167	4427
143	3920	4106	4199	4461
144	3951	4138	4231	4494
145	3982	4170	4264	4528
146	4014	4202	4297	4561
147	4045	4235	4329	4595
148	4076	4267	4362	4628
149	4108	4299	4395	4662
150	4139	4331	4427	4695

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Table 5: Service Circuit Capacity (Poisson Theory)

CIRCUITS	BLOCKING PROBABILITY			
	0.001	0.005	0.010	0.050
151	4171	4363	4460	4729
152	4202	4396	4492	4762
153	4234	4428	4525	4796
154	4265	4460	4557	4830
155	4297	4492	4590	4864
156	4328	4525	4622	4897
157	4360	4557	4655	4931
158	4392	4589	4688	4964
159	4423	4621	4721	4998
160	4455	4654	4754	5032
161	4486	4686	4786	5065
162	4518	4718	4819	5099
163	4550	4751	4851	5132
164	4581	4783	4884	5166
165	4613	4816	4917	5200
166	4645	4848	4949	5234
167	4676	4880	4982	5267
168	4708	4913	5015	5301
169	4740	4945	5048	5335
170	4771	4978	5081	5369
171	4803	5010	5114	5402
172	4835	5043	5146	5436
173	4867	5075	5179	5470
174	4898	5108	5212	5504
175	4930	5140	5245	5537
176	4962	5173	5277	5571
177	4994	5205	5310	5605
178	5026	5238	5343	5638
179	5058	5270	5376	5672
180	5089	5303	5409	5706

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Table 5: Service Circuit Capacity (Poisson Theory)

CIRCUITS	BLOCKING PROBABILITY			
	0.001	0.005	0.010	0.050
181	5121	5335	5442	5740
182	5153	5368	5475	5774
183	5185	5400	5508	5808
184	5217	5433	5541	5841
185	5249	5466	5574	5875
186	5281	5498	5606	5909
187	5313	5531	5639	5943
188	5345	5563	5672	5977
189	5377	5596	5705	6011
190	5409	5629	5738	6045
191	5441	5661	5771	6078
192	5473	5694	5804	6112
193	5505	5727	5837	6146
194	5537	5760	5871	6180
195	5569	5792	5904	6214
196	5601	5825	5937	6247
197	5633	5858	5969	6281
198	5665	5891	6002	6315
199	5697	5923	6035	6349
200	5729	5956	6068	6383

NOTES:

1. For capacity beyond 200 circuits, divide the traffic by 32.4 to determine the number of circuits required.

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2.6.6.10 Table 6: MF Receiver Holding Time

Table 6: MF Receiver Holding Time

Calls	4 Digit	Additional Digit
Incoming MF Call (all types)	1.9 Sec	0.14 Second
Key Pulsing Switchboard	5.7 Sec	0.60 Second

Note: Add 0.9 seconds for MF incoming calls and 2.32 seconds for Dialpulse incoming calls outputting ANI information.

2.6.6.11 Table 7: Digitone Receiver Holding Time

Table 7: Digitone Receiver Holding Time

Calls	Holding Time
0 Operator	2.3 Sec. (Note 1)
3-Digit Service Code	3.1 Sec.
7-Digit Number	7.9 Sec. (Note 2)
10-Digit Number	11.3 Sec. (Note 2)
False Attempt	3.0 Sec.

Note: When special toll call (0+) service is provided, add 4 second holding time to operator calls for the time-out feature used to discriminate between (0+) and (0-) calls.

Note: Add 0.8 seconds for each digit dialled for toll call prefixes.

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2.6.6.12 Table 8: CMR Modem Holding Times

Table 8: CMR Modem Holding Times

Service	Avg. Modem HT (sec.)	Max. Modem HT (sec.)
CND	0.20	1.0
CNAMD	0.20	1.0
CIDCW	0.90	1.0
DCIDCW	0.87	1.0
VSLE	0.20 per entry logged	N/A
CALLOG	0.20 per entry logged	N/A
BCLID	Dedicated	Dedicated

Note: The average holding time calculations for VSLE and CALLOG each involve the number of logged entries in the downloaded lists.

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2.6.6.13 Table 9: DWS ISUP Trunks HDBH (CCS)

Table 9: DWS ISUP Trunks HDBH (CCS)
(Carried Load)
Blocking = 1 %

H0 / H11 LOAD RATIOS					
# DS1s	0/100	20/80	30/70	40/60	50/50
4	686	296	261	245	302
5	1147	822	807	823	876
6	1607	1347	1353	1400	1450
7	2068	1873	1899	1978	2024
8	2528	2398	2445	2555	2598
9	3187	2898	3023	3096	3153
10	3845	3398	3601	3637	3708
11	4462	3981	4169	4265	4331
12	5079	4563	4737	4893	4954
13	5698	5154	5288	5494	5556
14	6317	5745	5839	6095	6157
15	6949	6390	6509	6694	6755
16	7581	7035	7179	7293	7353
17	8228	7747	7827	7909	8002
18	8875	8459	8475	8524	8651
19	9555	9105	9138	9187	9279
20	10235	9750	9800	9850	9907
21	10802	10221	10245	10602	10697
22	11417	10771	10822	11189	11293
23	12042	11327	11406	11784	11897
24	12677	11889	11999	12386	12508
25	13320	12456	12599	12996	13128
26	13973	13029	13208	13613	13755

Table 9: DWS ISUP Trunks HDBH (CCS)
(Carried Load)
Blocking = 1 %

H0 / H11 LOAD RATIOS					
# DS1s	50/50	60/40	70/30	80/20	0/100
4	302	341	539	609	1651
5	876	915	1080	1187	2430
6	1450	1489	1620	1764	3209
7	2024	2063	2161	2342	3988
8	2598	2637	2701	2919	4767
9	3153	3206	3257	3448	5425
10	3708	3774	3813	3977	6083
11	4331	4410	4489	4662	6838
12	4954	5046	5165	5347	7593
13	5556	5632	5782	5982	8327
14	6157	6217	6399	6617	9060
15	6755	6914	7070	7298	9956
16	7353	7611	7741	7979	10851
17	8002	8186	8275	8479	11589
18	8651	8761	8809	8978	12326
19	9279	9355	9550	9779	13060
20	9907	9949	10291	10579	13793
21	10697	10739	10892	11201	14544
22	11293	11344	11512	11836	15300
23	11897	11956	12142	12480	16063
24	12508	12577	12780	13133	16831
25	13128	13207	13428	13795	17605
26	13755	13845	14085	14467	18385

Table 9: DWS ISUP Trunks HDBH (CCS)
(Carried Load)
Blocking = 1 %

H0 / H11 LOAD RATIOS					
# DS1s	0/100	20/80	30/70	40/60	50/50
27	14634	13608	13825	14238	14391
28	15305	14193	14449	14870	15034
29	15986	14783	15082	15510	15685
30	16675	15379	15723	16157	16344
31	17374	15981	16372	16811	17011
32	18082	16589	17029	17473	17685
33	18799	17202	17694	18143	18368
34	19525	17821	18367	18820	19058
35	20261	18446	19048	19505	19757
36	21005	19077	19737	20197	20463
37	21759	19713	20435	20896	21177
38	22523	20356	21140	21603	21899
39	23295	21004	21853	22318	22628
40	24077	21657	22575	23040	23366
41	24867	22317	23304	23769	24112
42	25667	22982	24042	24506	24865
43	26477	23653	24787	25251	25626
44	27295	24330	25541	26003	26395
45	28123	25012	26302	26762	27172
46	28960	25701	27072	27529	27957
47	29806	26395	27850	28303	28750
48	30661	27095	28636	29085	29550
49	31526	27800	29429	29875	30359
50	32400	28512	30231	30672	31175

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Table 9: DWS ISUP Trunks HDBH (CCS)
(Carried Load)
Blocking = 1 %

H0 / H11 LOAD RATIOS					
# DS1s	50/50	60/40	70/30	80/20	0/100
27	14391	14492	14751	15148	19170
28	15034	15147	15426	15838	19962
29	15685	15810	16111	16537	20759
30	16344	16482	16805	17245	21562
31	17011	17162	17508	17963	22371
32	17685	17851	18220	18690	23186
33	18368	18548	18941	19426	24006
34	19058	19254	19672	20171	24833
35	19757	19968	20412	20926	25665
36	20463	20691	21161	21690	26503
37	21177	21422	21919	22463	27346
38	21899	22161	22687	23245	28196
39	22628	22909	23463	24036	29051
40	23366	23665	24249	24837	29913
41	24112	24430	25045	25647	30780
42	24865	25203	25849	26466	31653
43	25626	25985	26662	27294	32531
44	26395	26775	27485	28132	33416
45	27172	27574	28317	28978	34306
46	27957	28381	29159	29834	35202
47	28750	29196	30009	30699	36104
48	29550	30020	30869	31574	37012
49	30359	30852	31737	32457	37926
50	31175	31693	32616	33350	38845

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2.6.6.14 Table A: Attendant Console Traffic Capacity

Table A: Attendant Console Traffic Capacity
Speed of Answer = 4 seconds

ATTENDANT CONSOLE ACTIVATED CCS/36	ATTENDANT WORK TIMES (AWT) IN SECONDS					
	16	20	30	40	60	80
31	2.36	2.69	3.63	3.89	4.69	5.31
32	2.38	2.70	3.66	3.92	4.72	5.35
33	2.39	2.72	3.68	3.96	4.77	5.40
34	2.40	2.74	3.71	3.99	4.81	5.45
35	2.41	2.76	3.73	4.03	4.86	5.50
36	2.42	2.78	3.76	4.06	4.90	5.55
37	2.43	2.79	3.78	4.09	4.93	5.59
38	2.44	2.80	3.81	4.12	4.96	5.62
39	2.45	2.81	3.83	4.15	4.99	5.66
40	2.46	2.82	3.85	4.18	5.02	5.70
41	2.47	2.83	3.86	4.19	5.06	5.74
42	2.48	2.84	3.87	4.21	5.09	5.78
43	2.49	2.85	3.88	4.22	5.13	5.82
44	2.50	2.86	3.89	4.24	5.17	5.86
45	2.51	2.87	3.90	4.25	5.20	5.90
46	2.52	2.89	3.93	4.28	5.23	5.94
47	2.53	2.90	3.95	4.31	5.25	5.98
48	2.54	2.91	3.98	4.34	5.28	6.02
49	2.55	2.92	4.00	4.37	5.31	6.06
50	2.56	2.93	4.03	4.40	5.34	6.10
51	2.56	2.94	4.04	4.41	5.36	6.12
52	2.57	2.95	4.06	4.42	5.38	6.15
53	2.58	2.96	4.07	4.43	5.41	6.17
54	2.58	2.97	4.09	4.44	5.43	6.20
55	2.59	2.98	4.10	4.45	5.45	6.22
56	2.60	2.99	4.12	4.47	5.48	6.26
57	2.60	3.00	4.14	4.49	5.51	6.29
58	2.61	3.01	4.16	4.51	5.54	6.33
59	2.62	3.02	4.18	4.53	5.57	6.37
60	2.62	3.03	4.20	4.55	5.60	6.40

Table A: Attendant Console Traffic Capacity
Speed of Answer = 4 seconds

ATTENDANT CONSOLE ACTIVATED CCS/36	ATTENDANT WORK TIMES (AWT) IN SECONDS					
	16	20	30	40	60	80
61	2.63	3.03	4.21	4.57	5.62	6.42
62	2.63	3.04	4.22	4.59	5.64	6.44
63	2.64	3.04	4.24	4.61	5.66	6.46
64	2.64	3.05	4.26	4.63	5.68	6.48
65	2.65	3.05	4.28	4.66	5.70	6.50
66	2.65	3.06	4.28	4.66	5.72	6.52
67	2.66	3.07	4.29	4.67	5.74	6.54
68	2.67	3.08	4.30	4.68	5.76	6.56
69	2.67	3.09	4.31	4.69	5.78	6.58
70	2.68	3.10	4.32	4.70	5.80	6.70
71	2.68	3.11	4.33	4.72	5.82	6.72
72	2.69	3.12	4.34	4.74	5.84	6.73
73	2.69	3.13	4.36	4.76	5.86	6.74
74	2.70	3.14	4.38	4.78	5.88	6.75
75	2.70	3.15	4.40	4.80	5.90	6.76
76	2.71	3.16	4.41	4.82	5.92	6.77
77	2.71	3.17	4.42	4.84	5.94	6.77
78	2.72	3.18	4.43	4.86	5.96	6.78
79	2.72	3.19	4.45	4.88	5.98	6.79
80	2.73	3.20	4.46	4.90	6.00	6.90

2.7 Product/System Specification

2.7.1 Physical Characteristics

Not applicable.

2.7.2 EMI/Earthquake Information

Not applicable.

2.7.3 Sparing Information

Not applicable.

2.7.4 Power Feed and Fusing Requirements

Not Applicable.

2.7.5 Current Drain Information

Not Applicable.

2.8 Software Provisioning

Not Applicable.

2.8.1 Required Software Packages and Interdependencies

Not applicable.

2.8.2 Software Usage Restrictions

Not applicable.

2.8.3 Memory Provisioning

Not applicable.

2.9 Real Time Impact

Not applicable.

Chapter 20

FEATURE ENGINEERING

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1.0 ECM174 - Automatic Identification of Outward Dialling (AIOD)

1.1 Overview

AIOD provides a means of billing outgoing calls from a PBX to individual PBX stations. The telephone call from a PBX may appear to DMS on a PBX line or a PBX trunk.

AIOD information relating to a telephone call on a particular PBX line or PBX trunk is provided over a separate data link between the PBX and the Host office. There may be one or more data links between one or more PBX's and the Host office.

The AIOD feature is optional. The V.O. office is Stevens Point H 1247-0 with a D date of wk 39/83.

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

Not applicable.

1.2.2 Hardware Dependencies

Not applicable.

1.2.2.1 P and C Side Port Requirements

Not applicable

1.2.2.2 DMS BUS Port Requirements

Not applicable

1.2.2.3 Circuits Per Card

Not applicable

1.2.2.4 Discrimination Numbering

Not applicable

1.2.3 Provisioning Considerations

The AIOD Data Receiver - C25 (NT2X01AA) circuit pack is required to support the AIOD feature.

One NT2X01AA card has four (4) circuits. Each circuit terminates a data channel or link between a PBX and a central office, providing the signalling supervision and data receiver required to accept, via the C25 - type signalling mode, the information re-

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quired to identify the PBX station number of the station originating the outgoing call.

The circuit provides an incoming signalling and voice grade facility interface between an MTM of a DMS-100 Family switch and the data sending circuit of the far end or connecting PBX. The circuit is designed to interface with the 118A Interconnecting Unit or equivalent PBX AIOD equipment which utilizes C25 signalling.eg. typical connecting circuit - SD1E239-01

Each NT2X01AA card provides four (4) incoming 2-wire trunk type appearances for four (4) data channels and occupies the space of two (2) card slots in an MTM, NT2X58AC. Each PBX requires a minimum of one (1) data channel. A maximum of six (6) NT2X01AA circuit packs, i.e. 24 AIOD receivers, can be accommodated in an MTM. The first of four receivers on a single AIOD pack must be placed in an MTM circuit number which is divisible by four (4) (i.e., circuits 0, 4, 8, 12,16, 20).

DMS will support a maximum of 60 data links.

Based on average PBX traffic samples, an MTM equipped with the maximum of six (6) NT2X01AA packs will support approximately 460,000 PBX lines or stations.

Limitations on the capacity of the AIOD feature for DMS may arise within the PBX ANI equipment or the particular connecting arrangement provided. For example, BSP 463-380-101 for the 118A Interconnecting Unit states "One Connecting Arrangement C25 and its associated voice grade private line has the capacity to handle the identification for up to 250 outgoing trunks depending upon the call attempts and the traffic load on the C0".

Based On

- (a) a typical PBX line to outgoing trunk ratio of 10 to 1,
- (b) the maximum capacity of the C25 Connecting Arrangement (as quoted above),
- (c) the traffic load on the C0,

the full MTM with 24 data links would handle $250 \times 24 = 6000$ trunks (for 60,000 PBX lines or stations). With 60 data links, this would increase to a maximum of 15,000 trunks.

Provisioning of the AIOD Data Receiver - C25 card is dependent upon the security or backup arrangement selected by the customer.

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Three arrangements are supported by DMS:

1. Single Data Link, Single Receiver (Figure 1)

In this configuration, a single data link is provided between the PBX and the DMS office, with a single AIOD receiver servicing that link.

Should an unrecoverable fault condition occur on a particular data channel, the channel is taken out-of-service, and billing assigned to the default PBX billing number for the duration of the fault. Maintenance action is required to replace the card (all four data channels on the card being affected) and to return the AIOD receiver to service.

The disadvantage of this method is that when one PBX channel fails, all four (4) channels on the AIOD card must be affected to replace the faulty card. However, the reliability of the equipment is expected to be high enough to justify this approach, and single channel faults are expected to be rare.

2. Single Data Link, Parallel Wired Standby Receiver (Figure 2)

This method provides a standby AIOD receiver, in addition to the active receiver, dedicated to each in-service data link. The standby is located in a separate MTM (preferably powered from a different bus than the 'active MTM'), but wired in parallel from the MDF to all four (4) data links. The receiver channels, when in a standby mode, are disabled. When a fault occurs in an active receiver channel, CC software re-directs the AIOD data to the standby receiver by setting the faulty circuit man-busy, and returning the standby to service (and raises an alarm condition). Maintenance action consists of forcing all four (4) channels onto their standby receivers in order to change the faulty card without degrading the service of the other three (3) channels.

This method does not, however, protect against data link faults occurring remotely to any particular receiver channel.

3. Duplicate Data Link and Receiver (Figure 3)

This method supports more than one AIOD data link for a particular PBX. Depending upon the logic of the PBX AIOD sending equipment, the second data link may be used in a standby mode, as in method 2, or in a work-sharing mode. Maintenance activity is the same as in method 2. This method provides the advantages of method 2, and also allows a PBX to maintain AIOD traffic even when one data link is down.

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1.2.4 Office Layout Information

Not applicable.

1.2.5 Traffic Tables

Not applicable.

1.3 Product/System Specification

1.3.1 Physical Characteristics

Not applicable.

1.3.2 EMI/Earthquake Information

Not applicable.

1.3.3 Sparing Information

Not applicable.

1.3.4 Power Feed and Fusing Requirements

Not applicable.

1.3.5 Current Drain Information

Not applicable.

1.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

Order the appropriate optional software feature package (i.e. NTX174AA (AIOD), Automatic Identification of Outward Dialling).

1.4.2 Software Usage Restrictions

Not applicable.

1.4.3 Memory Provisioning

Not applicable.

1.5 Real Time Impact

Not applicable.

2.0 ECM179 - Mechanized Calling Card Service (MCCS)

2.1 Overview

MCCS is a feature set introduced to reduce operator involvement in credit card type calls and to reduce the fraudulent use of telephone calling cards, and of third number and collect billing.

MCCS replaces the operator's involvement by using digitally recorded announcements to instruct the customer to dial his card number, by using digitone receivers to receive the number, and by exchanging Direct Signalling messages over the CCIS network with a Billing Validation Center to validate the card number.

MCCS will allow the subscribers to enter their calling card numbers via a digitone telephone. Subscribers using rotary dial instruments will be routed to the operator and will give the calling card number verbally to the operator. In either case the calling card number is validated in a centralized data base using Common Channel Interoffice Signalling - Direct Signalling (CCIS-DS) as a means of data base access.

The optional MCCS feature can be provided in DMS-200 TOPS and DMS-100/200 TOPS switches.

The MCCS Digital Recorded Announcement Machine and the digitone receiver pool are used for a portion of time on all calls that originate from MCCS capable lines, whether or not a calling card is actually circuit packs to provide the basic MTM functions. Reference ECM 531 for EDRAM information and provisioning.

| The Manufacturer Discontinued (MDd) DRA Module consists of the DRA shelf and circuit packs, and has been replaced by the single slot EDRAM CP (NT1X80AA). The DRA shelf is a modified version of the Maintenance Trunk Module (MTM). It must be equipped with the appropriate MTM controller circuit packs and power converter circuit packs to provide the basic MTM functions. Reference ECM 531 for EDRAM information and provisioning.

2.1.1 MCCS Capability Requirements

To be MCCS capable:

1. the line must be digitone,
2. the line must be automatically identified,

3. the call must be 0+ (01+), and
4. the line must be marked as M CCS capable by Originating Station Treatment (OST) checks.

2.1.2 Originating Station Treatment

When M CCS is introduced, a demand is created for the M CCS announcement machine and for digitone receivers. To minimize the number of service circuits required and to reduce any unnecessary increase in call holding time, Originating Station Treatment (OST) is used.

OST is the first step in processing 0+ (01+) automatically identified calls and identifies the M CCS treatment to be given. There are three OST classes:

1. No customer-dialed M CCS service is given. A 0+ (01+) call is routed directly to an operator queue for special billing handling.
2. Alerting tone only is heard by the calling party. This means that the initial prompt the subscriber hears consists of prompt tone only. This is usually the treatment for calls originating from non-public subscriber lines.
3. Alerting tone plus follow up voice announcement instructing the subscriber to enter a calling card number.

Certain data, such as how many of the served lines are digitone equipped, how many are ANI, and how many have OST check that indicates M CCS service is possible, can be obtained from records. The number of 0+ (01+) calls can be estimated based on experience and forecast.

The appropriate software packages and interdependencies must be ordered.

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2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

2.2.2 Hardware Dependencies

2.2.2.1 P and C Side Port Requirements

2.2.2.2 DMS BUS Port Requirements

Not applicable

2.2.2.3 Circuits Per Card

2.2.2.4 Discrimination Numbering

2.2.3 Provisioning Considerations

2.2.3.1 MCCS Digital Recorded Announcement (DRA) Machine

The MCCS DRA machine will provide digitally recorded announcements for use during handling of automated credit card calls.

It differs from an announcement machine used for conventional announcements in that the messages are not broadcast. Instead, when using the MCCS announcement machine, any one of several announcements may be directed to any one or more of the 30 (maximum) time slots available in each MCCS machine. The MCCS machine is considered a service circuit in that a particular time slot or announcement port is connected to an MCCS call only when required.

MCCS announcement service circuits serving MCCS traffic will be provisioned on a loss basis in DMS toll TOPS and local/toll TOPS offices. Use Poisson Table P0.001.

Each MCCS announcement machine has 30 service circuit ports but one of the 30 is dedicated to maintenance use. The number of MCCS announcement machines required for traffic is equal to the number of MCCS announcement service circuits required divided by 29 and rounded up to the next whole number. An additional one MCCS announcement machine is added in order to provide service protection in the event of failure of one of the MCCS announcement machines.

Announcements

The following announcements and tones are recorded on the Standard Announcement circuit pack NT1X76CA.

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- Announcement #1:

Prompt announcement on a customer dialed M CCS call using the tone plus prompt announcement OST:

"Please dial your card number or 0 for an operator now."
- Announcement #2:

A customer dialing error has occurred on a customer dialed M CCS call:

"Please dial your card number again now. (Pause) The card number you have dialed is not valid."
- Announcement #3:

Prompt announcement after an error has occurred and the alerting tone has been given:

"Please dial your card number."
- Announcement #4:

An invalid calling card number was entered and the error threshold has been reached. The customer must hang up and reoriginate the call:

"Please hang up and dial 0 plus the number you are calling. (Pause) The card number you have dialed is not valid."
- Announcement #5:

Prompt announcement on a customer dialed M CCS sequence call:

"You may dial another call now."
- Announcement #6:

A customer dialing error has occurred on a customer dialed M CCS sequence call:

"Please dial the number you are calling now. (Pause) The number you have dialed is not correct."
- Announcement #7:

Prompt announcement after an error has occurred on a sequence call:

"Please dial the number you are calling."
- Announcement #8:

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An invalid called number was entered and the error threshold has been reached. The customer must hang up and reoriginate the call:

"Please hang up and dial 0 plus the number you are calling.
(Pause) The number you have dialed is not correct."

- Announcement #9:

Termination announcement after error threshold has been reached without another number being entered:

"Please hang up and dial 0 plus the number you are calling."

- Announcement #10:

Reply to an inward, non-TOPS validation: valid calling card number, unrestricted PIN, known RAO:

"Valid number, unrestricted PIN, RAO XXX."

- Announcement #11:

Reply to an inward, non-TOPS validation: valid calling card number, restricted PIN, known RAO:

"Valid number, restricted PIN, RAO XXX."

- Announcement #12:

Reply to an inward, non-TOPS validation: valid calling card number, unrestricted PIN, unknown RAO:

"Valid number, unrestricted PIN, RAO unavailable."

- Announcement #13:

Reply to an inward, non-TOPS validation: invalid calling card number:

"Invalid number, please dial again now."

- Announcement #14:

Reply to an inward, non-TOPS validation: invalid calling card number, error threshold reached:

"Invalid number, please hang up."

- Announcement #15:

Error announcement given to customers who dial a new forward number that is restricted as a sequence call:

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"Please hang up and dial direct. (Pause) This number cannot be dialed as a sequence call."

- Announcement #16:

The following announcement is applicable whenever the subscriber has entered the card number correctly:

"Thank you."

- Announcement #17:

Alert tone prompt for calling card dialing. This is a complex tone consisting of 60 ms DTMF #-tone (941/1477 Hz at -10dBm) followed immediately by 940 ms of exponentially decayed dial tone (440/350 Hz with time constant of 200 ms initially at -10dBm).

In announcements #10 and #11, the XXX corresponds to the RAO number and is generated, digit-by-digit, by the MCCS announcement machine in accordance with the CCIS-DS response from the BVC.

MTM Requirements

Each MCCS announcement machine requires one Maintenance Trunk Module (MTM) NT2X58AK. This MTM is comprised of shelf hardware and common circuit packs to provide interface to the DMS network (one network port and 30 time slots) and to the MCCS announcement circuit packs.

One Enhanced Digital Recorded Announcement Controller CP NT1X75BA is required per MCCS announcement machine. This circuit pack provides control of application and recording of announcements.

Standard Announcement CP

One MCCS Standard Announcement CP NT1X76CA is required per MCCS announcement machine. This circuit pack contains all the voice messages to support the MCCS feature set. The memory used is double density. Erasable Programmable Read Only Memory (EPROM).

Custom Announcement CP

The MCCS Custom Announcement CP NT1X79AA is an optional circuit pack, required only if the customer wishes to offer voice responses not included on the MCCS Standard Announcement circuit pack. Electrically Erasable Programmable Read Only Memory (EEPROM) is used as memory, allowing the customer to record or rerecord messages. This card can hold up to 31 seconds of recording. EEPROM

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speech memory is provisioned based on total recording time in seconds per MCCS system. An announcement can run over two NT1X79AA cards associated with the same controller card. However, it must not be split over two controllers.

Max Number of Announcement CPs

To determine the maximum number of MCCS announcement cards that may be engineered onto one MTM shelf, use the following chart. For each of the speech memory cards supplied for one shelf, add the virtual card credit (128K - eight bit). The total must not exceed eight. For example, one NT1X76CA plus five NT1X79AA cards total seven, so one more card may be added if its vcard credit is only one.

MCCS SPEECH MEMORY CARD

CARD ----	PEC ---	VCARD CREDIT -----
ROM	NT1X76CA	2
EEPROM	NT1X79AA	1

2.2.3.2 MCCS DRA Machine Provisioning Procedure

1. Determine the total Average Busy Season Busy Hour Attempt (ABSBHA) for all 0+, 01+, ANI traffic with an OST indication of MCCS capable. This will be the sum of all incoming trunk groups as well as local originating traffic in the case of DMS-100/200/TOPS.
2. Determine the probability that the 0+ or 01+ call marked by OST as MCCS capable is actually a subscriber dialed MCCS call. This is difficult to predict and a value of 0.15 to 0.60 can be used.
3. Determine the complement of item 2. This is the probability that the 0+ or 01+ call marked by OST as MCCS capable is an operator handled call. The sum of item 2 and item 3 should be 1.
4. Multiply the value of item 2 by 37 seconds (the digitone receiver holding time for MCCS calls).
5. Multiply the value of item 3 by 6 seconds (the average holding time of the digitone receiver for non-MCCS calls when marked by OST as MCCS capable).

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6. Add the value of items 4 and 5. This is the Weighted Average Holding Time (WAHT) of the digitone receivers of all 0+ and 01+ calls marked by OST as MCCA capable.
7. Multiply the value of item 2 by 19 seconds (the MCCA announcement machine holding time for MCCA calls).
8. Add the value of items 5 and 7. This is the WAHT of the MCCA announcement machine of all 0+ and 01+ calls marked by OST as MCCA capable.
9. To obtain the traffic usage in CCS offered to the MCCA announcement machine, multiply the value of item 1 by the value of item 8, and divide by 100 to convert to CCS.
10. Using Poisson Table P0.001, determine the number of MCCA announcement service circuits required (using the value of item 9).
11. To determine the number of MCCA announcement machines required for traffic, divide item 10 by 29, round up to the next whole number, and add 1.
12. Each MCCA announcement machine requires one Maintenance Trunk Module (MTM), NT2X58AK. Enter the number of MCCA MTM's required for traffic.
13. If the customer wishes to offer voice responses not included on the MCCA Standard Announcement circuit pack, enter the number of seconds of recording required per MCCA group.
14. Determine the number of NT1X79AA MCCA Custom Announcement cards required per MCCA group by dividing item 13 by 31 seconds.
15. Determine the number of MCCA MTM's per MCCA group required to accommodate the NT1X79AA cards by dividing item 14 by 6. Since each MCCA announcement machine requires one MCCA Standard Announcement card, a maximum of 6 NT1X79AA cards can be mounted on a MCCA MTM.
16. The number of MCCA MTM's per office required is equal to the value of item 12 multiplied by the value of item 15.

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17. One Enhanced Digital Recorded Announcement Controller CP NT1X75BA is required per MCCA announcement machine MTM. Enter the number of circuit packs required.
18. One MCCA Standard Announcement CP NT1X76CA is required per MCCA MTM. Enter the number of circuit packs required.
19. The number of MCCA Custom Announcement cards NT1X79AA is equal to the value of item 14 multiplied by the value of item 12.

MCCA DRA Machine Calculation Form

	<u>EXIST</u>	<u>PROP.</u>	<u>NOTE</u>
1. Total ABSBHA for all 0+, 01+, ANI traffic determined by OST to be MCCA capable.	_____	_____	_____
2. Probability of subscriber dialed MCCA call.	_____	_____	_____
3. Probability of operator handled call.	_____	_____	_____
NOTE: Sum of item 2 and item 3 should be 1.			
4. Item 2 x 37 seconds	_____	_____	_____
5. Item 3 x 6 seconds	_____	_____	_____
6. Item 4 + Item 5 Weighted Average Holding Time of digitone receivers.	_____	_____	_____
7. Item 2 x 19 seconds	_____	_____	_____
8. Item 5 + Item 7 Weighted Average Holding Time of MCCA announcement machine.	_____	_____	_____
9. Item 1 x Item 8 / 100 MCCA announcement machine traffic usage in CCS.	_____	_____	_____
1 . Number of MCCA announcement service circuits required.	_____	_____	_____
1 . Number of MCCA announcement machines required.	_____	_____	_____
1 . Number of MCCA MTM's required for traffic.	_____	_____	_____
1 . Number of seconds of Custom Announcement recording required per MCCA group.	_____	_____	_____

	<u>EXIST</u>	<u>PROP.</u>	<u>NOTE</u>
14. Number of NT1X79AA MCCA Custom Announcement cards required per MCCA group.	_____	_____	_____
15. Number of MCCA MTM's per MCCA group required to accommodate the NT1X79AA cards.	_____	_____	_____
16. Number of MCCA MTM's per office required.	_____	_____	_____
17. Number of Enhanced Digital Recorded Announcement Controller cards NT1X75BA required.	_____	_____	_____
18. Number of MCCA Standard Announcement cards NT1X76CA required.	_____	_____	_____
19. Number of MCCA Custom Announcement cards NT1X79AA required.	_____	_____	_____

2.2.3.3 Digitone Receiver Circuits Provisioning Considerations

1. To support MCCA, it is necessary to provide digitone receivers that are attached as service circuits to an MCCA call during periods when digitone signalling is permitted or expected.
2. Typically, DMS toll TOPS offices and the toll side of local/toll TOPS offices are not provisioned with digitone receivers. The introduction of MCCA will necessitate the inclusion of this new resource in DMS toll offices.
3. The digitone receiver used is the same circuit pack (NT2X48AB) as is used in the DMS-100.
4. A separate group of digitone receivers dedicated to MCCA should be engineered in each office.
5. Digitone receivers serving MCCA traffic will be provisioned on a loss basis in DMS toll TOPS and local/toll TOPS offices. Use Poisson Table P0.001.

2.2.3.4 Digitone Receiver Circuits Provisioning Procedure

1. Determine the total Average Busy Season Busy Hour Attempt (ABSBHA) for all 0+, 01+, ANI traffic with an OST indication of MCCA capable. This will be the sum of all incoming trunk groups as well as local originating traffic in the case of DMS-100/200/TOPS.

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2. Determine the probability that the 0+ or 01+ call marked by OST as MCCS capable is actually a subscriber dialed MCCS call. This is difficult to predict and a value of 0.15 to 0.60 can be used.
3. Determine the complement of item 2. This is the probability that the 0+ or 01+ call marked by OST as MCCS capable is an operator handled call. The sum of item 2 and item 3 should be 1.
4. Multiply the value of item 2 by 37 seconds (the digitone receiver holding time for MCCS calls).
5. Multiply the value of item 3 by 6 seconds (the average holding time of the digitone receiver for non-MCCS calls when marked by OST as MCCS capable).
6. Add the value of items 4 and 5. This is the Weighted Average Holding Time (WAHT) of all 0+ and 01+ calls marked by OST as MCCS capable (i.e. Weighted Average Holding Time of digitone receivers).
7. To obtain the traffic usage in CCS offered to the digitone receivers, multiply the value of item 1 by the value of item 6, and divide by 100 to convert to CCS.
8. Using Poisson Table P0.001, determine the number of digitone receiver circuits required (using the value of item 7).
9. Each digitone receiver card contains four digitone receiver circuits. The number of digitone receiver cards is determined by dividing the number of digitone receiver circuits by four and rounding up to the next whole circuit pack.

Digitone Receiver Circuits Provisioning Form

EXIST PROP.

NOTE

1. Total ABSBHA for all 0+, 01+, ANI traffic determined by OST to be MCCS capable.	_____	_____	_____
2. Probability of subscriber dialed MCCS call.	_____	_____	_____
3. Probability of operator handled call.	_____	_____	_____
NOTE: Sum of item 2 and item 3 should be 1.			
4. Item 2 x 37 seconds	_____	_____	_____

5. Item 3 x 6 seconds	_____	_____	_____
6. Item 4 + Item 5 Weighted Average Holding Time of digitone receivers.	_____	_____	_____
7. Item 1 x Item 6 / 100 Digitone receivers traffic usage in CCS.	_____	_____	_____
8. Number of digitone receiver circuits required.	_____	_____	_____
9. Number of digitone receiver cards required.	_____	_____	_____

2.2.3.5 CCIS-DS Provisioning Considerations

1. MCCS is a feature that uses Common Channel Interoffice Signalling - Direct Signalling (CCIS-DS) as the vehicle to carry messages to centralized data bases and back to the DMS.
2. Hence, it is required that at least the minimum CCIS equipment for CCIS-DS be provided prior to or concurrent with MCCS, that is, message switch and buffer 6 (MSB6) and signal layer hardware.
3. DTC's are not required to support CCIS-DS.

2.2.3.6 CCIS-DS Provisioning Procedure

Provide the normal CCIS hardware.

2.2.4 Office Layout Information

Not applicable.

2.2.5 Traffic Tables

Not applicable.

2.3 Product/System Specification

2.3.1 Physical Characteristics

2.3.2 EMI/Earthquake Information

2.3.3 Sparing Information

Not applicable.

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2.3.4 Power Feed and Fusing Requirements

2.3.5 Current Drain Information

2.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

2.4.1 Required Software Packages and Interdependencies

2.4.2 Software Usage Restrictions

2.4.3 Memory Provisioning

Not applicable.

2.5 Real Time Impact

3.0 ECM203 - Automatic Identification of Outward Dialling (AIOD)

3.1 Overview

Concerning the possible configurations which are supported to assign the AIOD data links to the data receivers, a fourth configuration is possible in addition to the three shown in the above referenced ECM.

For the fourth arrangement, the configurations described in methods 2 and 3 may be combined to provide a standby receiver for each of the duplicated data links.

In summary, the four configurations supported by DMS are:

- 1) Single Data Link, Single Receiver
- 2) Single Data Link, Parallel Wired Standby Receiver
- 3) Duplicate Data Link and Receiver
- 4) Duplicate Data Link and Receiver, Parallel Wired Standby Receiver

3.2 Hardware Provisioning

3.2.1 Hardware Usage Restrictions

3.2.2 Hardware Dependencies

3.2.2.1 P and C Side Port Requirements

3.2.2.2 DMS BUS Port Requirements

Not applicable

3.2.2.3 Circuits Per Card

3.2.2.4 Discrimination Numbering

3.2.3 Provisioning Considerations

3.2.4 Office Layout Information

Not applicable.

3.2.5 Traffic Tables

Not applicable.

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3.3 Product/System Specification

3.3.1 Physical Characteristics

3.3.2 EMI/Earthquake Information

3.3.3 Sparing Information

Not applicable.

3.3.4 Power Feed and Fusing Requirements

3.3.5 Current Drain Information

3.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

3.4.1 Required Software Packages and Interdependencies

3.4.2 Software Usage Restrictions

3.4.3 Memory Provisioning

Not applicable.

3.5 Real Time Impact

4.0 ECM247 - Dial-Up Autoquote

4.1 Overview

The Dial-Up Autoquote feature allows hotel billing data to be accumulated and transmitted to a receiving device over a switched network path. When the receiving device is identified by the switch as being a Dial-Up Autoquote (DUAQ) device, the billing record is placed in the DUAQ queue. When the collection threshold is reached or the holding time expires, a network path to the hotel premise device is established and the billing records are transmitted. After the last record is transmitted, the network path is released. Whenever a new collection of records is ready for transmission, a new network path is established. Modems that are available for DUAQ are placed into availability queues for allocation on a random basis.

The Dial-Up Autoquote feature uses the NT3X02BA signal processor in a stand-alone configuration and an analog modem which is cross-connected to an incoming trunk and then out to the device via any line or trunk circuit.

4.2 Hardware Provisioning

4.2.1 Hardware Usage Restrictions

Previous DUAQ documentation specified different versions of the hardware components for this feature. Investigation has revealed problems unless the versions specified in this document are utilized.

4.2.2 Hardware Dependencies

The Dial-Up Autoquote feature requires the NT3X02BA mounted on an MTM shelf and used in a stand-alone configuration. This circuit pack is generally used with the NT3X03-- mounted in the slot to its right but this must not be done for DUAQ, since this will disable all four ports on the NT3X02BA.

A UDS 224A modem is used with the NT3X02BA at the host switch and is cross-connected to an incoming trunk and then out to the hotel on a line or trunk. The incoming trunk must be an NT2X81AB (2 wire, 600 ohm, E&M), which mounts on a TM8 shelf.

4.2.2.1 P and C Side Port Requirements

4.2.2.2 DMS BUS Port Requirements

Not applicable

4.2.2.3 Circuits Per Card

4.2.2.4 Discrimination Numbering

4.2.3 Provisioning Considerations

Determine the number of DUAQ circuits required per the following parameters. Actual busy hour usage should be calculated two ways, one in relation to buffer holding time and one relative to buffer threshold.

4.2.4 Traffic Calculations

1. CCS/Hotel Calculation relative to buffer time:

$$N = 60 \text{ Min.} / X \text{ Min.}$$

$$R = Y / N$$

$$S = E + F + G + Z$$

$$HT = S + (Q \times R) + (A \times R)$$

$$HTc = (Q \times C) + (C \times A)$$

$$HTd = S$$

$$CCS/HOTEL = \frac{(N \times HT) + (N \times HTc) + (D \times HTd)}{100}$$

2. CCS/Hotel calculation relative to threshold:

$$N = Y / B$$

$$S = E + F + G + Z$$

$$HTc = (Q \times C) + (C \times A)$$

$$HTd = S$$

$$HT = S + (Q \times B) + (A \times B)$$

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$$\text{CCS/HOTEL} = \frac{(N \times \text{HT}) + (N \times \text{HTc}) + (D \times \text{HTd})}{100}$$

X = Buffer Time	Billing record queue holding time. Telco selected from 1 to 10 minutes.
Y = Billed Calls per Busy Hour	Telco Provided.
Z = Average Time to Seize a Trunk	BNR calculated at 2 seconds
Q = Transmission Time per Record	BNR calculated at 5 seconds at 300 BPS.
N = Number of Sessions per Hour	Calculated above.
B = Threshold	Billing record queue threshold value. Telco selected from 1 to 5 call records.
R = Number of Call Records per Session	Calculated above.
S = Set Up Time per Session	Total time to seize a trunk and set up the network path including protocol handshaking time. Calculated above.
E = Wait Time for Receiving Answer From Device	Telco selected from 12 to 60 seconds.
F = Wait Time for Receiving Carrier From Device	Telco selected from 2 to 10 seconds.
G = Wait Time for Receiving 'ACK' Message After Carrier From Device	Telco selected from 2 to 10 seconds.
A = Wait Time for Receiving 'ACK' Message from Device Before Transmitting Each Record.	Telco selected from 2 to 10 seconds.
C = Average Number of Record Retransmissions per Session Allowed by Customer.	See note.
D = Number of Network Connect Retries to a DUAQ Device.	Telco selected from 1 to 6 See note.
HT = Transmission Circuit Holding Time (Normal Traffic).	
HTc = Record Retransmission Holding Time per Session.	

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HTd = Network Path Reconnect Holding Time.

NOTE: Transmission failures can occur as a result of the following:

- No modem available.
- All trunks busy. (Results in records being routed to the Voice Quote TTY located at the Hotel Billing Information Center for verbal quotation.)
- Outpulse or network connection failure.
- No answer received from device.
- No carrier received from device.
- No 'ACK' message received from device after carrier. (The existing connection is dropped and a new connection is retried.)

Retransmission of a record will occur immediately if no 'ACK' message is received from the device after each record is transmitted. The network path will be disconnected if no 'ACK' message is received after retransmission.

3. CIRCUIT QUANTITY CALCULATIONS

After calculating the dial-up autoquote usage for each hotel, determine the total usage (sum of all hotels) for calculation A and B. Use the highest traffic figure (total for calculation A or B) and refer to the Poisson traffic table (NTP 297-1001-450) for total circuits required.

The actual quantity of DUAQ circuits required is equal to the lesser of:

- The number of hotels with access to DUAQ.... or
- The number as determined in the P.001 (Poisson) traffic tables.

4. CIRCUIT REQUIREMENTS

One (1) dial-up autoquote circuit is comprised of the following hardware:

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QTY (1) Port NT3X02BA Signal Processor CP

- The NT3X02BA is used in a stand-alone configuration and the MTM card slot to the right of the NT3X02BA must be vacant. The NT3X02BA is equipped with four (4) EIA ports. The total number of CPs required is determined as follows:

Total circuits required divided by four (4).

QTY (1) 62245004 UDS 224A Stand-Alone Modem (A0326758)

QTY (1) CKT NT2X81AB 600 Ohm 2W Loop Incoming Trunk Circuit

One (1) 212A compatible far end modem is required for each hotel DUAQ printer. This modem may be provided by Northern Telecom or the Telco.

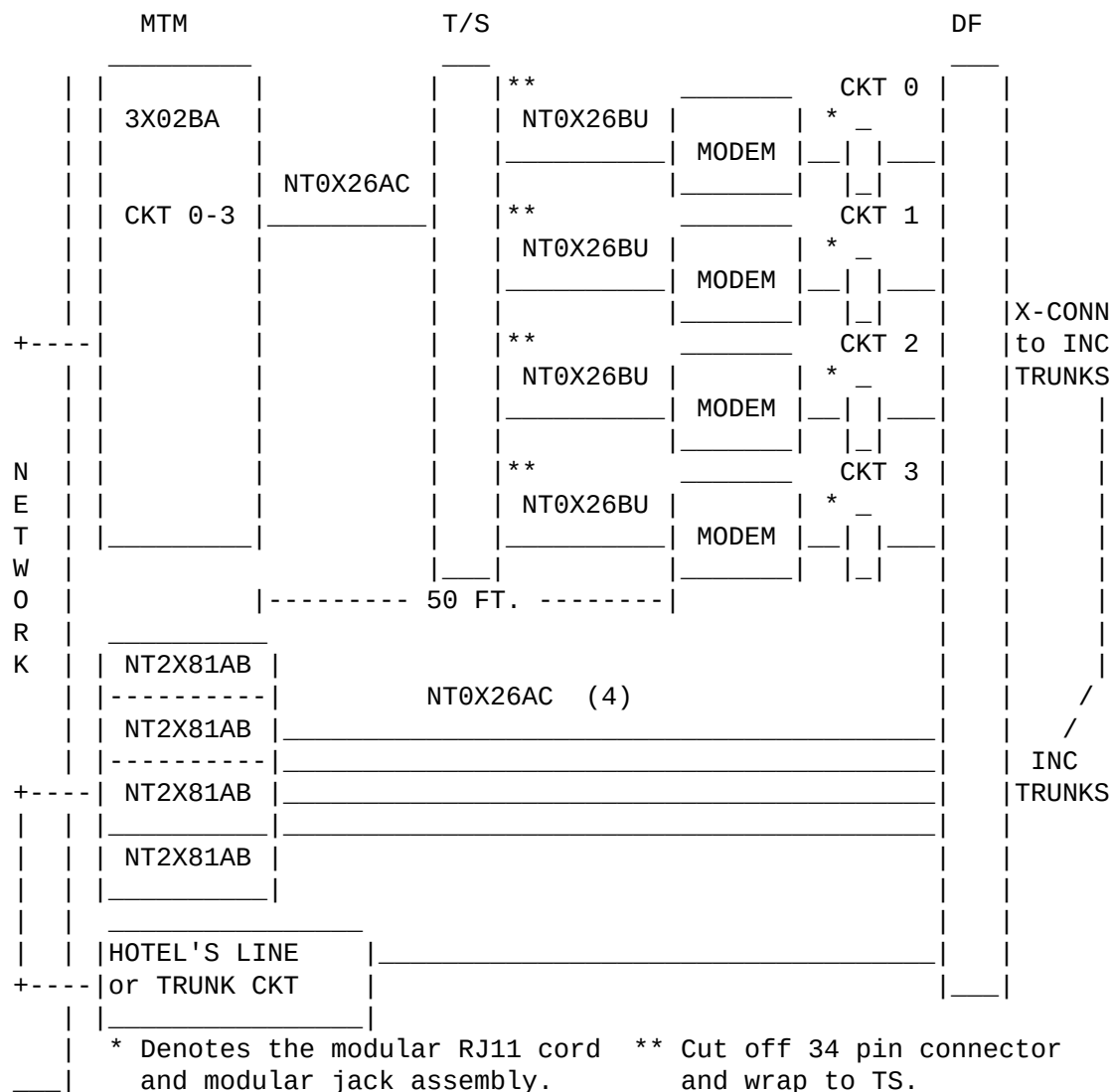
5. SUPPORTING HARDWARE REQUIREMENTS

Because stand-alone modems are being used, the following hardware is required to place them in a MIS frame.

NT3X25AA Common Equipment Shelf(CES) - A total of three (3) UDS 224A modems can be placed on a shelf.

NT0X87AA DC/AC Inverter - The UDS 224A modem requires AC power for operation. The NT0X87AA supplies this AC power and is cabled to an AC input on the NT3X25AA CES. Four (4) AC receptacles are available as power sources on the CES; three (3) for the modems and one (1) as a power multiple to another CES. Up to six (6) CES can be multiplied and powered from one (1) NT0X87AA when UDS 224A modems are used. Provide one (1) NT0X87AA inverter for every six (6) CES required.

NT3X25BA Terminal Strip Assembly - The NT3X25BA must be mounted in the MIS frame where the modems are located. It is required to provide a cross-connect facility between the NT3X02BA CPs and the 224A modems. Provide one (1) NT3X25BA for each ten (10) DUAQ circuits.



4.2.5 Office Layout Information

The total distance from the NT3X02BA to the NT3X25BA terminal strip and to the UDS 224A modem must not exceed fifty feet.

4.2.6 Traffic Tables

DUAQ circuits may be provisioned based on the number of hotels using the feature (one circuit per hotel) or based on traffic using the Poisson tables in NTP 297-1001-450. Normally, one circuit per hotel will be provisioned.

4.3 Product/System Specification

4.3.1 Physical Characteristics

All hardware for the DUAQ feature is available and has been previously documented.

4.3.2 EMI/Earthquake Information

4.3.3 Sparing Information

Standard sparing algorithms apply for all DUAQ hardware.

4.3.4 Power Feed and Fusing Requirements

4.3.5 Current Drain Information

4.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

4.4.1 Required Software Packages and Interdependencies

The following software is required for the DUAQ feature:

NTX140AA Dial-Up Autoquote

For interdependencies and additional software information, refer to the Software Management System (SMS) database.

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4.4.2 Software Usage Restrictions

4.4.3 Memory Provisioning

Not applicable.

4.5 Real Time Impact

There is no significant real time impact from application of the DUAQ feature.

5.0 ECM330 - Simplified Message Desk Interface (SMDI)

5.1 Overview

The SMDI software feature package is part of the DMS100 family product line.

5.2 Hardware Provisioning

5.2.1 Hardware Usage Restrictions

| For SMDI applications the NT1X89BB is the only cp available.

| The NT1X89BB CP replaces the NT1X67BC/BD/FA CP for all SMDI ap-
| plications.

5.2.2 Hardware Dependencies

Not Applicable

5.2.2.1 P and C Side Port Requirements

Not Applicable

5.2.2.2 DMS BUS Port Requirements

Not Applicable

5.2.2.3 Circuits Per Card

Not Applicable

5.2.2.4 Discrimination Numbering

Not Applicable

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5.2.3 Provisioning Considerations

New and Existing DMS100 hardware will be utilized to activate the SMDI feature as follows:

- * NT1X89BB - Multi-Protocol Controller(MPC) (two ports per card)
- * Modem - Up to 4800 baud full duplex (w/ 1X89BB)
- * Type "A","B","C" or"E" line cards for user stations
- * Type "A" or "B" line cards for the Message Desk

The NT1X67FA is equipped with two (2) C-Side ports to the DMS CPU and one (1) P-Side port to interface with a Voice Message System (VMS). One of the C-Side ports is dedicated to processing outgoing SMDI messages while the other is dedicated to processing incoming SMDI messages.

The NT1X89BB, MPC, is equipped with two (2) C-Side ports to the DMS CPU and two (2) asynchronous P-Side ports to interface with a VMS. The MPC CP will provide a higher bandwidth (up to 4800 baud), reduced real time in the DMS, and additional performance and reliability capabilities over the 1X67FA CP.

The SMDI application is only compatible with the NT1X89BB circuit pack. The NT1X89BB is the only circuit pack supported.

5.2.4 Office Layout Information

Not Applicable

5.2.5 Traffic Tables

Not Applicable

5.3 Product/System Specification

5.3.1 Physical Characteristics

Not Applicable

5.3.2 EMI/Earthquake Information

Not Applicable

5.3.3 Sparing Information

Standard sparing algorithm shall apply.

5.3.4 Power Feed and Fusing Requirements

The following fuses and feeds are required:

5.3.5 Current Drain Information

Current Drain for the circuit packs are:

5.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

5.4.1 Required Software Packages and Interdependencies

The software feature package for SMDI is as follows:

NTX732AA - Simplified Message Desk Interface

requiring:

NTX001AA - Common Basic
NTX100AA - IBN Basic
NTX101AA - IBN Enhanced Business Services
NTX119AA - IBN Message Service
NTX730AA - Multilink ASCII Device Driver
NTX901AA - Local Features

5.4.2 Software Usage Restrictions

When using the NT1X89 Multi-Protocol Controller for SMDI interface, the following feature package must also be provided:

NTXN10AA - High Speed SMDI

5.4.3 Memory Provisioning

Refer to MEMCALC for memory provisioning.

5.5 Real Time Impact

A simplified view of the SMDI impact on the CPU is provided below based on SMDI calls per hour. These are reserved capacities required for proper operation. However, if Call Processing requires the capacity, the SMDI CPU allocations will be limited to 1% per

link. Also, if the SMDI link uses less than maximum capacity, the CPU impact will be less than stated.

These figures may be used to predict the DMS CPU impact of the NT1X67FA when detailed calculations are not required or possible:

Calls/ Hour	Messages/Sec	PERCENT CPU	
		DMS CORE	NT40
3600	1 OG, 1 INC	1.7 +	3 +
7200	2 OG, 2 INC	3.4 +	6 +
10800	3 OG, 3 INC	5.1 +	9 +

Figure 1. BCS-26 through BCS-29

Calls/ Hour	Messages/Sec	PERCENT CPU	
		DMS CORE	NT40
3600	1 OG, 1 INC	1.2 +	2.4 +
7200	2 OG, 2 INC	2.4 +	4.8 +
10800	3 OG, 3 INC	3.6 +	7.2 +

Figure 2. BCS-30

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The SMDI message handling software and the NT1X67FA I/O Terminal Controller is capable of transferring data simultaneously in both directions (incoming and outgoing) over a single link at a bit rate of 960 bits per second full duplex. The offered Busy Hour SMDI messaging load for a single NT1X67FA data link should not exceed this capacity.

The following is a comparison of the link capacities for the NT1X67BD and the NT1X67FA CPs:

	NT1X67FA -----	NT1X67BD -----
Calls/Hr -	11,520 (per link)	1860 (per link)
Bit Rate -	960 bps (per link)	225 bps (per link)

The NT1X89 MPC is capable of operating at speeds up to 19,200 bits per second. However, for the SMDI application NTI currently recommends a maximum bit rate of 4800 bps.

Equating bit rates to calls, the following provides a cross reference from maximum bit rates of the link to the associated maximum SMDI call capacity.

1 00 bps	12,240 calls/hour at 85% link utilization
2400 bps	24,480 calls/hour at 85% link utilization
4800 bps	48,960 calls/hour at 85% link utilization

These call capacities assume an average outgoing message size of 37.5 bytes.

The required link speed to handle offered busy hour calls can then be determined by ensuring that the configured bit rate call capacity as shown above is less than or equal to the busy hour call rate.

Refer to SEB: 89-06-002 for detailed real time and Messaging Capacity information.

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6.0 ECM332 - Custom Local Area Signalling Services (CLASS) - U.S.

6.1 Overview

Custom Local Area Signalling Services or CLASS Features are a set of line-oriented features which the telephone company can deploy in their residential or Centrex customer environment to generate additional revenue. These features operate within a single switch or transparently between users on different end-office switches by means of CCS7-based signalling in a multi-node switch configuration. In the U.S., this feature is called CLASS and in Canada, the feature is called CMS. In this document, the feature will be referred to as CLASS.

CLASS Features are separated into Phase I and Phase II features. Phase I features include

- Automatic Callback (ACB) - allows a calling party to automatically call again the number most recently dialed, whether that call was answered, unanswered, or busy. If the station is busy, the user may queue against that station and be recalled when it becomes idle. The Automatic Callback feature is very similar to the Ring Again (RAG) feature, but will be deployed in the Public Network.
- Automatic Recall (AR) - enables the end user to return his latest incoming call automatically, regardless of whether the incoming call was answered, and regardless of whether the end user knows the identity of the calling party. If the station is busy, the user may queue against that station and be recalled when it becomes idle. With two (2) level activation, the directory number of the last call is voiced back prior to completing the call.
- Calling Number Delivery or Calling Number Display (CND) - enables receipt and display of the calling party's directory number and Date/Time during the ringing cycle. This allows the end user with a display set to make an informed decision about answering the call.
- Calling Number Delivery Blocking (CNDB) - permits the originating customer, by designating his calling identity as "private", to prevent his directory number from being transmitted for Calling Number Delivery. The calling party may change his DN Suppression default - Suppress DN or not Suppress DN - to the opposite status.
- Customer Originated Trace (COT) - enables the called party to request an automatic trace of the last call received. The trace record identifies the calling party and other call-related information. The results of the trace are not provided

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directly to the end user, but are made available only to an authorized agency, such as the telephone company or law enforcement agency.

Note that CLASS features are available only to lines with a line class code of RES (Residential Enhanced Services). Note that this does not include ISDN RES lines.

Automatic Recall Date and Time Feature (ARDT)

This feature provides the date and time voiceback capability for the Automatic Recall (AR) two-level activation sequence.

CLASS Configuration

Figure 3 on page 20-35 illustrates a typical configuration with a CLASS terminal on the DMS. This terminal is equipped with an enhanced Man-Machine Interface (MMI), such as a Liquid-Crystal Display (LCD) panel. The terminal could also consist of a standard telephone with a CLASS add-on unit. An integrated telephone set, such as NTL's MAESTRO, can also be used. The telephone section of the Customer Premises Equipment (CPE) is loop powered, whereas the CPE section providing CLASS features is powered by local AC.

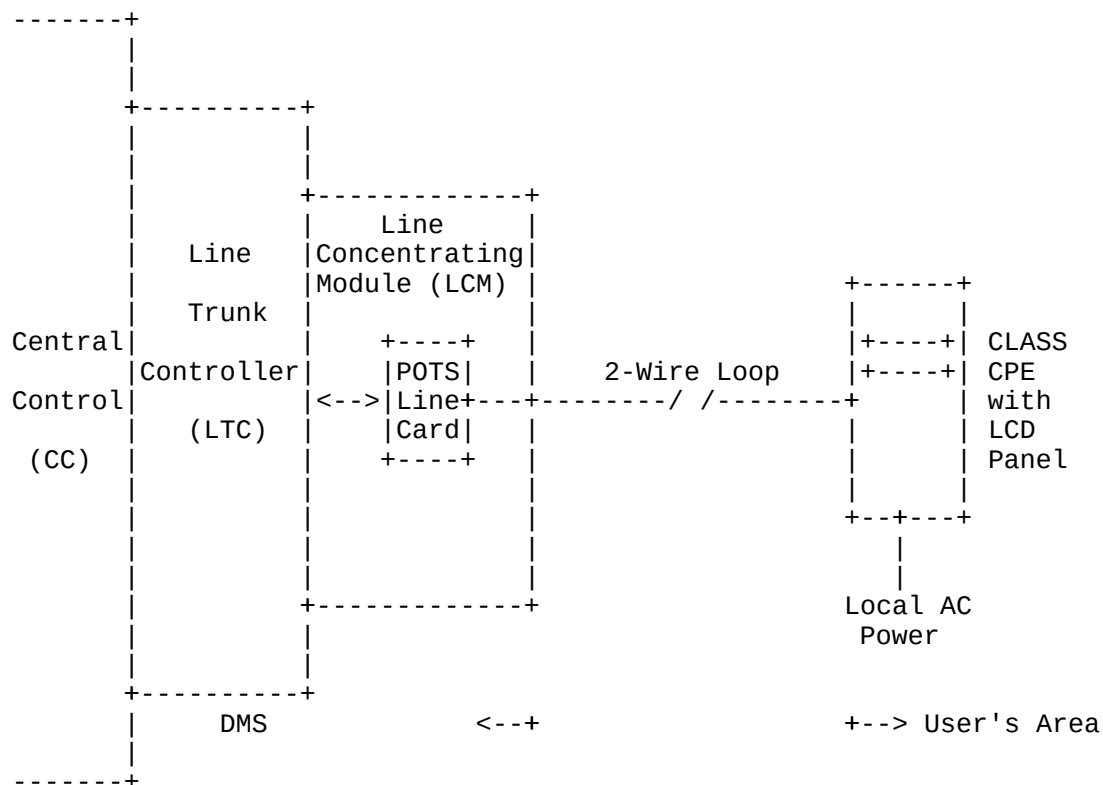


Figure 3. Typical Configuration with a CLASS CPE

The transmission of the calling party number to the Customer Premises Equipment (CPE) is accomplished via asynchronous FSK simplex-mode transmission at 1200 bits/sec over the 2-wire loop, in accordance with the Bell 202A standard. A burst of data is transmitted to the CPE during the silent interval between the first and second ring of the telephone set, before the incoming call is answered. The data link terminates at a 202A modem in the CPE, which outputs the calling party number to the LCD panel.

CCS7 Signalling is required when CLASS features are accessed between nodes. Within the same node, CCS7 Signalling is NOT required. Refer to ECM 271 for more information on CCS7 Signalling.

6.2 Hardware Provisioning

6.2.1 Hardware Usage Restrictions

An optional feature exists called Automatic Recall Date and Time (ARDT). This feature requires announcements provided on a pair

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of CPs; NT1X76JA and NT1X76JB. The NT1X76AJ and the NT1X76AK cards are required when the NT1X76JA and NT1X76JB cards are ordered. The NT1X76AJ, NT1X76AK, NT1X76JA, and NT1X76JB should be assigned to the same DRA module. In a Class Phase 1 English office, the NT1X76JA/JB can be assigned to a DRA where the NT1X76AJ/AK cards are existing and there is room. Otherwise, in other offices or where the DRAs with NT1X76AJ/AK cards are filled, an additional set of NT1X76AJ/AK cards must be ordered.

6.2.2 Hardware Dependencies

LCM Processor Cards, NT6X51AB, are required to support CND in LCMs. LCM Common CP, NT6X04AB, contains NT6X51AB and hence can support CND. Only LCMs which contain lines utilizing the CND feature must be upgraded to use the NT6X51AB. See ECM-425 for details on the NT6X51AB.

The Phase 1 or Phase 2 CLASS DRA Announcements require the CLASS/CMS feature to be applied in the DMS office.

6.2.2.1 P and C Side Port Requirements

Not applicable.

6.2.2.2 DMS BUS Port Requirements

Not applicable.

6.2.2.3 Circuits Per Card

Not applicable.

6.2.2.4 Discrimination Numbering

Not applicable.

6.2.3 Provisioning Considerations

CND Hardware Requirements

In addition to the LCM Processor Card NT6X51AB, the CLASS Modem Resource (CMR) card NT6X78AA was developed to support the introduction of CND.

A redesigned version of the CMR card, NT6X78AB, replaces the NT6X78AA CMR card.

The CMR card will support software to provide SP processor - CMR messaging and thus provide CMR sanity supervision, software down-

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loading, maintenance/diagnostics, operational measurements and swact activity.

The CMR card has direct access to the A-Bus of the Signalling Processor and the PCM Speech Bus. This card accommodates the transmit only modem resources and the ringing detection resources, which are connected to specific PCM channels at specific times under software control. Modem receive capability is not provided on the CMR card. The CMR card will incorporate the following additional features:

- 32 transmit only modem resources on the outgoing PCM Speech Bus
- 32 ringing detector resources on the incoming PCM Speech Bus
- Modem and detector resources switchable between all 640 time slots
- Compatibility with NT CLASS and some other display terminals
- The modems provide simplex-mode 1200 baud 202A data transmission.

The basic functions of the CMR card are to transmit modem resources to an appropriate time slot, detect ringing/silence on the specific line and transmit DN information to the line for display. The CMR card will send the DN information to the terminal during the 4 seconds of silence following the first ringing cycle.

The CMR card is a provisionable card in the LGC/LTC/RCC/SMS/SMU. This card is provisioned in slot 13 of the upper and lower shelves in the LGC/LTC, slot 18 of the upper and lower shelves in the RCC and slot 16 of the upper and lower shelves in the SMS/SMU. The CMR card will be provisionable for the SMS in BCS-28.

When CLASS is supported for lines off an SMS-R module, the CMR card in the hosting RCC/RCC2 shelf will be used. Do not provision CMR cards in SMS-R modules.

When the CND feature is required, provide two (2) CMR cards per LGC/LTC/RCC/SMS/SMU module (i.e. one (1) card per shelf). It is not necessary to equip all the LGC/LTC/RCC/SMS/SMUs in the office with the CMR card. Only LGC/LTC/RCC/SMS/SMUs that will provide CND to the subscribers that home on these peripherals will require the CMR card. Any number of LGC/LTC/RCC/SMS/SMUs of a given DMS may be equipped with CMR cards. For additional information, see ECM-373, ECM-282, ECM-328, ECM-314 and ECM-454 respectively.

If either the NT6X12AD or the NT6X12AE RCC common circuit pack is used for an RCC module requiring the CLASS feature, the NT6X12ZY PC kit must also be applied. This PC Kit replaces the NT6X69AA

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and NT6X79AA CPs with the NT6X69AB for CLASS applications with CND feature. The NT6X69AB CP and the NT6X12YZ PC kit are MD'd and have been replaced with the NT6X69AC CP.

For Canadian Applications Only

When the NT6X78AA/NT6X78AB cards are provisioned into an LGC, LTC, or SMS module, EITHER:

1. Retrofit the NT6X69AA/NT6X79AA card combination (if existing) to an NT6X69AB card via the application of the NT6X12ZY PC Kit, (The NT6X69AB CP and the NT6X12YZ PC kit are MD'd and have been replaced with the NT6X69AC CP.)

OR

2. Limit the number of NT6X50AA DS-1 cards to four per shelf (i.e. eight per module).

This is required to limit the shelf's overall +5 volt power requirements to below 55 amps. When applying the NT6X78AB card, note that it only requires 0.7 amps, versus the NT6X78AA card, which requires 3.5 amps.

Optional Announcement Requirements

There are optional announcements available for CLASS features to indicate successful or denied operation.

For BCS-27, the NT1X75BA DRAM Controller must be provisioned for all CLASS applications.

| NOTE: The NT1X75BA has been MD'd, and replaced by the NT1X80AA
| (EDRAM). NT1X80AA supports mu-law (DOM) applications as of BCS-34,
| and A-law (Int'l) applications as of BCS-35. See ECM 531 for de-
| tails on EDRAM provisioning.

There are two groups of announcements, Phase 1 CLASS DRA Announcements and Phase 2 CLASS DRA Announcements.

If the CLASS/CMS feature is required, at least one group of announcements (i.e. Phase 1 or Phase 2) must be provided.

The Telco/Customer can either have Phase 1 announcements or Phase 2 announcements or both.

For a description of the Phase 1 and Phase 2 CLASS DRA Announcements, refer to FD1X76 entitled Digital Recorded Announcement PROM Circuit Pack CMS/CLASS Phase I & II English, French, U.S. Custom

NT1X76AJ, AK, AP, AQ, AR, AS, AT, AU, AV, AW
NT1X76BJ, BK, BP, BQ, BR, BS, BT, BU, BV, BW
NT1X76GA, GB, GC, GE, GF, GG, GH, GJ, GK, GL

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Phase 1 CLASS DRA Announcements

For the optional Phase 1 CLASS DRA Announcements, the Telco/Customer can either make up his own announcements or he can order the pre-recorded ones from NTL.

For provisioning the Digital Recorded Announcement Recordable Memory cards (NT1X77AA/79AA), divide the total length of the announcements (in seconds) by 31. This determines the number of circuits required for these announcements. These are the announcements that the Telco/Customer can make up himself.

NOTE: The NT1X77AA has been MD'd, and replaced by the NT1X80AA (EDRAM). NT1X80AA supports mu-law (DOM) applications as of BCS-34, and A-law (Int'l) applications as of BCS-35. See ECM 531 for details on EDRAM provisioning.

If the Telco/Customer chooses to create his own announcements, and if he wants the Automatic Recall (AR) feature with the Voice Back Option within NTXA00AA activated, then the CLASS Phase 1 English Announcements () of (2) CP card, NT1X76AK, and/or the CLASS Phase 1 French Announcements (2) of (2) CP card, NT1X76BK, must be provided. Otherwise, if the Voice Back Option is not to be activated, then NT1X76AK and/or NT1X76BK are optional.

If the Telco/Customer wants our pre-recorded announcements, the following DRA cards are available:

PEC	CPC	
NT1X76AJ	B0225468	CLASS Phase 1 English Announcements (1) of (2) CP
NT1X76AK	B0228630	CLASS Phase 1 English Announcements (2) of (2) CP
NT1X76BJ	B0225472	CLASS Phase 1 French Announcements (1) of (2) CP
NT1X76BK	B0228633	CLASS Phase 1 French Announcements (2) of (2) CP

The above cards are the approved Telecom Canada Phase 1 CLASS DRA Announcements.

If bilingual announcements are required (e.g. French followed by English on the same announcement), then the Phase 1 CLASS DRA Announcement cards must be provisioned on the same DRA shelf (i.e. NT1X76AJ/AK/BJ/BK).

The Phase 1 CLASS DRA Announcement cards are only available in sets (e.g. NT1X76AJ/AK or NT1X76BJ/BK) and cannot be provisioned separately. However, the NT1X76AK and NT1X76BK cards can be ordered separately for the Automatic Recall feature (noted above). The NT1X76AK card can be ordered separately for the Call Forward Remote

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Activation (CFRA) feature (see ECM-473 on Residential Enhanced Services).

If the optional announcements are not selected, confirmation tone can be used for successful feature operation and fast busy (120 ipm) can be used for denial of feature operation. This is only applicable to Calling Number Delivery Blocking (CNDB) and Customer Originated Trace (COT). Phase 2 CLASS DRA Announcements

For Phase 2 CLASS DRA Announcements, the Digital Recorded Announcement Recordable Memory cards (NT1X77AA/79AA) cannot be used.

For provisioning, two groups of Phase 2 CLASS DRA Announcements are available:

- 1) Phase 2 CLASS DRA Announcements (List 1-12)
- 2) Phase 2 CLASS DRA Announcements (List 13-31)

The following are the Phase 2 CLASS DRA Announcement (List 1-12) cards:

PEC	CPC	
NT1X76AP	B0229968	CLASS Phase 2 English Announcements (1) of (8) CP
NT1X76AQ	B0229969	CLASS Phase 2 English Announcements (2) of (8) CP
NT1X76AR	B0229970	CLASS Phase 2 English Announcements (3) of (8) CP
NT1X76AS	B0229971	CLASS Phase 2 English Announcements (4) of (8) CP
NT1X76AT	B0229972	CLASS Phase 2 English Announcements (5) of (8) CP
NT1X76AU	B0229973	CLASS Phase 2 English Announcements (6) of (8) CP
NT1X76AV	B0229974	CLASS Phase 2 English Announcements (7) of (8) CP
NT1X76__*		English "Personality" card
NT1X76BP	B0229976	CLASS Phase 2 French Announcements (1) of (8) CP
NT1X76BQ	B0229977	CLASS Phase 2 French Announcements (2) of (8) CP
NT1X76BR	B0229978	CLASS Phase 2 French Announcements (3) of (8) CP
NT1X76BS	B0229979	CLASS Phase 2 French Announcements (4) of (8) CP
NT1X76BT	B0229980	CLASS Phase 2 French Announcements (5) of (8) CP
NT1X76BU	B0229982	CLASS Phase 2 French Announcements (6) of (8) CP

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NT1X76BV B0229981 CLASS Phase 2 French Announcements (7) of
(8) CP
NT1X76__* French "Personality" card

The following are the Phase 2 CLASS DRA Announcement (List 13-31) cards:

PEC	CPC	
NT1X76GA	B0230636	CLASS Phase 2 English Announcements (1) of (4) CP
NT1X76GB	B0230637	CLASS Phase 2 English Announcements (2) of (4) CP
NT1X76GC	B0230638	CLASS Phase 2 English Announcements (3) of (4) CP
NT1X76__		English "Personality" card

If Customers want Phase 2 CLASS DRA Announcements, the group of List 13-31 cards are optional.

If either group or both groups of Phase 2 CLASS DRA Announcements are required, provide a "Personality" card for each group. Note that if both groups are required, two "Personality" cards of the same type (i.e. one for each group) must be provided.

The following are the Phase 2 CLASS DRA "Personality" cards:

PEC	CPC	
NT1X76AW	B0229975	CLASS Phase 2 English Announcements (8) of (8) CP
NT1X76BW	B0229983	CLASS Phase 2 French Announcements (8) of (8) CP
NT1X76GE	B0230640	CLASS Phase 2 U.S. Custom Feature Names Announcements - Type I CP For Bell South
NT1X76GF	B0230641	CLASS Phase 2 U.S. Custom Feature Names Announcements - Type II CP For Bell Atlantic
NT1X76GG	B0230642	CLASS Phase 2 U.S. Custom Feature Names Announcements - Type III CP For United Tel
NT1X76GH	B0230643	CLASS Phase 2 U.S. Custom Feature Names Announcements - Type IV CP For GTE
NT1X76GJ	B0230644	CLASS Phase 2 U.S. Custom Feature Names Announcements - Type V CP For Pacific Bell
NT1X76GK	B0230645	CLASS Phase 2 U.S. Custom Feature Names Announcements - Type VI CP For Ameritech
NT1X76GL	B0230646	CLASS Phase 2 U.S. Custom Feature Names Announcements - Type VII CP For Southwest Bell

* The "Personality" card, NT1X76AW, contains only Bell Canada names and Bell South BCS-29 VO information. The "Personality" card, NT1X76BW, contains only Bell Canada names. It must be de-

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terminated up front which "Personality" cards are required by which Customer/Telco. When engineering a DMS job (initial or extension) which will require Phase 2 CLASS DRA Announcements, the onus will be on the Customer/Telco to determine which "Personality" card is required. At Customer Input (CI) time, the Systems Applications Engineer (SAE) will ask the Customer which card he wants.

The Phase 2 CLASS DRA Announcement cards are only available in sets (e.g. NT1X76AP/AQ/AR/AS/AT/AU/AV/AW or NT1X76BP/BQ/BR/BS/BT/BU/BV/BW or NT1X76GA/GB/GC) and cannot be provisioned separately. Note that the only exception to this is the "Personality" card (e.g. NT1X76AW) which will be provisionable with other Telco specific packs (as highlighted above).

Automatic Recall Date and Time (ARDT) CLASS DRA Announcements

The customized announcements require a DRAM with a NT1X75BA controller card. A set of AR Date and Time Phrase List PROM Cards NT1X76JA and NT1X76JB are required for ARDT (English) announcements. Each CP contain two (2) virtual card credits because they are double density cards.

| The NT1X75BA has been MD'd and replaced by the NT1X80AA.

The following are the AR Date and Time Phrase List PROM cards:

PEC	CPC	
NT1X76JA	B0231819	Automatic Recall Date/Time Announcements (1) of (2) CP
NT1X76JB	B0231820	Automatic Recall Date/Time Announcements (2) of (2) CP

The NT1X76AJ and the NT1X76AK cards are required and should be assigned to the same DRA module as the NT1X76JA and NT1X76JB cards. In a Class Phase 1 English office, the NT1X76JA/JB can be assigned to a DRA where the NT1X76AJ/AK cards are existing and there is room. Otherwise, in other offices or where the DRAs with NT1X76AJ/AK cards are filled, an additional set of NT1X76AJ/AK cards must be ordered.

Other CLASS DRA Announcement Provisioning Criteria

The DRA cards (either recordable or pre-recorded) can mount on DRA modules (i.e. NT2X58AM, NT2X58CB, NT2X58AK, NT2X58AG).

The DRA module can accommodate one (1) NT1X75BA DRAM Controller card and up to a maximum of eight (8) virtual card credits (i.e. the addressing range of the NT1X75BA).

| The NT1X75BA has been MD'd and replaced by the NT1X80AA.

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The DRA Recordable Memory cards (NT1X77AA and NT1X79AA) each contain one (1) virtual card credit because they are single density cards.

| NOTE: The NT1X77AA has been MD'd and replaced by NT1X80AA.

The existing DRA pre-recorded announcement card NT1X76AA contains one (1) virtual card credit. Currently, this is the only NT1X76__ card which contains one (1) virtual card credit. All other NT1X76__ cards contain two (2) virtual card credits because they are double density cards.

All Phase 1 and Phase 2 CLASS DRA pre-recorded announcement cards (i.e. NT1X76AJ/AK/BJ/BK, NT1X76AP-AW, NT1X76BP-BW, NT1X76GA-GC, NT1X76GE-GL) each contain two (2) virtual card credits because they are double density cards.

Hence, a DRA module can accommodate a maximum of eight (8) single density cards or a maximum of four (4) double density cards.

The two (2) Phase 1 CLASS DRA Announcement cards (English) can be mounted on half of a DRA module.

The two (2) Phase 1 CLASS DRA Announcement cards (French) can be mounted on half of a DRA module.

Hence, if both English and French are required, then the four (4) Phase 1 CLASS DRA Announcement cards (English and French) can be mounted on one (1) DRA module.

The eight (8) Phase 2 CLASS DRA Announcement (List 1-12) cards (English) can be mounted on two (2) DRA modules.

The eight (8) Phase 2 CLASS DRA Announcement (List 1-12) cards (French) can be mounted on two (2) DRA modules.

A quantity of five (5) DRA modules may be provisioned on a TME frame, NT0X46AB, if and only if double density DRA cards are provisioned on these modules. Any double density DRA cards (i.e. all NT1X76__ cards with the exception of NT1X76AA which is a single density card), up to a maximum of four (4) per module, may be provisioned. Otherwise, only four (4) DRA modules may be provisioned on a TME frame.

Hence, a DMS office requiring both Phase 1 and Phase 2 (List 1-12) pre-recorded CLASS DRA Announcements in English and French can have all twenty (0) double density DRA cards mounted on five (5) DRA modules and these five (5) modules could be mounted onto one (1) TME frame.

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Redundancy of announcements is available as an option in the U.S. only. If redundancy is provided, ensure that the announcement MTMs are on different power feeds.

The assignment rules for mounting Phase 1 and Phase 2 CLASS DRA Announcement cards onto DRA modules are the same as the rules pertaining to the existing NT1X76__ DRA Announcement cards.

Cards NT1X76AP/AQ/AR/AS must be mounted together onto the same DRA module. Cards NT1X76AT/AU/AV/AW must be mounted together onto the same DRA module. Similarly, cards NT1X76BP/BQ/BR/BS must be mounted together onto the same DRA module and cards NT1X76BT/BU/BV/BW must be mounted together onto the same DRA module. Cards NT1X76GA/GB/GC/+ "Personality" Card must be mounted together onto the same DRA module. The previous cards within each DRA module can be in any order.

I/O Port Requirements

Log messages are produced when a subscriber activates the Customer Originated Trace (COT) feature. If the customer/telco wants these log messages to be routed to a dedicated TTY, then a separate I/O port (i.e. one port off of a NT1X67BC card) is required. Otherwise, these log messages will be routed along with other log messages to the customer specified TTY.

CLASS Terminals

Canadian customers will be able to obtain CLASS Terminals from NTCL or from outside suppliers. To obtain CLASS terminals (i.e. an integrated telephone set, such as MAESTRO) from NTCL, Canadian customers will contact London Terminal Division.

U.S. customers will obtain CLASS terminals from outside suppliers.

6.2.4 Office Layout Information

N/A

6.2.5 Traffic Tables

N/A

6.3 Product/System Specification

6.3.1 Physical Characteristics

N/A

6.3.2 EMI/Earthquake Information

N/A

6.3.3 Sparing Information

Standard sparing algorithms shall apply.

6.3.4 Power Feed and Fusing Requirements

6.3.5 Current Drain Information

NT1X76AJ	1.0 amps at +5 volts
NT1X76AK	1.0 amps at +5 volts
NT1X76BJ	1.0 amps at +5 volts
NT1X76BK	1.0 amps at +5 volts
NT1X76AP	1.0 amps at +5 volts
NT1X76AQ	1.0 amps at +5 volts
NT1X76AR	1.0 amps at +5 volts
NT1X76AS	1.0 amps at +5 volts
NT1X76AT	1.0 amps at +5 volts
NT1X76AU	1.0 amps at +5 volts
NT1X76AV	1.0 amps at +5 volts
NT1X76AW	1.0 amps at +5 volts
NT1X76BP	1.0 amps at +5 volts
NT1X76BQ	1.0 amps at +5 volts
NT1X76BR	1.0 amps at +5 volts
NT1X76BS	1.0 amps at +5 volts
NT1X76BT	1.0 amps at +5 volts
NT1X76BU	1.0 amps at +5 volts
NT1X76BV	1.0 amps at +5 volts
NT1X76BW	1.0 amps at +5 volts
NT1X76GA	1.0 amps at +5 volts
NT1X76GB	1.0 amps at +5 volts
NT1X76GC	1.0 amps at +5 volts
NT1X76GE	1.0 amps at +5 volts
NT1X76GF	1.0 amps at +5 volts
NT1X76GG	1.0 amps at +5 volts
NT1X76GH	1.0 amps at +5 volts
NT1X76GJ	1.0 amps at +5 volts
NT1X76GK	1.0 amps at +5 volts
NT1X76GL	1.0 amps at +5 volts
NT1X76JA	1.0 amps at +5 volts
NT1X76JB	1.0 amps at +5 volts
NT6X78AA	3.5 amps at +5 volts
NT6X78AB	0.7 amps at +5 volts

6.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

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6.4.1 Required Software Packages and Interdependencies

CLASS feature packages were developed in two separate groups, CLASS Phase I and CLASS Phase II. CLASS Phase I features are scheduled for verification in BCS-26 (CND - BCS-27) and general availability in BCS-28. CLASS Phase II features (CLASS Screening Features) include Selective Call Rejection, Distinctive Ringing and Selective Call Forwarding, and are scheduled for verification in BCS-30.

The Automatic Recall Date and Time feature will be available with BCS-32.

Software Packages

CLASS Phase I feature packages include Calling Number Delivery (CND), Calling Number Delivery Blocking (CNDB), Automatic Call Back (ACB), Automatic Recall (AR) and Customer Originated Trace (COT). Feature packages with required package interdependencies includes the following:

CLASS PHASE I SOFTWARE PACKAGES

NTXA00AA - CLASS - Call Setup (features ACB/AR)
NTXA01AA - CLASS - Calling Number Delivery (CND)
NTXA02AA - CLASS - Customer Originated Trace (COT)
NTXA41AA - CLASS - Calling Number Delivery Blocking
Administration (CNDB)

To provide the Calling Number Delivery feature (CND) to CLASS subscribers served by a SLC-96 (interfaced to the host via an SMS), the following software packages are required:

NTXE38AA - CLASS - Calling Number Delivery on SCM-S

Additionally required as interdependencies for CLASS in multiple-node configurations are the following CCS7 software packages:

NTX041AB - CCS7 - MTP Associated and Non-Associated Signalling
NTX167AB - CCS7 - Trunk Signalling
NTX550AA - CCS7 - Transaction Service Support (for NTXA00AA only)

CLASS can be supported for lines off an SMS-R module. The CMR in the hosting RCC/RCC2 shelf will be used. The following software package is required:

NTXE38AB - CLASS - CND on SCM-S/SMS-R

Effective with BCS-30, the CMR card NT6X78AA/AB will be provisionable on the SMU and will be needed if the following software feature packages are required:

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1. NTXA01AA CLASS - Calling Number Delivery (CND)
2. NTXE52AA CLASSPLUS Name Display
3. NTXF55AA Bulk Calling Line ID
4. NTXJ39AA CLASS Message Waiting Indicator
5. NTXA87AA Long Distance Indicator (CDN Only)
6. NTXE27AA Dialable Number Delivery

If an SMU is required, NTX387AB is needed, regardless of whether CLASS features are ordered or not.

The above CLASS software feature packages (requiring NT6X78AA/AB) can be ordered with NTX387AB (i.e. office has SMUs) either individually or in any combination.

This software packaging concept allows the Customer to only order those CLASS features (which require NT6X78AA/AB) that he wants.

The software packages for Phase 1 CLASS DRA Announcements include the following:

NTXA00AA CLASS Automatic Call Set-Up (ACS)
NTXA02AA CLASS Customer Originated Trace (COT)

The CLASS Phase II group includes the following The software packages

CLASS PHASE II SOFTWARE PACKAGES

NTXE56AA CLASS Screening List Editing
NTXA96AA CLASS Selective Call Rejection
NTXA95AA CLASS Selective Call Forwarding
NTXA42AA CLASS Distinctive Ringing/Call Waiting
NTXA45AA CLASS Selective Call Acceptance

For package availability, the Marketing Software Matrix, which is available through menu item 11 on CODA, should be referenced. To determine package interdependency or master package content, the SMS89 document or SMSQUERY should be used.

The software packages necessary to allow CLASS to be offered to MDC business customers include the following:

NTXE46AA - CLASS Name/Number Blocking

NTXE58AA - CLASS on Multiline Variety Package (MVP)

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This package allows CLASS Phase I features to be assigned to users who are part of an MVP group, where an MVP group is a set of business lines having a POTS public network dial plan and a subset of MDC features.

NTXF60AA - CLASS on MVP II

This package allows CLASS Phase II features to be assigned to users within an MVP group.

NTXF56AA - CLASS on Meridian Digital Centrex - Base

This package expands from the NTXE58AA package to allow CLASS Phase I features to be assigned to MDC users.

NTXJ78AA - CLASS Phase II on Meridian Digital Centrex

This package allows CLASS Phase II features to be assigned to MDC users.

NTXF72AA - CLASS on Meridian Business Set (MBS)

This package allows the CLASS Phase I features to work on the Meridian Business Set and to be delivered to Multiple Appearance Directory Number (MADN) groups.

Please reference SMS to determine the availability of these packages, and their dependencies on each other and on additional packages.

6.4.2 Software Usage Restrictions

All CLASS/CMS features will work with the Series I Line Modules (LMs) except for the Display features. These Display features are:

NTXA01AA	CLASS - Calling Number Delivery (CND)
NTXE52AA	CLASSPLUS Name Display
NTXJ39AA	CLASS Message Waiting Indicator
NTXA87AA	Long Distance Indicator (CDN Only)
NTXE27AA	Dialable Number Delivery

6.4.3 Memory Provisioning

Refer to MEMCALC for memory provisioning.

6.5 Real Time Impact

Processing is distributed over the Central Processing Unit (CPU) and the Peripheral Processors (PP) in the peripheral modules. Real Time is one of the measurements that is utilized to determine the loading characteristics of these devices for specific applica-

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tions. Real Time is the amount of time required for these processors to perform a function such as establish a call or activate a feature.

For Canadian Applications

For a detailed calculation of CPU real time, use the CPRT program issue 03 or later. Refer to Systems Engineering Letter (SEL) 87-05-001 for more details and operational instructions. For a detailed calculation of PP real time, use the XPRT program issue 02 or later. Refer to SEL 87-05-002 for details and operational instructions.

To measure the CPU real time for an in-service switch, use the ACTIVITY TOOL.

To measure the PP real time for an in-service switch, use the NEW PERIPHERAL ACTIVITY and PERFORMANCE TOOL for the new peripherals.

For information on CPU real time and PP real time pertaining to CLASS/CMS features, refer to the appropriate Systems Engineering Letters.

For U.S. Applications

For a detailed calculation of CPU real time, use the REAL::TIME program issue 4A or later. Refer to System Engineering Bulletin (SEB) 87-02-004 for more details on REAL::TIME and operational instructions. For a detailed calculation of PP real time, use the PRTCALC program issue 1C or later. Refer to SEB 86-10-004 for more details on PRTCALC and operational instructions.

To measure the CPU real time for an in-service switch, use the ACTIVITY TOOL. Refer to SEB 86-11-005 for more details on the ACTIVITY TOOL and operational instructions. To measure the PP real time for an in-service switch, use the NEW PERIPHERAL ACTIVITY and PERFORMANCE TOOL for the new peripherals. Refer to SEB 87-02-004 for more details on the NEW PERIPHERAL ACTIVITY and PERFORMANCE TOOL.

For information on CPU real time and PP real time pertaining to CLASS/CMS features, refer to the appropriate System Engineering Bulletins.

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7.0 ECM348 - AOSS Voice Response (AOSSVR)

7.1 Overview

Auxiliary Operator Services System (AOSS) is a system that handles subscriber calls for Directory Assistance (DA) service and calls to directory numbers that require operator interception (INT). AOSS also has the capability to handle operator calls for Rate and Route information. The system allows the Operator to handle calls which originate from trunks that are marked either for Automatic Number Identification (ANI) or Operator Number Identification (ONI).

DA service allows subscribers to ask an operator to look-up listing information from the telephone listing database. Subscribers use DA service when a directory is not available, is out of date, or when a handicap prevents the Subscriber from looking up the number. Most North American exchanges provide DA service to Subscribers who dial 411 (local), 1-555-1212 (HNPAA) or 1-area code-555-1212 (FNPA). DA service is also available to subscribers via Toll operators using 131.

INT calls occur when a subscriber dials an out of service number or a number which has recently been changed. The Operator informs the Subscriber of the problem and may provide the new number.

When the Operator uses the vendor database to search for the listing information that the Subscriber requires, the handling of the subscriber requests requires the use of two keyboards. The Directory Assistance System (DAS) keyboard is used to access the listing database and the Operator uses the AOSS keyboard to enter billing data. The Operator verbally quotes the information that was found to the Subscriber.

7.1.1 AOSSVR

AOSSVR can enhance the Operator's ability to process DA and INT calls in three ways:

- Once the Operator determines which information the Subscriber requires, AOSSVR allows the Operator to connect the calling Subscriber to a channel that delivers this information in the form of concatenated voice recordings made from human speech (this is a channel connected to an Audio Response Unit (ARU). This frees the Operator from further handling of the call and thus allows him/her to handle another call sooner.
- A datalink between DMS and DAS transfers billing data from DAS directly to DMS with a single keystroke on the vendor position keyboard. Thus it is not necessary for the Operator to copy the billing data from the vendor position screen to DMS via

the AOSS position keyboard. The savings in terms of average work time (AWT) and therefore the numbers of Operators required is significant.

- Allow intercepted callers to connect to ARU directly if the facility they connect the DMS office with, provides AOSS with the dialed number. Thus, the operator will be by-passed entirely.

The synthetic voice equipment, also referred to as an Audio Response Unit (ARU), may be supplied by either the DMS or a database vendor, according to Telco preference. AOSSVR supports two (2) protocols. One protocol is operational with IBM DAS equipment. The other protocol has been developed in cooperation with Computer Consoles Incorporated (CCI) and can be used with their corresponding DAS equipment.

In addition, various types of datalinks may eventually be supported that relay billing and call control data between the DMS and the vendor database controller. The initial application however will employ a Multiple Protocol Controller (MPC).

The inter-machine protocol is independent of the type of datalink that AOSSVR uses. There is provision to support more than one protocol.

This feature effectively encourages the use of only one keyboard by the AOSS Operator to handle subscriber requests and decreases average work time by the time taken to recite listing information and enter billing details.

The Voice Response feature will never degrade the performance of current AOSS since any failure of the VR subsystem or DMS/DAS datalink will effect a return to pre-Voice Response operations.

The AOSSVR system is an enhancement to the existing basic AOSS system and is an optional feature. This feature does not affect the AOSS call type 141 (Rate and Route).

7.1.2 System Architecture

The AOSSVR system is designed to increase the efficiency of Directory Assistance and Intercept systems by reducing operator work time and ideally, for Auto-Intercept, replace the Operator entirely. This reduction of operator involvement is accomplished by automating the transfer of DAS search results and billing information from the vendor database to the AOSS switch via point-to-point datalinks. Providing Audio Response Units (ARU) to automatically quote the search results to the Subscriber decreases the Operator work time by allowing the Operator to handle the next call while simultaneously providing previous subscribers with their requested numbers. The architecture of the AOSS Voice Re-

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sponse system can assume a number of configurations, permitting flexibility for the Telco.

7.1.3 Configurations

The Telco may purchase an AOSSVR system with either internal or external ARU's for the automated voice. The Operator position which includes an AOSS console and a DAS terminal, though not currently optional, may at some point be replaced with the TOPS Multipurpose Position (TOPS MP) which will provide the functional equivalent of the present two terminal architecture.

The Multiple Protocol Controller (MPC) will provide the current interface to the datalink from the AOSS side.

Figure 4 on page 20-53 and Figure 5 on page 20-54 illustrate the system architecture with internal and external ARU respectively.

With the internal or external ARU's providing the automated voice, there can be up to two languages, one primary and the other a secondary language.

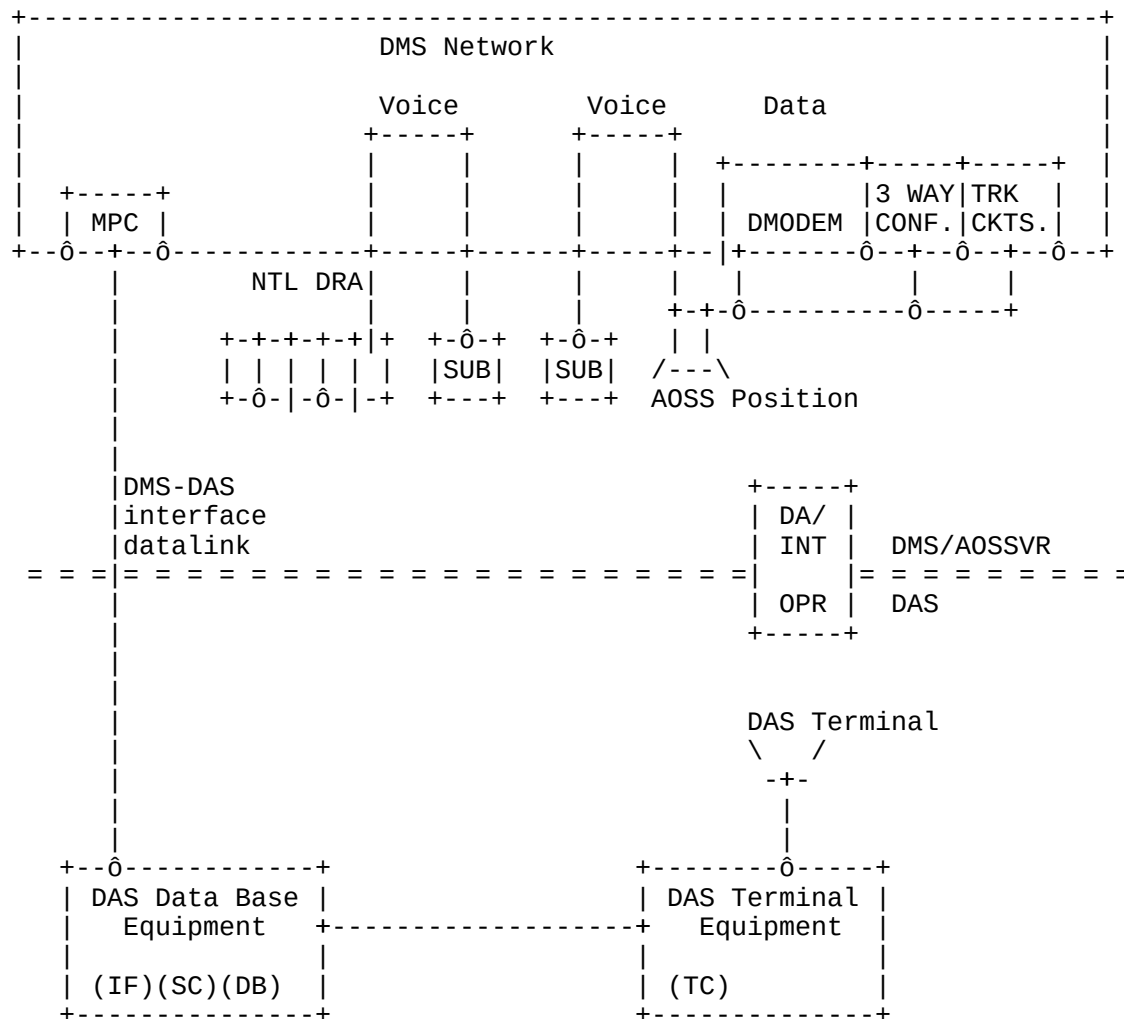


Figure 4. AOSVVR ARU-DAS Configuration Using DRA

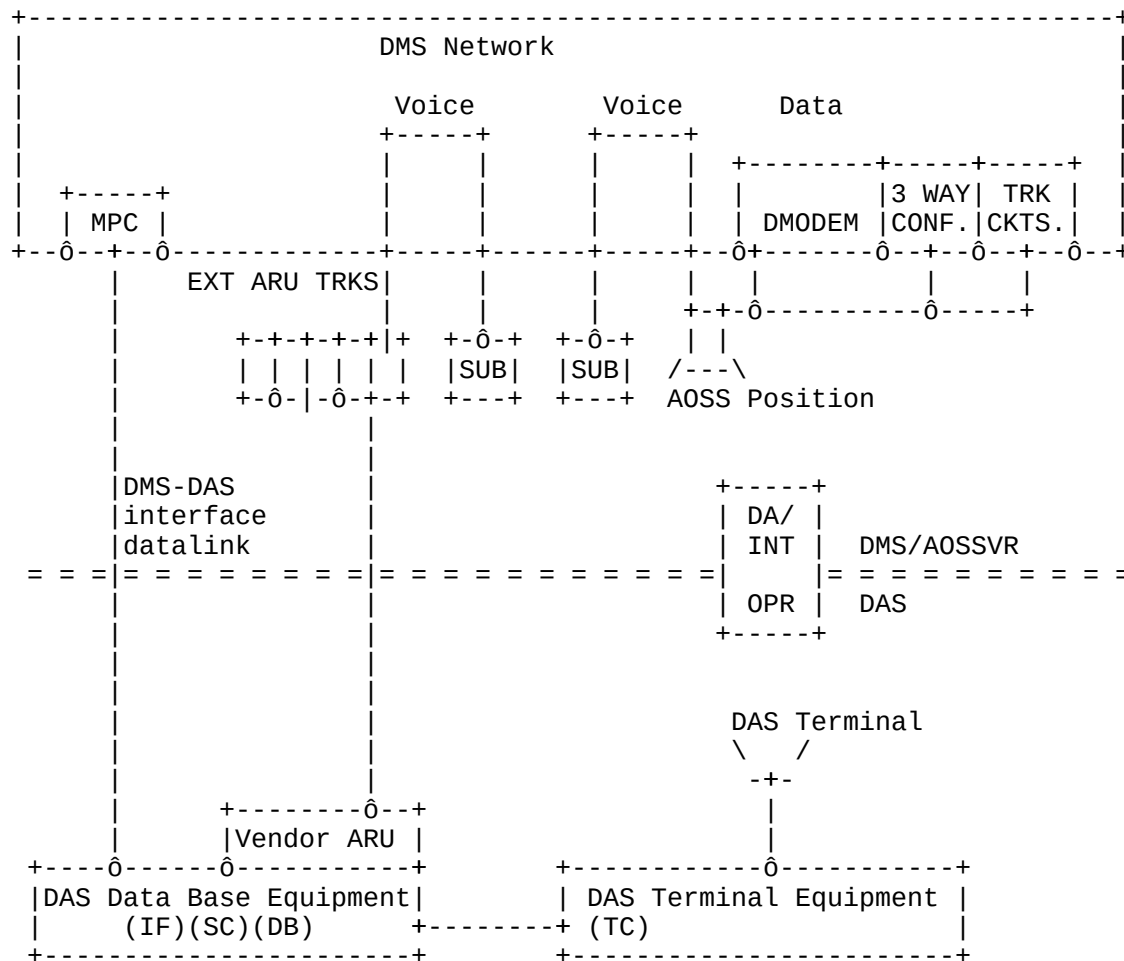


Figure 5. AOSSVR ARU-DAS Configuration Using Vendor ARU

7.2 Hardware Provisioning

7.2.1 Hardware Usage Restrictions

Not applicable.

7.2.2 Hardware Dependencies

Not applicable.

7.2.2.1 P and C Side Port Requirements

Not applicable

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7.2.2.2 DMS BUS Port Requirements

Not applicable

7.2.2.3 Circuits Per Card

Not applicable

7.2.2.4 Discrimination Numbering

Not applicable

7.2.3 Provisioning Considerations

7.2.3.1 System Components

Directory Assistance System (DAS)

The DAS will enable the Telco to automate selected portions of its Directory Assistance and Intercept services. Various suppliers provide this facility, consequently, several implementations for this service exist. A few such vendors are IBM, CCI and Lockheed. The IBM system is known as Mechanized Directory Assistance Records (MDAR) to Bell Canada. These vendor systems are all referred to simply as DAS throughout this document. Though differences exist in the architecture of various vendor systems, each DAS conforms to a generic model which uses vendor specific names for their processors and controllers. The logical components of a typical DAS are as follows:

1. Interface (IF).

The Interface is the link between AOSS and the DAS. The IF handles messaging over the datalink.

2. Terminal Controller (TC)

The Terminal Controller manages the DAS inquiry display terminals. The TC might be responsible for formatting, editing and concentration of display information as well as display formatting.

3. Session Control (SC)

The Session Control handles the DAS side of an inquiry session. The SC initiates interaction with the DB and the raw display information destined for the TC as well as any response required by AOSS over the datalink using the IF. The SC might also perform statistical extractions for later use by an administrative DAS terminal.

4. Database (DB)

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The Data Base performs the actual look up of data. The DB contains the actual data for Directory Assistance and Intercept information.

The Telco will obtain the DAS equipment from the vendor.

Digital Multiplex System (DMS) Switch

The NTL DMS will enable the Telco to automate the remainder of the DA and Intercept services. This facility will provide Automated Call Distribution (ACD), trunk control, billing (AMA), and if desired can supply automated speech via the DRA. The DMS will interface with the DAS via a point to point datalink.

Operator Positions

The current AOSS configuration includes both an AOSS console and a DAS terminal, the associated terminal controllers, and an AOSS headset. This arrangement will remain for the Voice Response system.

The DAS terminal and associated equipment is provided by the Telco from the DAS vendor (i.e. IBM, CCI).

The AOSS console and associated equipment will be provided by NTL in the usual manner.

In future, the TOPS MP is intended to replace both the AOSS console and DAS terminals.

AOSSVR-DAS Interface

The AOSSVR-DAS Interface will include a DAS Gateway Processor which will allow multiple AOSSVR offices to simultaneously connect to DAS.

AOSSVR will access this Gateway via a Multiple Protocol Controller (MPC) card, NT1X89AA, which manages messaging over a BX.25 datalink.

Up to nine (9) NT1X89AA cards can reside on the Input/Output Controller (IOC) Module, NT1X61AA/AB.

Up to four (4) NT1X89AA cards can reside on the Central Message & I/O Device Controller (MDC) Module, NT2X76AA/BA.

These NT1X89AA cards will not be cross connected, but message traffic will be distributed evenly over all available NT1X89AA cards.

Two datalinks may be connected to each NT1X89AA card (i.e. ports 2 and 3). Baud rate is 9600 baud per datalink.

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At least two (2) NT1X89AA cards will be employed in case of failure, and are spread over at least two (2) IOC's/MDC's.

These datalinks will be point to point, thus will access only one DAS.

There can be a maximum of sixteen (16) datalinks per DMS switch.

7.2.3.2 Multiple Protocol Controller Card Provisioning

To determine number of multiple protocol controller cards, NT1X89AA, required provide answers to the following questions and perform the following calculations:

Determine the number of calls per second using the NT1X89AA card:

No. of 411 DA calls (ABSBH)	_____
No. of intercept calls (ABSBH)	_____
No. of 131 calls (ABSBH)	_____
No. of HNPA DA calls (ABSBH)	_____
No. of FNPA DA calls (ABSBH)	_____
Total No. of calls	<u>TOT</u>

No. of calls per second = $TOT/3600 = NC$

Determine the number of X.25 datalinks as follows:

$TL = NC \times NM \times NB \times 8 \times 100/25/LS \times 2$

where:

TL = the total number of X.25 datalinks required

NC = the number of calls per second using the NT1X89AA card (variable)

NM = the number of messages per call
= 4 (constant)

NB = the number of bytes per message
= 25 (constant)

8 = the number of bits per byte

100 = 100% line occupancy

25 = 25% line occupancy

LS = line speed per X.25 datalink
(assumes all links at same speed)
= 9600 baud

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2 = the redundancy factor

Hence, $TL = NC (4 \times 25 \times 8 \times 100/25/9600 \times 2)$
 $= (NC/3) \times 2$ (round up to the nearest integer)

Note that several IOC's in an office will reduce the redundancy or sparing factor. The redundancy factor of 2 is the worst case. For example, if you needed 4 datalinks and had 5 IOC's, then one link per IOC would give adequate redundancy or sparing.

The number of NT1X89AA cards required

= $TL/2$ (round up to the nearest integer).

7.2.3.3 Audio Response Unit (ARU) Provisioning

AOSSVR may employ either internal or external Audio Response Units (ARU) which playback the Directory Assistance and Intercept database search results to subscribers.

The Telco may employ either of the following ARU configurations:

1. DAS Vendor Supplied External ARU
2. DMS Internal ARU - Digital Recorded Announcement (DRA) Module

7.2.3.4 DAS Vendor Supplied External ARU

The external ARU's will require trunks, as illustrated in Figure 5 on page 20-54 in order to carry speech from the DAS to the DMS calling trunk.

These trunks are digital trunks (i.e. DS-1 Interface card, NT6X50AA). Number of trunks to be specified by Telco.

If digital trunks are used by Telcos who employ analog systems (IBM for instance), then the Telco will require channel banks to perform the digital to analog conversion.

7.2.3.5 DMS Internal EDRAM - Enhanced Digital Recorded

Announcement (DRA) Module

For information on the Enhanced Digital Recorded Announcement (EDRAM), see ECM 531.

7.2.4 Office Layout Information

Not applicable.

7.2.5 Traffic Tables

Not applicable.

7.3 Product/System Specification

7.3.1 Physical Characteristics

Not applicable.

7.3.2 EMI/Earthquake Information

Not applicable.

7.3.3 Sparing Information

Not applicable.

7.3.4 Power Feed and Fusing Requirements

The following fuses and feeds are required:

7.3.5 Current Drain Information

Not applicable.

7.4 Software Provisioning

7.4.1 Required Software Packages and Interdependencies

7.4.1.1 Software Feature Packaging

If this feature is required, order the following software feature packages:

SOFTWARE FEATURE PACKAGE	DESCRIPTION	V.O. APPL.	GENERAL RELEASE
NTX720AA	AOSS VR Call Handling	BCS-24	BCS-25
NTX721AA	Internal Announcement Response Capability	BCS-24	BCS-25
NTX723AA	AOSSVR Voice Response Handling of IBM Protocol	BCS-24	BCS-25

3.2 The following software feature packages are required as a prerequisite:

SOFTWARE FEATURE PACKAGE	DESCRIPTION	V.O. APPL.	GENERAL RELEASE

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NTX273AA	Multi-Protocol Controller BX.25	Existing
NTX892AA	MPC Multilink Mgmt	BCS-24 BCS-25
NTX131AA	Auxiliary Operator Services System (AOSS)	Existing

Check the appropriate SMS reports for the latest software packages.

7.4.2 Software Usage Restrictions

Not applicable.

7.4.3 Memory Provisioning

Not applicable.

7.5 Real Time Impact

Not applicable.

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8.0 ECM355 - NT5X88AA ABBT Applique Replaced by Software

8.1 Overview

This ECM is issued to cancel the requirement for applique shelf NT5X88AA when performing Automatic Board to Board Testing (ABBT) in conjunction with a #5XBAR, #1ESS, SP-1 or SA-1 switch. Feature package NTX057AB BCS-13 included a software replacement for this applique. All other ABBT hardware requirements remain unchanged.

8.2 Hardware Provisioning

8.2.1 Hardware Usage Restrictions

Not applicable.

8.2.2 Hardware Dependencies

Not applicable.

8.2.2.1 P and C Side Port Requirements

Not applicable.

8.2.2.2 DMS BUS Port Requirements

Not applicable

8.2.2.3 Circuits Per Card

Not applicable.

8.2.2.4 Discrimination Numbering

Not applicable.

8.2.3 Provisioning Considerations

Not applicable.

8.2.4 Office Layout Information

Not applicable.

8.2.5 Traffic Tables

Not applicable.

8.3 Product/System Specification

8.3.1 Physical Characteristics

Not applicable.

8.3.2 EMI/Earthquake Information

Not applicable.

8.3.3 Sparing Information

Not applicable.

8.3.4 Power Feed and Fusing Requirements

Not applicable.

8.3.5 Current Drain Information

Not applicable.

8.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

8.4.1 Required Software Packages and Interdependencies

Not applicable.

8.4.2 Software Usage Restrictions

Not applicable.

8.4.3 Memory Provisioning

Not applicable.

8.5 Real Time Impact

Not applicable.

9.0 ECM356 - 3-Way Call Chaining

9.1 Overview

The 3-Way Call Chaining feature will be provided in software packages NTX820AA (IBN offices) and NTX808AA (POTS offices). This feature will allow a non-controlling party in a simple 3-Way call or existing chain to flash hook and initiate another 3-Way call provided the non-controlling party either has the 3-Way Calling (3WC) line option or a call transfer option datafiled on his line or customer group.

Figure 6 below shows 3 subscribers, A,B and C, in a 3-Way conference with A being the controlling party and B and C being the non-controlling parties. All parties have the 3WC feature. Party B decides to add party D to the conference which he does by flash hooking once (this flash hook places parties A and C on hold) to connect to party D, then flash hooking again to connect back to parties A and C.

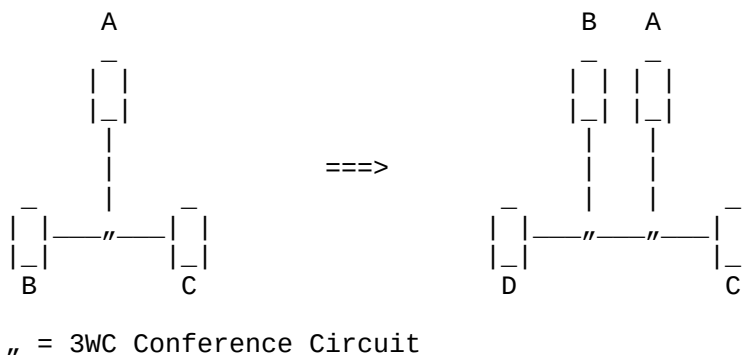


Figure 6. 3-Way Call Chaining

Party B is now a controlling party. Controlling parties A and B are not allowed to add another party to the conference since both parties are in a fully established conference.

To prevent overusage of 3-Port Conference circuits for 3-Way Call chaining, a new parameter in table OFCENG, MAX_NO_OF_3_PORTS_IN_CHAIN, can be used to specify a limit of 2 to 20 three port conference circuits. It is not intended for the 3-Way Call Chaining feature to take the place of the Large Conference Calling feature.

9.2 Hardware Provisioning9.2.1 Hardware Usage Restrictions

Not applicable.

9.2.2 Hardware Dependencies

Not applicable.

9.2.2.1 P and C Side Port Requirements

Not applicable.

9.2.2.2 DMS BUS Port Requirements

Not applicable

9.2.2.3 Circuits Per Card

Not applicable.

9.2.2.4 Discrimination Numbering

Not applicable.

9.2.3 Provisioning Considerations

In order to provision the 3-Port Conference circuits for 3-Way Call Chaining one of the following methods must be followed:

- Method #1: (a) Determine the number of lines with 3-Way Calling capability.
- (b) Telco to provide the % Feature Penetration for 3-Way Call Chaining from the number of lines in (a).
- (c) Telco to provide the % Feature Activation for 3-Way Call Chaining.
- (d) Telco to provide the average number of conferees in in a 3-Way Call Chaining Group.
- (e) Number of 3-Way Call Chaining Groups =
- $$(a * b * c) / d$$
- (round up to next Integer)
- (f) Number of 3-Port Conference Circuits required for 3-Way Call Chaining =
- $$(d - 2) * e$$

(g) Number of 6-Port Conference Circuits (NT3X67AA) required
for 3-Way Call Chaining =

$f / 2$
(round up to next Integer)

Method #2: Telco may provide traffic information for 3-Port
Conference Circuits that include 3-Way Call Chaining
requirements. With this method Conference Circuits
would be calculated by the standard method using total
ABSBH CCS and Poisson Tables.

9.2.4 Office Layout Information

Not applicable.

9.2.5 Traffic Tables

Not applicable.

9.3 Product/System Specification

9.3.1 Physical Characteristics

Not applicable.

9.3.2 EMI/Earthquake Information

Not applicable.

9.3.3 Sparing Information

Not applicable.

9.3.4 Power Feed and Fusing Requirements

Not applicable.

9.3.5 Current Drain Information

Not applicable.

9.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond
refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

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9.4.1 Required Software Packages and Interdependencies

DMS-100 or DMS-100/200 offices requiring the 3-Way Call Chaining feature must be provisioned with the following software packages:

For IBN Office

NTX100AA - Integrated Business Networks - Basic (IBN)
NTX820AA - Enhanced Three Way Calling (IBN)

For POTS Office

NTX020AC - Vertical Services I NTX808AA - Enhanced Three
Way Calling (POTS)

9.4.2 Software Usage Restrictions

Not applicable.

9.4.3 Memory Provisioning

Not applicable.

9.5 Real Time Impact

Not applicable.

10.0 ECM365 - Custom Charge Calling (CCC)

10.1 Overview

1. Mechanized Calling Card Service (MCCS), Custom Charge Calling (CCC), and Automated Calling Card Service (ACCS) are virtually the same except as shown below:

OPTION	U.S. APPL.	CDN APPL.	NO. 6 SIGNALLING CCIS	NO. 7 SIGNALLING CCS7
MCCS	YES	NO	YES	NO
CCC	NO	YES	NO	YES
ACCS	YES	NO	NO	YES

Figure 7. MCCS, CCC, ACCS Comparison

2. The standard recorded announcements and associated hardware for ACCS are the same as for MCCS (except for the hardware associated with the signalling of course).

The standard recorded announcements for CCC are different than the ones for MCCS/ACCS.

3. CCC is a feature set introduced to reduce operator involvement in credit card type calls and to reduce the fraudulent use of telephone calling cards, and of third number and collect billing.

4. CCC replaces the operator's involvement by using digitally recorded announcements to instruct the customer to dial his card number, by using digitone receivers to receive the number, and by initiating the validation over the CCS7 network with a Validation Database to validate the card number.

5. CCC will allow the subscribers to enter their calling card numbers via a digitone telephone. Subscribers using rotary dial instruments will be routed to the operator and will give the calling card number verbally to the operator. In either case the calling card number is validated in a centralized database using Common Channel Signalling No. 7 (CCS7) as a means of database access.

6. The optional CCC feature can be provided in DMS-200 TOPS and DMS-100/200 TOPS switches.

7. The class five offices that provide CCC capabilities are required to perform functions that will inform the DMS TOPS of the

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subscriber's capabilities, i.e. identification of the originating station type (DTMF/DP) and the transmission of this information to the DMS TOPS. Another function is required to enable the DTMF keypad if the originating station is a coin station.

8. The CCC Digital Recorded Announcement Machine and the digitone receiver pool are used for a portion of time on all calls that originate from CCC capable lines, whether or not a calling card is actually entered.

To be CCC capable:

- 1) the line must be digitone,
- 2) the line must be automatically identified,
- 3) the call must be 0+ (01+), and
- 4) the line must be marked as CCC capable by Originating Station Treatment (OST) checks.

9. Certain data, such as how many of the served lines are digitone equipped, how many are ANI (i.e. this indicates CCC service is possible) can be obtained from records. The number of 0+ (01+) calls can be estimated based on experience and forecast.

| The Manufacturer Discontinued (MDD) DRA Module consists of the DRA
| shelf and circuit packs, and has been replaced by the single slot
| EDRAM CP (NT1X80AA). The DRA shelf is a modified version of the
| Maintenance Trunk Module (MTM). It must be equipped with the ap-
| propriate MTM controller circuit packs and power converter circuit
| packs to provide the basic MTM functions. Reference ECM 531 for
| EDRAM information and provisioning.

10.2 Hardware Provisioning

10.2.1 Hardware Usage Restrictions

Not Applicable.

10.2.2 Hardware Dependencies

Not Applicable.

10.2.2.1 P and C Side Port Requirements

Not Applicable.

10.2.2.2 DMS BUS Port Requirements

Not Applicable.

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10.2.2.3 Circuits Per Card

Not Applicable.

10.2.2.4 Discrimination Numbering

Not Applicable.

10.2.3 Provisioning Considerations

CCC Digital Recorded Announcement (DRA) Machine

1. The CCC DRA machine will provide digitally recorded announcements for use during handling of automated credit card calls.
2. It differs from an announcement machine used for conventional announcements in that the messages are not broadcast. Instead, when using the CCC announcement machine, any one of several announcements may be directed to any one or more of the 30 (maximum) time slots available in each CCC machine. The CCC machine is considered a service circuit in that a particular time slot or announcement port is connected to a CCC call only when required.
3. CCC announcement service circuits serving CCC traffic will be provisioned on a loss basis in DMS toll TOPS and local/toll TOPS offices. Use Poisson Table P0.001.
4. Each CCC announcement machine has 30 service circuit ports but one of the 30 is dedicated to maintenance use. The number of CCC announcement machines required for traffic is equal to the number of CCC announcement service circuits required divided by 29 and rounded up to the next whole number. An additional one CCC announcement machine is added in order to provide service protection in the event of failure of one of the CCC announcement machines.
5. Each CCC announcement machine requires one Maintenance Trunk Module (MTM) NT2X58CB/AK/AG. This MTM is comprised of shelf hardware and common circuit packs to provide interface to the DMS network (one network port and 30 time slots) and to the CCC announcement circuit packs.
6. One Enhanced Digital Recorded Announcement Controller CP NT1X75BA is required per CCC announcement machine. This circuit pack provides control of application and recording of announcements.
7. One CCC Standard English Announcement CP, NT1X76AH or one CCC Standard French Announcement CP, NT1X76BH is required per CCC announcement machine. If both English and French announcements are required, then provide NT1X76AH and NT1X76BH. These circuit packs

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contain all the voice messages to support the CCC feature set. The memory used is double density, Erasable Programmable Read Only Memory (EPROM).

8. The Custom Announcement CP NT1X79AA is an optional circuit pack, required only if the customer wishes to offer voice responses not included on the CCC Standard Announcement circuit pack. Electrically Erasable Programmable Read Only Memory (EEPROM) is used as memory, allowing the customer to record or rerecord messages. This card can hold up to 31 seconds of recording. EEPROM speech memory is provisioned based on total recording time in seconds per CCC system. An announcement can run over two NT1X79AA cards associated with the same controller card. However, it must not be split over two controllers.

9. To determine the maximum number of CCC announcement cards that may be engineered onto one MTM shelf, use the following chart. For each of the speech memory cards supplied for one shelf, add the virtual card credit (128K - eight bit). The total must not exceed eight. For example, one NT1X76AH and one NT1X76BH plus three NT1X79AA cards total seven, so one more card may be added if its vcard credit is only one.

CCC SPEECH MEMORY CARD

CARD	PEC	VCARD CREDIT
----	---	-----
ROM	NT1X76AH	2
ROM	NT1X76BH	2
EEPROM	NT1X79AA	1

10. CCC Circuit Pack Power Consumption Table

PEC	MAXIMUM POWER CONSUMPTION (WATTS)
NT1X75BA	3.0
NT1X76AH	2.5
NT1X76BH	2.5
NT1X79AA	11.0

Digitone Receiver Circuits

Provisioning Considerations

1. To support CCC it is necessary to provide digitone receivers that are attached as service circuits to a CCC call during periods when digitone signalling is permitted or expected.

2. Typically, DMS toll TOPS offices and the toll side of local/toll TOPS offices are not provisioned with digitone receivers. The

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introduction of CCC will necessitate the inclusion of this new resource in DMS toll offices.

3. The digitone receiver used is the same circuit pack (NT2X48AB) as is used in the DMS-100.

4. A separate group of digitone receivers dedicated to CCC should be engineered in each office.

5. Digitone receivers serving CCC traffic will be provisioned on a loss basis in DMS toll TOPS and local/toll TOPS offices. Use Poisson Table P0.001. Digitone Receiver Circuits

Provisioning Procedure

1. Determine the total Average Busy Season Busy Hour Attempt (ABSBHA) for all 0+, 01+, ANI traffic with an indication of CCC capable. This will be the sum of all incoming trunk groups as well as local originating traffic in the case of DMS-100/200/TOPS.

2. Determine the probability that the 0+ or 01+ call marked as CCC capable is actually a subscriber dialed CCC call. This is difficult to predict and a value of 0.15 to 0.60 can be used.

3. Determine the complement of item 2. This is the probability that the 0+ or 01+ call marked as CCC capable is an operator handled call. The sum of item 2 and item 3 should be 1.

4. If the sequence calling feature is disabled, then multiply the value of item 2 by 22.05 seconds (the digitone receiver holding time for CCC calls).

Otherwise, if the sequence calling feature is enabled, then multiply the value of item 2 by 42.55 seconds (the digitone receiver holding time for CCC calls).

5. Multiply the value of item 3 by 4 seconds (the average holding time of the digitone receiver for non-CCC calls when marked as CCC capable).

6. Add the value of items 4 and 5. This is the Weighted Average Holding Time (WAHT) of all 0+ and 01+ calls marked as CCC capable (i.e. Weighted Average Holding Time of digitone receivers).

7. To obtain the traffic usage in CCS offered to the digitone receivers, multiply the value of item 1 by the value of item 6, and divide by 100 to convert to CCS.

8. Using Poisson Table P0.001, determine the number of digitone receiver circuits required (using the value of item 7).

9. Each digitone receiver card contains four digitone receiver circuits. The number of digitone receiver cards is determined by dividing the number of digitone receiver circuits by four and rounding up to the next whole circuit pack. Digitone Receiver Circuits

	<u>EXIST</u>	<u>PROP.</u>	<u>NOTE</u>
1. Total ABSBHA for all 0+, 01+, ANI traffic determined to be CCC capable.	_____	_____	_____
2. Probability of subscriber dialed CCC call.	_____	_____	_____
3. Probability of operator handled call. NOTE: Sum of item 2 and item 3 should be 1.	_____	_____	_____
4. Item 2 x 22.05 or 42.55 seconds	_____	_____	_____
5. Item 3 x 4 seconds	_____	_____	_____
6. Item 4 + Item 5 Weighted average holding time of digitone receivers.	_____	_____	_____
7. Item 1 x Item 6 / 100 Digitone receivers traffic usage in CCS.	_____	_____	_____
8. Number of digitone receiver circuits required.	_____	_____	_____
9. Number of digitone receiver cards required.	_____	_____	_____

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CCS7

Provisioning Considerations

1.CCC is a feature that uses Common Channel Signalling Number 7 (CCS7) as the vehicle to carry messages to centralized databases and back to the DMS.

2.Hence, it is required that at least the minimum CCS7 equipment be provided prior to or concurrent with CCC, that is, Message Switch and Buffer 7 (MSB7), etc.

10.2.4 Office Layout Information

Not Applicable

10.2.5 Traffic Tables

CCC Digital Recorded Announcement (DRA) Machine

1. Determine the total Average Busy Season Busy Hour Attempt (ABSBHA) for all 0+, 01+, ANI traffic with an indication of CCC capable i.e. trunk group = CCC capable + originating station is DTMF type. (This will be the sum of all incoming trunk groups as well as local originating traffic in the case of DMS-100/200 TOPS.)

2. Determine the probability that the 0+ or 01+ call marked as CCC capable is actually a subscriber dialed CCC call. This is difficult to predict and a value of 0.15 to 0.60 can be used.

3. Determine the complement of item 2. This is the probability that the 0+ or 01+ call marked as CCC capable is an operator handled call. The sum of item 2 and item 3 should be 1.

4. Multiply the value of item 2 by 19 seconds (the CCC announcement machine holding time for CCC calls). This is the WAHT of the CCC announcement machine of all 0+ and 01+ calls marked as CCC capable.

5. To obtain the traffic usage in CCS offered to the CCC announcement machine, multiply the value of item 1 by the value of item 4, and divide by 100 to convert to CCS.

6. Using Poisson Table P0.001, determine the number of CCC announcement service circuits required (using the value of item 5).

7. To determine the number of CCC announcement machines required for traffic, divide item 6 by 29, round up to the next whole number, and add 1.

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8. Each CCC announcement machine requires one Maintenance Trunk Module (MTM), NT2X58CB/AK/AG. Enter the number of CCC MTM's required for traffic which determines the number of CCC groups.

9. If the customer wishes to offer voice responses not included on the CCC Standard Announcement circuit pack, enter the number of seconds of recording required per CCC group.

10. Determine the number of NT1X79AA Custom Announcement cards required per CCC group by dividing item 9 by 31 seconds.

11. Determine the number of CCC MTM's per CCC group required to accommodate the NT1X79AA cards by dividing item 10 by 4 or 2 depending on whether bilingual announcements are required or not. Since each CCC announcement machine requires two Standard Announcement cards per language, if the Standard English Announcements are required, a maximum of four (4) NT1X79AA cards can be mounted on a CCC MTM.

12. The number of CCC MTM's per office required is equal to the value of item 8 multiplied by the value of item 11.

13. One Enhanced Digital Recorded Announcement Controller CP NT1X75BA is required per CCC announcement machine MTM. Enter the number of circuit packs required.

14. 1) If Standard English Announcements are required, one (1) CCC Standard English Announcement CP, NT1X76AH is required per CCC MTM. 2) If Standard French Announcements are required, one (1) CCC Standard French Announcement CP, NT1X76BH is required per CCC MTM. 3) If both Standard English and French Announcements are required, provide one each of NT1X76AH and NT1X76BH per CCC MTM. 4) Enter the number of circuit packs required.

15. The number of Custom Announcement cards NT1X79AA is equal to the value of item 10 multiplied by the value of item 8. CCC Digital Recorded Announcement (DRA) Machine

	<u>EXIST</u>	<u>PROP.</u>	<u>NOTE</u>
1. Total ABSBHA for all 0+, 01+, ANI traffic determined to be CCC capable.	_____	_____	_____
2. Probability of subscriber dialed CCC call.	_____	_____	_____
3. Probability of operator handled call. NOTE: Sum of item 2 and item 3 should be 1.	_____	_____	_____
4. Item 2 x 19 seconds	_____	_____	_____

5.	Item 1 x Item 4 / 100 CCC announcement machine traffic usage in CCS.	_____	_____	_____
6.	Number of CCC announcement service circuits required.	_____	_____	_____
7.	Number of CCC announcement machines required.	_____	_____	_____
8.	Number of CCC MTM's required for traffic.	_____	_____	_____
9.	Number of seconds of Custom Announcement. recording required per CCC group.	_____	_____	_____
10.	Number of NT1X79AA CCC Custom Announcement cards required per CCC group.	_____	_____	_____
11.	Number of CCC MTM's per CCC group required to accommodate the NT1X79AA cards.	_____	_____	_____
		<u>EXIST</u>	<u>PROP.</u>	<u>NOTE</u>
12.	Number of CCC MTM's per office required.	_____	_____	_____
13.	Number of Enhanced Digital Recorded Announcement Controller cards NT1X75BA required.	_____	_____	_____
14.	Number of CCC Standard Announcement cards required.	_____	_____	_____
	(1) NT1X76AH (English)	_____	_____	_____
	(2) NT1X76BH (French)	_____	_____	_____
15.	Number of Custom Announcement cards NT1X79AA required.	_____	_____	_____

10.3 Product/System Specification

10.3.1 Physical Characteristics

Not Applicable

10.3.2 EMI/Earthquake Information

Not Applicable

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10.3.3 Sparing Information

Not Applicable

10.3.4 Power Feed and Fusing Requirements

Not Applicable

10.3.5 Current Drain Information

Not Applicable

10.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

10.4.1 Required Software Packages and Interdependencies

Not Applicable.

10.4.1.1 Software Feature Packaging

1. If the CCC feature is required, order the following software feature packages:

SOFTWARE FEATURE PACKAGE	DESCRIPTION	DMS OFFICE TYPE
-----	-----	-----
NTX552AB	CCC	DMS TOPS Office
NTX559AA	DP/DTMF Separation	DMS TOPS Office
NTX558AA	DP/DTMF Separation	DMS Local End Office
NTXA08AA	Non CCS7 DMS Tandem: KP/DTMF Tandeming	Non CCS7 DMS-200 Tandem Office
NTX192AA	Non CCS7 DMS Tandem: ANI Regeneration	Non CCS7 DMS-200 Tandem Office

2. The following software feature packages are required as a pre-requisite:

SOFTWARE FEATURE PACKAGE	DESCRIPTION	DMS OFFICE TYPE
-----	-----	-----

NTX550AA	TCAP	DMS TOPS Office
NTX041AA	CCS7 MTP + SCCP	DMS TOPS Office

3. Check the appropriate SMS reports for the latest software packages.

10.4.2 Software Usage Restrictions

Not Applicable

10.4.3 Memory Provisioning

Not Applicable

10.5 Real Time Impact

Not Applicable

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11.0 ECM375 - Enhanced Call Waiting Features

11.1 Overview

The Call Waiting enhancements consist of the following:

Feature -----	Description -----
IBN Cancel Call Waiting	- allows an IBN station to dial an access code to protect an individual call from Call Waiting Tone and barge-in. Provided in package NTX824AB.
POTS Cancel Call Waiting	- allows a subscriber to dial an access code to cancel the Call Waiting feature for the duration of one call. Provided in package NTX807AB.
Call Waiting for 3-Way Calling	- allows the non-controlling parties in a 3-way call (with call waiting option) to have incoming calls waited against them. This feature is allowed for POTS or IBN stations using model 500 or 2500 sets. Provided in packages NTX824AB and NTX807AB.

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11.2 Hardware Provisioning

11.2.1 Hardware Usage Restrictions

11.2.2 Hardware Dependencies

11.2.2.1 P and C Side Port Requirements

11.2.2.2 DMS BUS Port Requirements

Not applicable

11.2.2.3 Circuits Per Card

11.2.2.4 Discrimination Numbering

11.2.3 Provisioning Considerations

11.2.4 Office Layout Information

Not applicable.

11.2.5 Traffic Tables

Not applicable.

11.3 Product/System Specification

11.3.1 Physical Characteristics

11.3.2 EMI/Earthquake Information

11.3.3 Sparing Information

Not applicable.

11.3.4 Power Feed and Fusing Requirements

11.3.5 Current Drain Information

11.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

11.4.1 Required Software Packages and Interdependencies

Package NTX824AB requires the following software packages:

NTX000AA09 - Bilge
NTX001AA17 - Common Basic

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NTX100AA16 - IBN Basic
NTX901AA14 - Local Features I

Package NTX807AB requires the following software packages:

NTX000AA09 - Bilge
NTX001AA17 - Common Basic
NTX020AC01 - Vertical Services I
NTX901AA14 - Local Features I

Office Parameters

The following Office Parms are affected by the enhancements added here:

Enhanced Call Waiting (POTS) - CCW_ACTIVE Yes/No Default=NO
Yes indicates that Cancel Call Waiting (CCW) is in
effect for all CWT POTS subscribers. No indicates CCW
is not in effect.

11.4.2 Software Usage Restrictions

These enhancements to the Call Waiting feature are applicable to offices which are already configured for the current Call Waiting feature. The hardware described in ECM 320 is still required for Call Waiting.

The IBN Cancel Call Waiting feature is available to 500/2500 stations and to an Electronic Business Set (EBS) station provided it is equipped with the CONF 3/XFER option.

For the Three Way Call Waiting feature, a party using a 500/2500 set must be a noncontroller in the three way call to receive a call waiting call. A party using an EBS in a three-way call may receive a call while it is the controller or noncontroller.

11.4.3 Memory Provisioning

Not applicable.

11.5 Real Time Impact

Since Cancel Call Waiting can be activated either prior to placing a call (by dialing an access code) or during a call (by hook flash and dialing an access code), the Real Time required depends on which way the feature was implemented. The expected Real Time increase required for each method follows :

Cancel Call Waiting (prior to call) -	14 milliseconds
Cancel Call Waiting (during call) -	35 milliseconds

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12.0 ECM376 - Enhancements to Call Forwarding

12.1 Overview

Feature -----	Description -----
POTS Multiple Simultaneous Call Forwarding	- allows a multiple number of calls to forward through a POTS station. This will provide better service to a subscriber who forwards to destinations, such as hunt groups, which can handle multiple calls.
Call Forward - Busy Line	- allows calls to a busy station to be forwarded to another station within or outside the DMS. Permits a subscriber to have calls to his number, when busy, forward to an alternate number.
Call Forward - Doesn't Answer	- allows calls to an idle station
Call Forward - Group Doesn't Answer	to route to another station within or outside the DMS switch after a Telco set number of rings.

12.2 Hardware Provisioning

12.2.1 Hardware Usage Restrictions

12.2.2 Hardware Dependencies

12.2.2.1 P and C Side Port Requirements

12.2.2.2 DMS BUS Port Requirements

Not applicable

12.2.2.3 Circuits Per Card

12.2.2.4 Discrimination Numbering

12.2.3 Provisioning Considerations

Feature Availability

Engineers shall refer to ECM 362 for availability of these enhancements.

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12.2.4 Office Layout Information

Not applicable.

12.2.5 Traffic Tables

Not applicable.

12.3 Product/System Specification

12.3.1 Physical Characteristics

12.3.2 EMI/Earthquake Information

12.3.3 Sparing Information

Not applicable.

12.3.4 Power Feed and Fusing Requirements

12.3.5 Current Drain Information

12.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

12.4.1 Required Software Packages and Interdependencies

Software package NTX806AA requires the following packages:

NTX000AA09 : Bilge
NTX001AA17 : Common Basic
NTX020AC01 : Vertical Services I
NTX901AA14 : Local Feature I

Restrictions and Limitations

Multiple Simultaneous Call Forwarding only applies to POTS lines which have one or more POTS call forwarding features and to hunt groups which have the "Call Forward - Group Doesn't Answer" option specified.

The maximum number of sequential forwardings permitted within a single Central Office, due to any combination of POTS and IBN Call Forwarding features is five (5).

When translation datafill indicates that a call forwarded via the Call Forward - Busy Line feature requires Central Automatic Mes-

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sage Accounting (CAMA) recording, it is NOT possible to indicate in the billing record that the call was subject to Call Forwarding.

12.4.2 Software Usage Restrictions

12.4.3 Memory Provisioning

Not applicable.

12.5 Real Time Impact

Real Time impact of the enhancements to Call Forwarding is expected to be minimal. The following figures should be used for estimating Real Time impact:

Call Forward - Busy Line : 8 milliseconds
Call Forward - Don't Answer : 25 milliseconds

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13.0 ECM385 - SERVICE EVALUATION SYSTEM(SES) No.2 INTERFACE

13.1 Overview

The No.2 Service Evaluation System (SES) interface allows the centralized operations system No.2 SES to perform service evaluation of calls served by the DMS-100 family switch. This interface provides an end user perspective for the Bell operating companies (BOC) who perform service evaluation on a centralized basis from a No.2 SES.

Two distinct types of service evaluation are performed on the No.2 SES for the DMS-100 F interface; Incoming Trunk Service Evaluation (ITSE) and/or Dial Line Service Evaluation (DLSE).

ITSE provides for service evaluation of calls coming from an Inter-Exchange Carrier Point of Presence (POP) to the access tandem. Note that a DMS-100 office would not be able to perform ITSE functions.

DLSE provides for service evaluation of calls originating at an end office. These can be either intralata and/or interlata calls. Note that DLSE would not be performed on a strictly DMS-200 office, however, both may be performed on a local/toll office.(MAX one ITSE & one DLSE interface per office).

13.2 Hardware Provisioning

13.2.1 Hardware Usage Restrictions

13.2.2 Hardware Dependencies

13.2.2.1 P and C Side Port Requirements

13.2.2.2 DMS BUS Port Requirements

Not applicable

13.2.2.3 Circuits Per Card

13.2.2.4 Discrimination Numbering

13.2.3 Provisioning Considerations

The DMS-100F interfaces with the No.2 SES via a dedicated, synchronous 2400 bit/second data link. One such data link is required for both DSLE and ITSE each. Physical requirements for a data link include one RS232 synchronous BX.25 communication link on the NT1X89AA Multi-Protocol Controller (MPC) (link 2 or 3) and a 2400 bit/second synchronous modem compatible with the far end modem.

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SES functionality may not be combined on an MPC with other features.

Additionally, a 1-way outgoing trunk either Analog or Digital(For ANALOG applications use NT2X82AA,For DIGITAL use Digital facilities) must be dedicated for ITSE and a second trunk must be dedicated for DLSE. These trunks also interface with the No. 2 SES. Each voice link (trunk) either Analog or Digital requires a dedicated 3-port conference circuit.

13.2.4 Office Layout Information

Not applicable.

13.2.5 Traffic Tables

Not applicable.

13.3 Product/System Specification

13.3.1 Physical Characteristics

13.3.2 EMI/Earthquake Information

13.3.3 Sparing Information

Not applicable.

13.3.4 Power Feed and Fusing Requirements

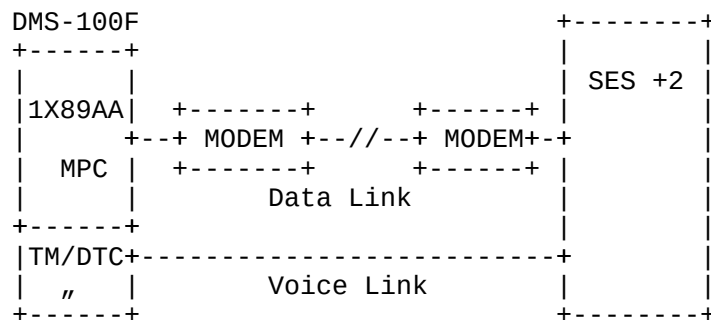
13.3.5 Current Drain Information

13.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

13.4.1 Required Software Packages and Interdependencies

NTX215AA	No. 2 SES Interface
NTX273AA	Multi-Protocol Controller



notes

=====

„ For ANALOG use NT2X82AA

" For DIGITAL use Digital Trunks

1 set required per each ITSE and DLSE applications.

Figure 8. DMS-100F to SES #2 Interface

13.4.2 Software Usage Restrictions

13.4.3 Memory Provisioning

Not applicable.

13.5 Real Time Impact

CPU real time required for the No. 2 SES interface is 0.5% of total time during the Busy Hour.

14.0 ECM400 - Distinctive Call Waiting Ringback

14.1 Overview

When a call completes to a Meridian Digital Centrex (MDC) or Residential Enhanced Services (RES) line with Call Waiting Terminating (CWT), this feature, when present on the terminating line, provides an indication to the caller as to the state of the terminating line. If the terminating line is currently engaged in a stable two-port call that is available for call waiting, a distinctive audible ringback is returned to the caller. The distinctive audible ringback provided by this feature consists of 1200 msec of audible ring tone followed by 400 msec of silence followed by 400 msec of audible ring tone followed by 4 seconds of silence. Otherwise, standard audible ringback or busy tone is provided as before.

Restrictions

This feature is only available to MDC stations, EBSs, and RES lines that have the CWT option. Distinctive call waiting ringback is not provided for calls that come in on ISUP trunks because ringback is generated within the trunk itself. Distinctive Call Waiting Ringback is not provided for attendant extended calls.

14.2 Hardware Provisioning

14.2.1 Hardware Usage Restrictions

Not applicable.

14.2.2 Hardware Dependencies

There is no additional hardware required to implement this feature.

14.2.2.1 P and C Side Port Requirements

Not applicable

14.2.2.2 DMS BUS Port Requirements

Not applicable

14.2.2.3 Circuits Per Card

Not applicable

14.2.2.4 Discrimination Numbering

Not applicable

14.2.3 Provisioning Considerations

Not applicable

14.2.4 Office Layout Information

Not applicable.

14.2.5 Traffic Tables

This feature will impact the switch as follows:

- MDC/RES lines with the CWR feature are increased by .030ms/call.
- MDC with EBS will increase .45ms/call.

These changes are considered minimal and traffic guidelines require no change for this feature.

14.3 Product/System Specification

14.3.1 Physical Characteristics

Not applicable.

14.3.2 EMI/Earthquake Information

Not applicable.

14.3.3 Sparing Information

Not applicable.

14.3.4 Power Feed and Fusing Requirements

Not applicable

14.3.5 Current Drain Information

Not applicable

14.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

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14.4.1 Required Software Packages and Interdependencies

Distinctive Call Waiting Ringback is provided in Feature Package NTXA32AA which is available to order in BCS26. Feature Package NTXA32AA needs the following:

NTX000AA	:	Bilge
NTX001AA	:	Common Basic
NTX100AA	:	IBN Basic
NTX435AA	:	IBN Superset
NTX901AA	:	Local Features I

14.4.2 Software Usage Restrictions

Not applicable.

14.4.3 Memory Provisioning

Memory Requirements

Program Store and Data Store requirements for the Distinctive Call Waiting Ringback feature are negligible. The "per line" requirements are satisfied via the line option questions in Memcalc. Refer to Memcalc for memory provisioning requirements.

14.5 Real Time Impact

Not applicable.

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15.0 ECM408 - MULTI-PARTY BRIDGED SERVICES

15.1 Overview

In DMS-100 offices, a requirement is needed to allow a group of subscriber lines to simulate being a single line, or a Multi-Party Line. This has been done previously using jumper wires at the Central Office(CO).

A new Plain Old Telephone Service(POTS) Software feature Package called "MULTI-PARTY BRIDGED(MPB) Services(NTX297AA)" has been developed. This feature associates together a group of lines (MPB Group) so they appear to the subscribers to be different parties of a Multi-Party line. This feature makes it possible to bridge(by Software) up to Four(4) lines which cannot be bridged physically because they have no Analog appearance in the CO.

MPB is available on lines connected to any module (LM,LCM,DMS-1U,SLC-96, DMS-1R). Members of an MPB Group each have a unique Directory Number(DN) and a unique Line Equipment Number (LEN).

Bridging is supported through Software and Conference circuit cards(NT3X67). Six Port Conference Circuits are used when, Two, Three, or Four members of an MPB Group are Bridged. A useful application for Bridged Services is to set-up Conference Calls.

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15.2 Hardware Provisioning

15.2.1 Hardware Usage Restrictions

15.2.2 Hardware Dependencies

15.2.2.1 P and C Side Port Requirements

15.2.2.2 DMS BUS Port Requirements

Not applicable

15.2.2.3 Circuits Per Card

15.2.2.4 Discrimination Numbering

15.2.3 Provisioning Considerations

(A) Conference Circuits:

Provision the NT3X67AA Six Port conference cp per the following formula whenever more than one(1) member of a Bridge Group is to be bridged together. These Six Port Conference CP's shall be configured as Two(2) Three Port Conference Circuits.

$$\text{NO. OF SIX PORT CONFERENCE CP} = (0.5 \times A) + (B) + (1.5 \times C)$$

Where A = Number of Two(2) Party MPB Groups

B = Number of Three(3) Party MPB Groups

C = Number of Four(4) Party MPB Groups

Round up to the nearest Whole Number for the total NT3X67AA Six Port Conference CP's that are required for each office that Requires Multi- Party Bridged Services.

(B) Memory Associated With Software Package NTX297AA:

Overhead Program Store = 16,244 Bytes

Incremental Data Store = $1000 + (N \times 10) + (M \times 4)$ Words

Where N = The Number of Bridge Groups.

M = The Number of Lines in Bridge Groups.

Overhead Data Store = 569 Bytes

Note that the overhead values are based upon the sum total of all software modules within each software package. Any redundant modules within the software load will not be counted in memory

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requirements and may result in a lesser memory impact for the MPB feature. Refer to the latest MEMCALC for a more precise value.

15.2.4 Office Layout Information

Not applicable.

15.2.5 Traffic Tables

Not applicable.

15.3 Product/System Specification

15.3.1 Physical Characteristics

15.3.2 EMI/Earthquake Information

15.3.3 Sparing Information

Not applicable.

15.3.4 Power Feed and Fusing Requirements

15.3.5 Current Drain Information

15.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

15.4.1 Required Software Packages and Interdependencies

Provision NTX297AA MULTIPARTY BRIDGED SERVICES package for DMS 100 or DMS 100/200 Offices where Multi-Party Bridging is a requirement. There are no office parameters that are affected. Refer to the appropriate Software Packaging ECM for detailed BCS availability.

The following Software Packages are required for feature package NTX297AA:

	NTX000AA	Bilge	\
	NTX001AA	Common Basic	/ STANDARD
	NTX901AA	Local Features I	
Either	NTX020AA	Vertical Services I	<upgraded by NTX020AB>
OR	NTX020AB	Vertical Services I	<upgraded by NTX020AC>
OR	NTX020AC	Vertical Services I	<upgrade from NTX020AB>

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15.4.2 Software Usage Restrictions

- () MPB is compatible with Line Class Code for Individual Flat Rate (1FR) and Line Class Code for Message Rate (1MR) lines only. Only Single-Party ringing is supported.
- () MPB is incompatible with POTS Custom Calling features(Call Forwarding, Call Waiting, Speed Calling, and Three-Way Calling).

If Two or more members of an MPB Group are bridged into a call involving a subscriber that has Call Waiting or Three-Way Calling, the Call Waiting or Three-Way Calling feature is deactivated.

If a member of an MPB Group is involved in a call in which the Call Waiting or Three-Way Calling features are active,any other member of that MPB Group that goes offhook is given its own separate call.

- () When a member of an MPB group is connected to an Attendant Console, any other member of the MPB Group that goes offhook is given it's own separate call rather than being bridged in.
- (4) Four is the maximum number of members allowed in an MPB Group.
- (5) The Change Feature (CHF) command, used in Service Orders,is not allowed for the MPB Line Option.
- (6) When one member of an MPB Group is offhook and another member of the MPB Group goes offhook and cannot be bridged in because the First member is dialing or a Conference Card is unavailable,the Second member gets its own separate call.

When a member of an MPB gets its own separate call for either of the previous reasons, all other MPB members subsequently going offhook also get their own calls. This is true until all members of the MPB group are simultaneously idle.

The following line features are not allowed with the MPB feature.

AUTOMATIC LINE(AUL)
BRIDGED NIGHT NUMBER(BNN)
CALL FORWARDING(CFW)
CIRCULAR HUNT(CIR)
CIRCUIT SWITCHED DIGITAL DATA SERVICE(CSD0)
CALL WAITING(CWT)
DISTRIBUTED LINE HUNTING(DLH)
DIRECTORY NUMBER HUNT(DNH)
ESSENTIAL LINE(ELN)
EMERGENCY SERVICE(ESL)
FIRE REPORTING SYSTEM TERMINATION AND ORIGINATION(FRO)
FIRE REPORTING SYSTEM TERMINATION ONLY(FRS)
HOTEL(HOT)
INTERCOM(INT)
LINE HUNT OVERFLOW TO A DIRECTORY NUMBER(LOD)
LINE OVERFLOW TO A ROUTE(LOR)
MANUAL LINE(MAN)
MULTILINE HUNTING(MLH)
NO DOUBLE CONNECT(NDC)
PREFERENTIAL HUNT(PRH)
SPEED CALLING, SHORT LIST(SC1)
SPEED CALLING, LONG LIST(SC2)
STOP HUNT(SHU)
WARM LINE(WML)
THREE-WAY CALLING(3WC)
CALL FORWARDING USAGE SENSITIVE DENIAL(CUSD)
CALL FORWARDING GROUP DON'T ANSWER(CFGDA)
CALL FORWARDING DON'T ANSWER(CFDA)
CALL FORWARDING BUSY LINE(CFBL)

15.4.3 Memory Provisioning

Not applicable.

15.5 Real Time Impact

For the following conditions, A and B are two lines in the same bridge group.

(A) Call Processing:

WHEN =====	IMPACT =====
Originating a call from A ==>	0.6 ms (Delta:compared with extended line)
Terminating a call to A ===>	0.4 ms (Delta:compared with extended line)
Going onhook on A =====>	0.3 ms (Delta:compared with extended line)
A getting routed to =====>	0.3 ms (Delta:compared with extended line)
disconnect treatment	
While A is active on a =====>	42 ms (Total CPU Time)
call,B goes offhook and gets bridged into A's call.	
B goes onhook while B was ==>	32 ms (Total CPU Time)
bridged into A's call.	
B goes offhook while A is ==>	25 ms (Total CPU Time)
being rung (results in B usurping A's call)	
B goes offhook and gets =====>	11 ms (Total CPU Time)
its own call while A is involved in a call(due to lack of resources).	

(B) Non-Call Processing:

Driven by Man Machine Interface (Servord and Table Control),there is no significant impact.

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16.0 ECM416 - Automatic Call Distribution

16.1 Overview

16.1.1 TELEPHONE SETS

An agent position may be a single line set (500/2500), a Meridian Business Set, or an Electronic Business Set (EBS). The M5212 series Meridian Business set was designed specifically for ACD. Supervisors should use Meridian Business sets.

16.1.2 ANNOUNCEMENTS

An ACD customer can provide an announcement to callers queued in an incoming call queue to explain the delay they are experiencing or re-route ACD calls received while in a night service mode to an announcement that specifies the customer's hours of operation. There are no pre-programmed announcements for the ACD feature. The customer must program each announcement for their specific application. The ACD announcement traffic is added to the total office announcement traffic. To determine the additional circuits for the ACD announcement, divide the ACD announcement time (seconds) by 31 seconds.

Music On Delay is an option with the ACD feature. The music source must be provided by the customer. The music source is connected to the DMS via a trunk circuit (NT2X88AA). For more information on ACD Music On Delay, refer to ECM 420.

16.1.3 ACD QUEUE STATUS LAMP (QSL)

The ACD QSL feature enables supervisors and/or agents to determine which ACD groups need additional agents or redistribution of existing agent positions to more efficiently handle incoming calls.

This is accomplished by having three (3) additional thresholds per ACD group. These thresholds, datafilled as part of the ACD group option MSQS (Multi-Stage Queue Status) provide four ranges for assessing the call handling capability of each ACD group. This feature is supported using SD points in either a MTM or OAU. It is not supported on any other peripheral device, including an RMM. BNR recommends that use of MSQS with SD points be limited to the MTM and/or OAU due to the potential for high messaging load presented by the MSQS audit.

The QSL feature provides a visual indication, approximately once a minute, for calls that are being deflected because the incoming ACD call queue has overflowed. An overflow occurs when the maximum number of calls are queued and/or maximum call queued wait time has been exceeded. If an overflow condition exists, a lamp is lit on an external display panel. Each lamp is associated with one

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ACD group. All ACD groups with the QSL option can be monitored, up to a maximum of 1024 groups.

One Signal Distributor (SD) point is required for each ACD group that utilizes the Queue Status Lamp feature. Each SD card (NT2X57AA) has 14 points that can be provisioned. Each SD Card requires one slot in the Maintenance Trunk Module (MTM) or OAU. Each of the three thresholds of an ACD group will have a separate SD point to indicate the current threshold. Fifty-five (55) Signal Distributor Cards are needed to handle the 3 threshold levels for the possible 1024 ACD groups that can be monitored. Two (2) slots in the MTM or OAU are taken up by each Signal Distributor Card.

The Central Alarm Display Panel (NT5X72AA) can be used as an external display panel for ACD groups requiring the QSL option in a local arrangement. Each NT5X72AA has 15 lamps and can accommodate 15 groups. One Central Alarm Applique Circuit (NT5X72AB) is required for each group.

16.1.4 OBSERVE AGENT FEATURE

The Observe Agent feature enables an observer to obtain a monitoring path between the ACD agent and the caller or join in the conversation by depressing CALL AGENT key. This feature enables an ACD supervisor to control the quality of service offered to callers or to provide training. The Observe Agent feature can only be assigned to supervisor sets.

The agent position to be observed must be in the ACD group that the Observe Agent key is associated with.

The Observe Agent feature can optionally have a warning tone to notify the agent that the ACD call is being monitored. This warning tone will be heard by the ACD agent at the beginning of each call that the supervisor observes.

The Call Waiting Tone Generator CP, NT3X68AC, provides the observe agent warning tone. Since the traffic requirements for the warning tone for this feature are considered to be minimal, any existing NT3X68AC cards in the DMS office will be sufficient to handle the requirements for this feature.

16.1.5 DMS ACD MANAGEMENT INFORMATION

A series of load management commands are available at the DMS Command Interpreter (CI) level. These commands allow the supervisor to modify various ACD configuration parameters by way of a DMS terminal. ACDSHOW is also a series of CI commands that are available for administrative use and can be executed at a Maintenance and Administration position.

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The ACD Real Time Status Display feature allows the customer to print simple management reports about their ACD group's operation to aid in configuring their ACD groups so that calls to all groups are serviced efficiently. These reports can be provided directly from a DMS-100 to an ASCII terminal. These reports are designed to allow smaller ACD users, who don't have a Management Information System to access statistical information about their group so that they can better manage their call center.

16.1.6 ACD MANAGEMENT INFORMATION SYSTEM - RT-100

The RT-100 MIS has been discontinued and replaced by CC MIS. See the next section for information on CC MIS.

The RT-100 ACD MIS provides the ACD customer with timely and accurate statistics relevant to the ACD operation. These statistics allow the customer to monitor changing ACD traffic loads and levels of service being provided.

RT-100 MIS consists of a Compaq 386 or NT386 Personal Computer (PC), which is connected to a Memotec SP830 Asynchronous Packet Assembler/Disassembler (PAD) via an RS232 interface. The PAD is connected to a Data Unit via an RS232 interface. The two Data Units (NT4X25AF or NT4X25AH) are connected by a Network Operations Protocol (NOP) X.25 link (two-wire circuit). The second Data Unit is connected to the switch via an RS232 interface to a Multi-Protocol Controller (MPC) Card NT1X89AA located in the IOC shelf. The Data Units operate at 4800 baud. Although the second port on the NT1X89AA card can be used at the same time as the first port, it is recommended that a second NT1X89AA card be used to connect a second Data Unit.

The PC can have up to eleven (11) color screen monitors extended to other locations. These monitors are the IBM PS/2 Model 25/35. These require Data Units when they are located more than 50 feet from the PC.

Currently, the Compaq 386 or NT386 with Xenix Operating System version 2.2 is the recommended PC. The recommended software for this PC is the RT100 which is manufactured by Perimeter Technology. If the IBM monitors are used, each monitor must have the RT100T software supplied.

The PC, PAD and IBM PS/2 Units are customer provided equipment. The MPC card, RT100 software, RT100T software and one Data Unit are supplied by NTI. The second Data Unit (CPE end) must be provided by either the customer or NTI (customer option).

It is HIGHLY recommended that the host PC be equipped with an Uninterruptable Power Supply (UPS) to provide several minutes of system operation during power failures.

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Maximum Number of ACD Directory Numbers(DN) - 17 per ACD Group

Maximum Number of Supervisor sets - 1024 per ACD Group
- 1 Supervisor per Subgroup

Maximum Number of Agents - 9999

Maximum Number of Groups an Agent can be a member of - 1

Maximum Number of Agent Keys or Status Lamps - 48 per Supervisor set

Maximum Number of Calls in Queue - 511 per ACD Group

Maximum Number of Queue Status Lamps - 1 per ACD Group

Range of incoming call priorities - 0-3 (0 is the highest and 3 is the lowest)

The hardware used to store the announcements is DRA (i.e. MTM DRA NT2X58CB/AK/AG, DRA Controller CP NT1X75AA/BA, DRA Recordable Memory Cards NT1X77AA, DRA Recordable Memory Cards NT1X79AA).

One (1) Call Waiting Tone Generator CP, NT3X68AC, is required per office. Since the traffic requirements for the observe agent warning tone are considered to be minimal, any existing NT3X68AC cards in the DMS office will be sufficient to handle the requirements for this feature.

16.2.2 Hardware Dependencies

A single line set (500/2500), a Meridian Business Set, or an Electronic Business Set (EBS).

16.2.2.1 P and C Side Port Requirements

Not Applicable

16.2.2.2 DMS BUS Port Requirements

Not Applicable

16.2.2.3 Circuits Per Card

Not Applicable

16.2.2.4 Discrimination Numbering

Not Applicable

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16.2.3 Provisioning Considerations

16.2.3.1 CC-MIS / DMS-100F Interface Requirements

The CC-MIS uses an X.25 link to communicate with the ACD switch.

The DMS switch supports 3 MPC protocol loads:

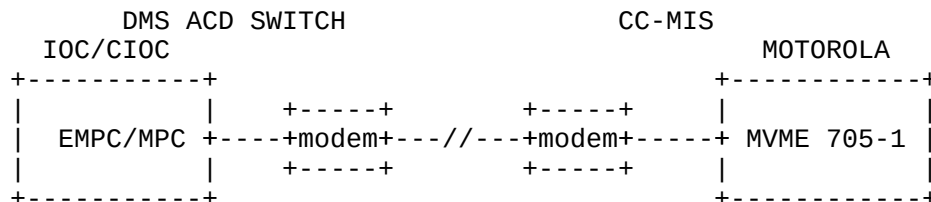
- MPCXnn load - BELLCORE pre 1980 protocol
- MPCOnn load - CCITT 1980 protocol
- MPCOnn load - CCITT 1984 protocol

Both the MPC and EMPC card will support MPCX and MPCO loads. The MPC card can not be used for speeds over 19.2kbps.

A redundant link option provides two links between the ACD switch and the CC-MIS. Only one link is active at a time.

If high speed(19.2/56kbps) interface is used, then the EMPC card is required.

This section provides provisioning information for the ACD switch side of the interface between the ACD switch and the CC-MIS system. There are four configurations for the interface: VME/DMS 9.6K bps, VME/DMS 19.2K bps, VME/DMS 56k bps configurations and co-located. VME/DMS 9.6Kbps configuration.



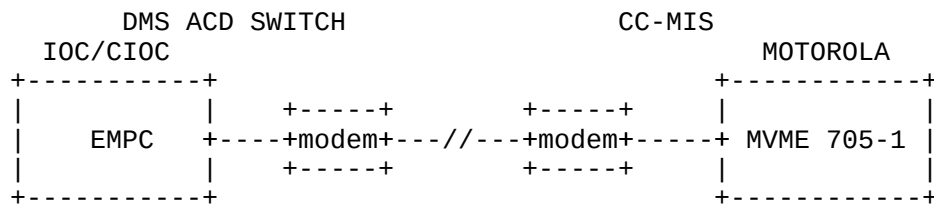
The modem configuration can be any one of the following four:

- 1: Dowty 9.6Kbps modem. Rack Mount modem on the DMS side and S/A on the CC-MIS side.
OR
- 2: GDC 9.6Kbps modem. Rack Mount modem on the DMS side and S/A on the CC-MIS side.
OR
- 3: NT4X25CH. Low Speed Rack Mount Data unit on the DMS side and NT4X25AF. Low Speed S/A Data unit on the CC-MIS side.
OR
- 4: GDC 500C/UXR Rack Mount Data Unit on the DMS side and GDC 500A S/A Data Unit on the CC-MIS side.

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„ NOTE: If the redundant link option is used, Two MPC/EMPC cards and two sets of modems will be required.

VME/DMS 19.2Kbps configuration.

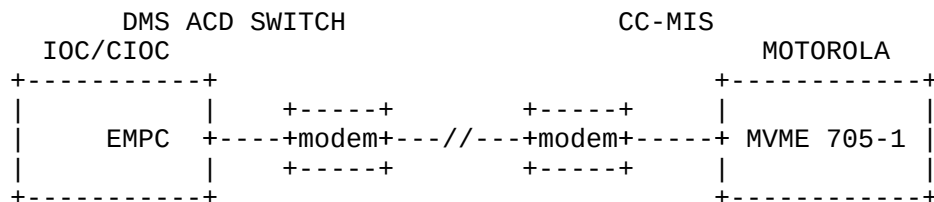


The modem configuration can be any one of the following three:

- 1: Dowty 19.2Kbps Data Unit. Rack Mount on the DMS side and S/A on the CC-MIS side.
- OR
- 2: GDC 500C/UXR Rack Mount Data Unit on the DMS side and GDC 500A S/A Data Unit on the CC-MIS side
- OR
- 3: NT4X25CH. Low Speed Rack Mount Data unit on the DMS side and NT4X25AF. Low Speed S/A Data unit on the CC-MIS side

„ NOTE: If the redundant link option is used, Two EMPC cards and two sets of modems will be required.

VME/DMS 56Kbps configuration.



The modem configuration can be any one of the following three:

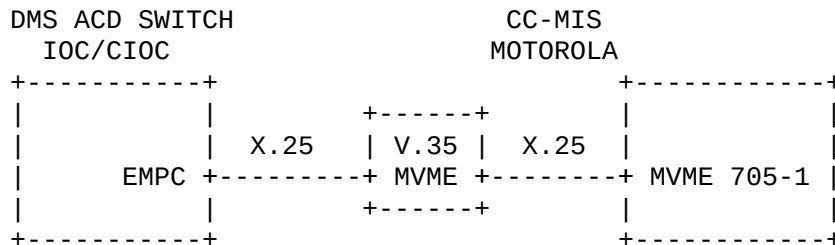
- 1: Dowty 19.2Kbps Data Unit. Rack Mount on the DMS side and S/A on the CC-MIS side.
- OR
- 2: GDC 500C/UXR Rack Mount Data Unit on the DMS side and GDC 500A S/A Data Unit on the CC-MIS side
- OR
- 3: NT4X25AV. High Speed Rack Mount Data unit on the DMS side and NT4X25AG. High Speed S/A Data unit on the CC-MIS side

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„ NOTE: If the redundant link option is used, Two EMPC cards and two sets of modems will be required.

CO-LOCATED CC-MIS

If the DMS ACD switch and the host (Motorola 8420) are less than 10 cable feet apart (co-located), one V.35 modem eliminator (MVME) set to 56KBPS is required between the DMS ACD switch and the Motorola 8420 host.



„ NOTE: If the redundant link option is used, Two EMPC cards and two modem eliminators will be required.

16.2.4 Office Layout Information

Not applicable

16.2.5 Traffic Tables

Not applicable

16.3 Product/System Specification

16.3.1 Physical Characteristics

Not Applicable

16.3.2 EMI/Earthquake Information

Not Applicable

16.3.3 Sparing Information

The standard sparing algorithms shall apply

16.3.4 Power Feed and Fusing Requirements

Not Applicable

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16.3.5 Current Drain Information

Not Applicable

16.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

16.4.1 Required Software Packages and Interdependencies

The Base ACD and Enhanced ACD with MIS are ordered as Master Packages, identified as follows:

NTXD13 Basic ACD

This package delivers all of the call distribution and queuing functions, the agent and supervisor features, the load management capabilities required for ACD functionality.

NTXD14 Enhanced ACD with MIS.

This package includes all of the basic ACD functionality and adds support for integrated MIS and Load Management through a downstream processor. The added software is required for CC MIS.

Refer to the SMS database for details of Master Package Contents.

16.4.2 ACD AND CC-MIS REQUIRED DMS SOFTWARE PACKAGES

The following list of software must be in the DMS ACD switch for ACD and/or CC-MIS to function correctly. The packages are incremental, meaning that ACD requires all previously listed Base and Centrex packages. CC MIS requires all previously listed Base, Centrex, ACD, and Enhanced ACD packages.

„	NTX000	Bilge	Base
„	NTX001	Common Basic	Base
„	NTX901	Local Feature	Base
„	NTX100	IBN Basic	Centrex Base
„	NTX106	IBN-P Business Set	Centrex Base
„	NTX108	IBN Display Feature	Centrex Base
„	NTXD13	Basic ACD Master Package	ACD
	-	NTX407 ACD Call Processing	
	-	NTX415 ACD Basic	

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- NTX416 ACD Enhanced
- NTX727 ACD Load Management
- „ NTX991 ACD Mgmt Rep 2-way datastream Enhanced ACD 1
- „ NTXA52 ACD Remote Load Management Enhanced ACD 1
- „ NTX273 Multi-protocol controller BX.25 CC MIS
- „ NTX560 NOP - Generic R0 Services CC MIS

- 1 If you do not have ACD and want to provision both ACD and Enhanced ACD at the same time, order Master Package NTXD14, Enhanced ACD Master Package, which includes all packages in NTXD13 Master Package plus the listed Enhanced ACD packages.

The following additional packages are also required for CC MIS.

„ X.25 related packages.

- CC MIS uses, at a minimum, the pre-1980 BELLCORE version of X.25 and no additional features are required for this.
- If 1980 CCITT X.25 is required, NTXE65 is required.
- If 1984 CCITT X.25 is required, NTXE65 and NTXN85 are required.

„ Low Speed related packages (19.2kbs and below)

- For BCS 34 and below, if a MPC card is used no additional features are required. If an EMPC card is used NTXE98 is required.
- For BCS 35 and above no additional packages are required if either a MPC or EMPC card is used.

„ High Speed related packages (above 19.2kbs)

- The High Speed configuration requires the EMPC card and NTXE98. This option is BCS independent. The MPC can not be used.

16.4.3 ACD OPTIONAL DMS SOFTWARE PACKAGES

- NTXE09 ACD on 2500 Sets
- NTXP53 ACD Access Feature Grouping

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16.4.4 Software Usage Restrictions

Minimum BCS supported is BCS 32.

16.4.5 Memory Provisioning

Use the appropriate MEMCALC issue for calculations.

16.4.6 CC-MIS REQUIRED MICROPROCESSOR SOFTWARE PACKAGES

This information varies by market. Refer to the appropriate ACD Purchase Planner for this information.

16.5 Real Time Impact

For Canadian applications refer to SEL 87-05-001
For U.S. applications refer to SEB 93-02-001

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17.0 ECM420 - NTX101AA - ACD MUSIC ON DELAY / MUSIC ON HOLD

17.1 Overview

MOH is an enhancement to the previous Music On Hold (MOH) feature. The MOH feature is used in conjunction with the Attendant Console to connect calls on hold to announcements or music while they are waiting. Audio Interlude or MOH utilizes the new AUDIO table which contains the appropriate audio connections. Certain line options encountered in the IBN Customer Group tables that require audio while calls are on hold receive announcements after the AUDIO table is referenced to determine what should be sent. MOH was first available in BCS15.

17.2 Hardware Provisioning

17.2.1 Hardware Usage Restrictions

Not applicable.

17.2.2 Hardware Dependencies

Not applicable.

17.2.2.1 P and C Side Port Requirements

Not applicable

17.2.2.2 DMS BUS Port Requirements

Not applicable

17.2.2.3 Circuits Per Card

Not applicable

17.2.2.4 Discrimination Numbering

Not applicable

17.2.3 Provisioning Considerations

A minimum of one of the following must be provided for MOH:

- NTIs MTM mounted Digital Recorded Announce Machine
- Audiochron Recorded Announcement Machine, and/or
- Broadcast Trunk Interface.

NTI supports hardware provisioning of the broadcast trunk interface card NT2X88AA. However, if the telco requires this configuration the following must be provided by the Telco:

- a 900 ohm FCC approved interface, and
- a music or announcement source such as an FM radio.

The above card is the standard one to be used. A different trunk card may be required dependent on the requirements of the Announcement Machine used.

17.2.3.1 Provisioning Rules for Network Broadcasting

For non-ENET networks, to determine the number of ports required to be deloaded per network subgroup (NSG) as a result of the network broadcast facility, use the table in Figure 9 on page 20-110 or Figure 10 on page 20-110.

Note that since ENET is a virtually non-blocking network, there is no deloading requirement for ENET offices.

For non-ENET offices, the amount of announcement or music traffic should be estimated (in CCS). This value is matched to the next higher value of CCS traffic under the appropriate column (i.e., No. of Digital Broadcast Announcement Channels = 8,16,24,30) in Figure 9 on page 20-110 or Figure 10 on page 20-110 as applicable. The number of ports which must be left spare on that network subgroup is obtained from the left most column (i.e., No. of Ports Deloaded per NSG).

The reason for the four (4) columns (i.e., No. of Digital Broadcast Announcement Channels = 8,16,24,30) is because the Digital Recorded Announcement (DRA) can share its DS-30 channels with other circuits, thereby lowering the traffic level which necessitates deloading.

If the ACD Music on Hold announcement DS-30 shares its DS-30 channels with other types of announcements, use the column headed No. of Digital Broadcast Announcement Channels = 8. If it is dedicated to the ACD Music on Hold announcement, use the column headed No. of Digital Broadcast Announcement Channels = 30.

17.2.4 Office Layout Information

Not applicable.

17.2.5 Traffic Tables

NUMBER OF PORTS DELOADED PER NSG	NUMBER OF DIGITAL BROADCAST ANNOUNCEMENT CHANNELS (CIRCUITS)			
	8	16	24	30
0	480	590	680	740
1	1180	1290	1380	1440
2	1880	1990	2080	2140
3	2580	2690	2780	2840
4	3280	3390	3480	3540
5	3980	4090	4180	4240
6	4680	4790	4880	4940
7	5380	5490	5580	5640

Figure 9. Total DRA Traffic (CCS) - Table, for NT0X48 Network

NUMBER OF PORTS DELOADED PER NSG	NUMBER OF DIGITAL BROADCAST ANNOUNCEMENT CHANNELS (CIRCUITS)			
	8	16	24	30
0	950	1110	1240	1330
1	1650	1810	1940	2030
2	2350	2510	2640	2730
3	3050	3210	3340	3430
4	3750	3910	4040	4130
5	4450	4610	4740	4830
6	5150	5310	5440	5530
7	5850	6010	6140	6230
8	6550	6710	6840	6930
9	7250	7410	7540	7630
10	7950	8110	8240	8330
11	8650	8810	8940	9030
12	9350	9510	9640	9730
13	10050	10210	10340	10430
14	10750	10910	11040	11130
15	11450	11610	11740	11830

Figure 10. Total DRA Traffic (CCS) - Table, for NT5X13/NT8X10 Network

17.3 Product/System Specification17.3.1 Physical Characteristics

Not applicable.

17.3.2 EMI/Earthquake Information

Not applicable.

17.3.3 Sparing Information

Not applicable.

17.3.4 Power Feed and Fusing Requirements

Not applicable.

17.3.5 Current Drain Information

Not applicable.

17.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

17.4.1 Required Software Packages and Interdependencies

The feature F3458 (DDOC No.BC0946) may be referred to as "Music On Hold (MOH)", "Audio Interlude", or "ACD Music On Delay". In any event it is provided via the S/W pkg NTX101AA - IBN - ENHANCED BUSINESS SERVICES. This S/W pkg requires the following packages in order to function properly:

- NTX100AA - Integrated Business Networks - Basic
- NTX901AA - Local Features I

17.4.2 Software Usage Restrictions

Not applicable.

17.4.3 Memory Provisioning

Not applicable.

17.5 Real Time Impact

Not applicable.

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18.0 ECM421 - ENHANCED OFFICE RECOVERY

18.1 Overview

Enhanced Office Recovery, NTXA66AA, is an optional software feature that improves the present office recovery time of extended peripheral modules (XPM). Extended peripheral modules (XPM) refers to LGC, LTC, DTC, RCC, SMU, MSB7, IAC, ISDN LTC.

This software feature provides the following capabilities for internal and external maintenance:

- Enhances present loading capability to support additional peripheral module (XPM) types, so that the XPM can load its P-side peripherals in parallel and load its mate unit.
- Provides the capability to distribute data and software loads to the P-side peripheral modules and to XPMs connected by the inter-peripheral message link.

18.2 Hardware Provisioning

18.2.1 Hardware Usage Restrictions

18.2.2 Hardware Dependencies

18.2.2.1 P and C Side Port Requirements

18.2.2.2 DMS BUS Port Requirements

Not applicable

18.2.2.3 Circuits Per Card

18.2.2.4 Discrimination Numbering

18.2.3 Provisioning Considerations

18.2.4 Office Layout Information

Not applicable.

18.2.5 Traffic Tables

Not applicable.

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18.3 Product/System Specification

18.3.1 Physical Characteristics

18.3.2 EMI/Earthquake Information

18.3.3 Sparing Information

Not applicable.

18.3.4 Power Feed and Fusing Requirements

18.3.5 Current Drain Information

18.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

18.4.1 Required Software Packages and Interdependencies

Enhanced Office Recovery, NTXA66AA, is applicable to any peripheral module (XPM) which contains both enhanced messaging (i.e. the 6X69/79 pair or the 6X69AB CP) and enhanced memory (i.e. the 6X46AC CP or the 6X46BA CP).

The hardware required for Enhanced Office Recovery is either the NT6X45BA, XPM Processor CP; or the NT6X45BB, Upgraded XPM Processor CP. The NT6X45BA CP and the NT6X45BB CP are both provisionable cards which mount in Slots 08 & 12 of a peripheral module (XPM).

For each new-order peripheral module (XPM) which requires Enhanced Office Recovery provide four (4) NT6X45BA, XPM Processor CP, in Slots 08 & 12.

For each existing peripheral module (XPM) which requires Enhanced Office Recovery provision as follows:

In U.S. Provide four (4) NT6X45BB, Upgraded XPM Processor CP, in Slots 08 & 12 of each existing peripheral module.

In Canada Provide four (4) NT6X45BA, XPM Processor CP, in Slots 08 & 12 of each existing peripheral module.

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For further information on the provisioning and assigning of the above mentioned hardware, refer to the following ECM's:

- ECM-373 - DTC/LGC/LTC Modules
- ECM-314 - Subscriber Carrier Module (Urban)
- ECM-271 - CCS7
- ECM-282 - Remote Switching Center
- ECM-418 - Integrated Services Digital Network (ISDN)

The Enhanced Office Recovery feature, NTXA66AA, requires the following software packages:

- NTX000AA - Bilge
- NTX001AA - Common Basic
- NTX270AA - New Peripheral Maintenance Package

Enhanced Office Recovery, NTXA66AA, is an optional feature. Refer to the appropriate BCS Packaging API/ECM and other availability reports to identify the valid ordering dates of the software and hardware.

18.4.2 Software Usage Restrictions

18.4.3 Memory Provisioning

Not applicable.

18.5 Real Time Impact

19.0 ECM422 - EXTENDED XPM DIAGNOSTICS

19.1 Overview

Extended XPM Diagnostics, NTXA67AA, is an optional software feature that enhances the present diagnostics of extended peripheral modules (XPM). Extended peripheral modules (XPM) refers to LGC, LTC, DTC, RCC, SMU, MSB7, IAC, ISDN LTC.

This software feature provides the following capabilities for internal and external maintenance:

- reduces incidence of undetected faults and multicard fault lists.
- enhances ROM level diagnostics coverage/isolation.
- improves CC interpretation of failures, by enabling the CC to diagnose an XPM unit through its mate XPM unit.

19.2 Hardware Provisioning

19.2.1 Hardware Usage Restrictions

19.2.2 Hardware Dependencies

19.2.2.1 P and C Side Port Requirements

19.2.2.2 DMS BUS Port Requirements

Not applicable

19.2.2.3 Circuits Per Card

19.2.2.4 Discrimination Numbering

19.2.3 Provisioning Considerations

Extended XPM Diagnostics, NTXA67AA, is applicable to any peripheral module (XPM) which contains both enhanced messaging (i.e. the 6X69/79 pair or the 6X69AB CP) and enhanced memory (i.e. the 6X46AC CP or the 6X46BA CP).

The hardware required for Extended XPM Diagnostics is either the NT6X45BA, XPM Processor CP; or the NT6X45BB, Upgraded XPM Processor CP. The NT6X45BA CP and the NT6X45BB CP are both provisionable cards which mount in Slots 08 & 12 of a peripheral module (XPM).

For each new-order peripheral module (XPM) which requires Extended XPM Diagnostics provide four (4) NT6X45BA, XPM Processor CP, in Slots 08 & 12.

For each existing peripheral module (XPM) which requires Extended XPM Diagnostics provision as follows:

IN U.S. - Provide four (4) NT6X45BB, Upgraded XPM Processor CP, in Slots 08 & 12 of each existing peripheral module.

IN CANADA - Provide four (4) NT6X45BA, XPM Processor CP, in Slots 08 & 12 of each existing peripheral module.

19.2.4 Office Layout Information

Not applicable.

19.2.5 Traffic Tables

Not applicable.

19.3 Product/System Specification

19.3.1 Physical Characteristics

19.3.2 EMI/Earthquake Information

19.3.3 Sparing Information

Not applicable.

19.3.4 Power Feed and Fusing Requirements

19.3.5 Current Drain Information

19.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

19.4.1 Required Software Packages and Interdependencies

The Extended XPM Diagnostics feature, NTXA67AA, requires the following software packages:

- NTX000AA - Bilge
- NTX001AA - Common Basic
- NTX270AA - New Peripheral Maintenance Package

19.4.2 Software Usage Restrictions

19.4.3 Memory Provisioning

Not applicable.

19.5 Real Time Impact

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20.0 ECM455 - Enhanced 911 Emergency Service

20.1 Overview

Enhanced 911 (E911) Emergency Service is a feature that allows the routing of emergency telephone calls to the primary Public Service Answering Point (PSAP) that serves the calling party's location.

This routing is based on the calling party's telephone number and is accomplished through the E911 software. At the PSAP, information containing the caller's address and those agencies serving the caller can be automatically retrieved from an external source called the Automatic Location Identification (ALI) data base and displayed to the attendant. Emergency calls are rapidly processed since all required information is readily available as soon as the call is answered. The E911's improved routing to the proper PSAP, call selective routing, is what distinguishes this feature from the Basic 911 (B911) feature. The hardware configuration of the feature follows:

```

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      0"
      |
+---0-----+
|END      +-+ +-----+ +-----+ +-----+
|OFFICE 1| | |          E911 Tandem          | |Pri.+--+
+-----+ + | |          +-----+ +-----+ +-----+
+-----+ + | +---+ +---+ +---+ +---+ +---+ +---+ |ALI|
|END      | +-+ | | | | | | | | | | | | | | | |
|OFFICE 2| +---+DTC+---+NET +---+SCM-U +---+Sec. | | |base|
+---+---+ +---+ | | | | | | | | | | | | | | | |
      | | | | | | | | | | | | | | | |
      æ†††'
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      |
      | +-----+ +---+---+ +---+ +---+ | loop around
      | | LCM +---+ LGC | | | DTC +---+---+ | trunk
      | | | | | | | | | | | | | | | |
      | +---+---+ +---+---+ +---+---+ +---+---+ +---+---+
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      |
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      0"

```

20.2 Hardware Provisioning

20.2.1 Hardware Usage Restrictions

Not applicable.

20.2.2 Hardware Dependencies

Operation of the E911 requires a Subscriber Carrier Module (SCM) to interface via T1 lines between the PSAP and the host switch.

The SCM requires channel banks to interface to the PSAP.

Refer to ECM314 - Subscriber Carrier Module for DMS-1 Urban (SMU) for required hardware packaging.

20.2.2.1 P and C Side Port Requirements

Not applicable

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20.2.2.2 DMS BUS Port Requirements

Not applicable

20.2.2.3 Circuits Per Card

Not applicable

20.2.2.4 Discrimination Numbering

Not applicable

20.2.3 Provisioning Considerations

This section details the provisioning guidelines for this product.

DS-30 speech links must be engineered to provide one DS-30 channel for each DS-1 channel.

The maximum number of analog trunks that can be offered for the PSAP is 480.

The number of analog trunks required by the PSAP determines the number of DS-1 links. Each DS-1 can have a maximum of 24 channels. Each DS-30 supports 30 channels.

The DS-30 to DS-1 connection is a dedicated, non-blocking arrangements.

Maximums per SCM-100U:

16 DS-30 speech links: 480 channels.

20 DS-1 links: 480 channels.

E911 calls that originate within the E911 office or from remotes that are served by the office must be routed from the 100 side to the 20 side of the office through a loop around trunk. In order to determine the number of loop around trunks needed in an office, refer to ECM273 for calculation.

20.2.4 Office Layout Information

Not applicable.

20.2.5 Traffic Tables

Not applicable.

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20.3 Product/System Specification

20.3.1 Physical Characteristics

Not applicable.

20.3.2 EMI/Earthquake Information

Not applicable.

20.3.3 Sparing Information

Not applicable.

20.3.4 Power Feed and Fusing Requirements

Not applicable

20.3.5 Current Drain Information

Not applicable

20.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

20.4.1 Required Software Packages and Interdependencies

The following packaging is required for the E911 product:.

NTX451AA - E911 Database

The following packages are interdependencies of NTX451AA:

NTX007AB - PBX Interface II

NTX100AA - Meridian Digital Centrex

NTX387AA/AB - SCM-100U

NTX447AA - E911 Tandem

OR

NTXF61AA - DMS INTEGRATED E911 PSAP FUNCTIONALITY

NTX877AA/AB - Interface to Non-Data Link Console

NTX901AA - Local Features I

20.4.2 Software Usage Restrictions

Not applicable.

20.4.3 Memory Provisioning

For memory requirements per software package, utilize the MEMCALC tool.

20.5 Real Time Impact

XPM Call Timings:

	MP	SP
SMU Zero-call Overhead Call Processing Occupancies (No RTs DS1 or LDTs)	14%	51%
DS1 Overhead Additives	0%	0%
Overhead Additive for each LDT	0%	+ .5%
Call Timings:	MP msec	SP msec
TERM to PSAPNN Line (No Wink, No ANI)	96	96
TERM to PSAPWN Line (Wink, No ANI)	101	107
TERM to PSAPWA Line (Wink, ANI)	110	148
Per Call Additive for WarmSwact	12	5

CCC Call Timings:

Refer to the REAL::TIME and PRTCALC tools.

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21.0 ECM473 - Residential Enhanced Services

21.1 Overview

The Residential Enhanced Services (RES) packages will provide residential and small business customers with the opportunity to upgrade their class of service from single line flat rate (1FR) to RES by subscribing to a specific set of features which includes some IBN station features as well as other features available only through RES.

21.2 Hardware Provisioning

21.2.1 Hardware Usage Restrictions

An optional feature exists called Call Forward Remote Activation. This feature requires announcements which the Operating Company can record on their own or can provide by ordering the NT1X76AM card. The NT1X76AK card is required when the NT1X76AM card is ordered and is recommended to provide the numerical phrasing when a telco records their own announcements. The NT1X76AM and NT1X76AK should be assigned to the same DRA module. In a Class Phase 1 English office, the NT1X76AM can be assigned to a DRA where the NT1X76AK card is existing and there is room. Otherwise, in other offices or where the DRAs with NT1X76AK cards are filled, an additional NT1X76AK must be ordered. For CFRA, the requirement to order the NT1X76AJ with the NT1X76AK does not apply.

There is currently a requirement for a looparound trunk to connect to announcements. The looparound provides interworking between ISUP trunks and the Direct Inward System Access (DISA) feature and is held for the duration of the call.

21.2.2 Hardware Dependencies

To work properly, when the Call Forward Remote Activation capability is required, software package NTXA43AA is required. The NT1X76AM card is required unless the telco is recording their own announcements. The NT1X76AK card is required when the NT1X76AM card is ordered and is recommended to provide the numerical phrasing when a telco records their own announcements. Additional digitone receivers may be required to support CFRA in older peripheral modules (LMEs or DCMs). The ideal number of digitone receivers should equal the number of CFRA announcement members.

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21.2.2.1 P and C Side Port Requirements

21.2.2.2 DMS BUS Port Requirements

21.2.2.3 Circuits Per Card

21.2.2.4 Discrimination Numbering

21.2.3 Provisioning Considerations

Looparound trunks must be provisioned to connect Call Forward Remote Access announcements.

21.2.4 Office Layout Information

Not applicable

21.2.5 Traffic Tables

Loopback trunks are provisioned based on the Call Forward Remote Access traffic. The loopback load (in CCS) is determined by multiplying the call attempt rate (calls/sec) by the average holding time for each CFRA call. Loopback trunks are then provisioned for this level of traffic using standard loopback trunk provisioning procedures.

21.3 Product/System Specification

21.3.1 Physical Characteristics

Not applicable

21.3.2 EMI/Earthquake Information

Not applicable

21.3.3 Sparing Information

Not applicable

21.3.4 Power Feed and Fusing Requirements

21.3.5 Current Drain Information

21.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

21.4.1 Required Software Packages and Interdependencies

For a POTS office:

Master package NTXD00AA - MASTER POTS TO RES CONVERTER

OR

Master package NTXD00AB - MASTER POTS TO RES CONVERTER

OR

Master package NTXD01AA - RES OFFICE CONVERSION (U.S. MARKET)

Within the POTS to RES CONVERTER master package, the RES BASE package - NTXA64AA, provides equivalent IBN features for existing POTS features. Refer to SW Matrix for availability of each master package for proper ordering.

For an IBN office:

NTXA64AA - RES BASE

21.4.2 Optional Software Packaging

In addition to the above required packaging, the following packages may be ordered:

- NTX734AA - EAE0 - IBN PIC USING SERVORD

The EAE0 - IBN PIC USING SERVORD package is contained in the Master Package NTXD01AA (US market). Because the RES design is based on IBN, changing a line from POTS to RES results in a change to the mode of PIC (Primary InterLATA Carrier) editing for the line when using SERVORD or the Table Editor. The POTS to RES conversion results in PIC editing of RES lines being done by line group rather than line-by-line, as it is with POTS lines. The feature package NTX734AA makes the change from POTS to RES transparent with respect to PIC editing. That is, it enables SERVORD and the Table Editor to be used for changing PICs on RES lines on a per line basis.

- NTXA81AA - EXTENSION BRIDGED SERVICES

The EXTENSION BRIDGED SERVICES package enhances the Multiple Appearance Directory Number (MADN) feature so that it may be used to allow a group of lines to more closely simulate being extensions of a single line.

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- NTXA43AA - CALL FORWARD REMOTE ACTIVATION

The CALL FORWARD REMOTE ACTIVATION (CFRA) package allows an MDC or RES subscriber with Call Forward Intragroup (CFI), Call Forwarding Universal (CFU) or Call Forwarding Fixed (CFF) to activate or deactivate these features from a digitone line other than his own. This functionality is applied on a per line basis. Master package content and software package interdependencies are to be determined by referencing the SMS89 or SMSQUERY.

21.4.3 Software Usage Restrictions

Not applicable

21.4.4 Memory Provisioning

Not applicable

21.5 Real Time Impact

Not applicable

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22.0 ECM475 - Automated Alternate Billing Service (AABS)

22.1 Overview

Automated Alternate Billing Service (AABS) is a feature of the Traffic Operator Position System (TOPS). This feature provides the ability to fully automate operator-handled Collect and Billed-to-Third Number calls. In addition, the AABS feature will support all current automated calling-card service features, such as Mechanized Calling Card Service and Exchange Alternate Billing Service.

The AABS offering will comprise of a DMS switch connected to a TOPS Voice Service Node (VSN). The AABS feature will integrate the call processing of automated TOPS Toll and Assistance calls with the TOPS Voice Service Node (VSN). The TOPS VSN is a new applications program based on the Data Voice System (DVS) hardware technology, which is designed to meet industry standards for computers. The TOPS VSN is a hardware and software system which is used to provide the interactive voice technology and speech recognition that are required for the AABS feature. The TOPS VSN provides dual-tone multifrequency (DTMF) acceptance, speech-recognition, speech-storage, and speech-playback capabilities.

The TOPS Voice Service Node (VSN) requests the billing method from the calling party through prompting announcements. Initially, the desired billing method is accepted through DTMF input; determination by using speech recognition is planned as a future enhancement. If acceptance of the charges is required, the TOPS VSN places an automated call to the requested billed party by using speech recognition, stored announcements, speech storage, and playback announcements. Operator assistance can be obtained by DTMF input, switch-hook flash, or timeout during the acceptance phase.

When a call arrives at the DMS, it is screened to determine whether or not it may be routed to the TOPS VSN for AABS handling. The following conditions must be true for AABS handling to be selected:

- The call must be a 0+ call that can be processed by the telephone operating company.
- The Automatic Number Identification (ANI) digits must have been successfully received by the DMS.
- The call is from a touch-tone telephone.
- Billing must not be restricted for at least one of the three billing types handled by the TOPS VSN (calling card, collect, and third number billing).

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- The call must not be from a hotel that requires no-charge records. Such calls require an operator to obtain the room number.
- The call must have arrived over a trunk group for which TOPS VSN processing is provided.

Some of these calls (person-to-person, for example) cannot be handled automatically and are sent to an operator for processing. This occurs after a time-out period or when the calling party dials 0 or switchhook flashes at the indicated time.

22.1.1 PRODUCT LINE

Automated Alternate Billing Service (AABS) is a feature of the DMS Traffic Operator Position System (TOPS). The AABS feature can be offered on DMS-200 TOPS, DMS-200 Remote OC TOPS, and a DMS-100/200 Remote OC TOPS.

22.1.1.1 PRODUCT/PACKAGE

The DVS Cabinet version of TOPS VSN documented in this ECM has been changed to A&M status. Refer to ECM-495 for the current offering of TOPS VSN. Existing TOPS VSNs in the DVS Cabinet configuration can be extended using DVS Cabinet hardware on an as-required basis.

22.2 Hardware Provisioning

22.2.1 Hardware Usage Restrictions

The TOPS VSN supports connection to only one DMS at a time, (i.e. the TOPS VSN cannot be functionally split across multiple DMS's). Therefore, the AABS feature will require a TOPS VSN at each host and remote TOPS switch.

For BCS-30 offices with TOPS VSN, provide one (1) P 710773 AABS Keycap for every TOPS 04 position in the network. These keycaps are required for the VSN 0- Handoff Feature, and they shall be sent directly to the TOPS 04 office. AABS Keycaps are not required for TOPS MP positions. |

22.2.2 Hardware Dependencies

Not applicable.

22.2.2.1 P and C Side Port Requirements

Not applicable

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22.2.2.2 DMS BUS Port Requirements

Not applicable

22.2.2.3 Circuits Per Card

Not applicable

22.2.2.4 Discrimination Numbering

Manual.

Not applicable

22.2.3 Provisioning Considerations

22.2.3.1 TOPS Voice Service Node (VSN)

Provide the TOPS VSN system at each host and remote TOPS switch which requires the AABS software feature. The TOPS VSN is a hardware and software system which is used to provide the interactive voice technology and speech recognition that are required for the AABS feature.

The TOPS VSN is packaged in free-standing Data Voice System (DVS) cabinets. The TOPS VSN system is only available in the following two configurations:

- A 24-Channel, 5-Cabinet System
- A 48-Channel, 7-Cabinet System

22.2.3.2 The 24-Channel, 5-Cabinet System

For a 24-Channel, 5-Cabinet System provision the following hardware at the TOPS VSN site. The configurations for the DVS cabinets and the MIS frame at the VSN site are shown on the following pages.
Manufacture Discontinued items noted by # sign.

Hardware List For VSN Site:

QTY	PEC CODE	DESCRIPTION
---	-----	-----
(2)	A0317073	Desktop Matrix Printer
(2)	A0317078	Pedestal Stand
(1)	A0321335	Cross Connect Panel & Cover
(2)	C2501313	Paper Catch Tray (Desktop PRT)
(1)	NT0M90QA	M4120 IVD Controller
(1)	NT0M91BA	Keyboard
(1)	NT0M92DA	Monochrome Monitor
(1)	NT3M20AA	NT-220 Terminal

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(1)	NT4G09AE	Local Cable, SCSI/SCSI 2 ft.
(1)	NT4G09CE	Local Cable, SCSI/SCSI 5 ft.
(1)	NT4G13AN	-48V DC Option 5 Cabinets
(5)	NT4G13FA	Loft Cabinet
(1)	NT4G14DA	LANlink
(1)	NT4G16EE	Primary Processor XP 68010-6
(1)	NT4G20LA	SCSI 80 MB Disk/Tape SRU (1/4)
# (1)	NT4G20TA	SCSI 350 MB Storage SRU
(2)	NT4G23BA	Digital Trunk Link SRU (T-1)
(5)	NT4G25GA	Application Processor 68020-10
(5)	NT4G27BA	Voice Interface SRU
(4)	NT4G40CA	Horizontal Jumper
(1)	NT4G41BA	Vertical Jumper
(1)	NT4G42CA	Input Jumper 110V/220V
(1)	NT4G46BK	Alarm LIU Option Kit (ALIU)
(6)	NT4G46CA	LAN Interface Unit
(5)	NT4G50DA	-48/+32 V Power Converter
(1)	NT4G91FF	DVIX Operating System (68020)
(1)	NT4G91HK	DVIX Operating System NSR-32
(1)	NT0X02AB	MIS Frame (dedicated for modems)
(1)	NT0X9504	Bus Bar Assembly
(1)	NT0X88AF	Frame Supervisory Panel (FSP)
(1)	P0673914	FSP Cover
(2)	NT0X87AA	Inverter Unit
(1)	62005220	UDS RM16M Modem Shelf 23-inch
(2)	64565022	UDS 19.2K Modem Card
(2)	62125084	UDS 212A/D Modem Card
(4)	P0702320	Mounting Panel for LIUs
(4)	NTZX1701	LIU Mounting Panel Isolation Kit
(1)	NTZX1702	MIS Frame Cabling Kit For VSN
(2)	NT0X0053	Inverter Isolation Kit
(1)	NT0X0050	Modem Shelf Isolation Kit
(1)	P0709010	Modem Faceplate
(1)	NTNX1113	Modem Faceplate Kit

Configuration For DVS Cabinets:

CABINET NUMBER	SRU POS	MTG LOC	PEC CODE	DESCRIPTION
-----	-----	-----	-----	-----
01	01-04	04	NT4G25GA	Application Processor 68020-10 e/w NT4G91FF/HK DVIX Software
01	05-08	08	NT4G16EE	Primary Processor XP 68010-6
01	09-10	10	NT4G20LA	SCSI 80 MB Disk/Tape SRU (1/4)
01	11-14	14	NT4G25GA	Application Processor 68020-10
01	15-16	15	NT4G14DA	LANlink
02	01-02	02	NT4G50DA	-48V/+32 V Power Converter
02	03-04	04	NT4G50DA	-48V/+32 V Power Converter
02	05-08	--	----	----
02	09-16	10	# NT4G20TA	SCSI 350 MB Storage SRU
03	01-02	02	NT4G50DA	-48V/+32 V Power Converter
03	03-04	--	----	----

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03	05-08	08	NT4G27BA	Voice Interface SRU
03	09-12	12	NT4G25GA	Application Processor 68020-10
03	13-16	14	NT4G23BA	Digital Trunk Link SRU (T-1)
04	01-04	04	NT4G25GA	Application Processor 68020-10
04	05-08	08	NT4G27BA	Voice Interface SRU
04	09-12	12	NT4G27BA	Voice Interface SRU
04	13-16	16	NT4G25GA	Application Processor 68020-10
05	01-02	02	NT4G50DA	-48V/+32 V Power Converter
05	03-04	04	NT4G50DA	-48V/+32 V Power Converter
05	05-08	08	NT4G27BA	Voice Interface SRU
05	09-12	12	NT4G27BA	Voice Interface SRU
05	13-16	14	NT4G23BA	Digital Trunk Link SRU (T-1)

Configuration For MIS Frame At VSN Site: fo off

SHELF POS	CARD POS	QTY	PEC CODE	DESCRIPTION
--	--	(1)	NT0X02AB	MIS Frame (dedicated for modems)
--	--	(1)	NT0X9504	Bus Bar Assembly
--	--	(1)	NTZX1702	MIS Frame Cabling Kit For VSN
72	--	(1)	62005220	UDS RM16M Modem Shelf 23-inch
72	--	(1)	NT0X0050	Modem Shelf Isolation Kit
72	01	(1)	64565022	19.2K Modem for DMS Data Link A
72	16	(1)	64565022	19.2K Modem for DMS Data Link B
72	03	(1)	62125084	212A/D Modem for TAS Terminal
72	14	(1)	62125084	212A/D Modem for ASCII Dialup
52F, 54R	--	(2)	P0702320	Mounting Panel for LIUs
52F, 54R	--	(2)	NTZX1701	LIU Mounting Panel Isolation Kit
54R	--	(1)	NT4G46CA	LIU for DMS Data Link A (powered from A-Power Inverter)
54R	--	(1)	NT4G46CA	LIU for DMS Data Link B (powered from B-Power Inverter)
52F	--	(1)	NT4G46CA	LIU with alarms kit added (ALIU) (powered from A-Power Inverter)
52F	--	(1)	A0321335	Cross Connect Panel & Cover
38	--	(1)	NT0X88AF	Frame Supervisory Panel
38	--	(1)	P0673914	FSP Cover
0F, 22R	--	(2)	P0702320	Mounting Panel for LIUs
0F, 22R	--	(2)	NTZX1701	LIU Mounting Panel Isolation Kit

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20F	--	(1)	NT4G46CA	LIU for TAS Terminal/Patcher (powered from A-Power Inverter)
22R	--	(1)	NT4G46CA	LIU for ASCII Dialup (powered from B-Power Inverter)
10	--	(1)	NT0X87AA	Inverter Unit (powered from A-Power PDC Fuse)
10	--	(1)	NT0X0053	Inverter Isolation Kit
03	--	(1)	NT0X87AA	Inverter Unit (powered from B-Power PDC Fuse)
03	--	(1)	NT0X0053	Inverter Isolation Kit

The 48-Channel, 7-Cabinet System

For a 48-Channel, 7-Cabinet System provision the following hardware at the TOPS VSN site. The configurations for the DVS cabinets and the MIS frame at the VSN site are shown on the following pages.

Hardware List For VSN Site:

QTY	PEC CODE	DESCRIPTION
(2)	A0317078	Pedestal Stand
(1)	A0321335	Cross Connect Panel & Cover
(2)	C2501313	Paper Catch Tray (Desktop PRT)
(1)	NT0M90QA	M4120 IVD Controller
(1)	NT0M91BA	Keyboard
(1)	NT0M92DA	Monochrome Monitor
(1)	NT3M20AA	NT-220 Terminal
(1)	NT4G09AE	Local Cable, SCSI/SCSI 2 ft.
(1)	NT4G09CE	Local Cable, SCSI/SCSI 5 ft.
(1)	NT4G13AQ	-48V DC Option 7 Cabinets
(7)	NT4G13FA	Loft Cabinet
(1)	NT4G14DA	LANlink
(1)	NT4G16EE	Primary Processor XP 68010-6
(1)	NT4G20LA	SCSI 80 MB Disk/Tape SRU (1/4)
# (1)	NT4G20TA	SCSI 350 MB Storage SRU
(3)	NT4G23BA	Digital Trunk Link SRU (T-1)
(6)	NT4G25GA	Application Processor 68020-10
(9)	NT4G27BA	Voice Interface SRU
(6)	NT4G40CA	Horizontal Jumper
(1)	NT4G41BA	Vertical Jumper
(1)	NT4G42CA	Input Jumper 110V/220V
(1)	NT4G46BK	Alarm LIU Option Kit (ALIU)
(6)	NT4G46CA	LAN Interface Unit
(7)	NT4G50DA	-48/+32 V Power Converter
(1)	NT4G91FF	DVIX Operating System (68020)
(1)	NT4G91HK	DVIX Operating System NSR-32
(1)	NT0X02AB	MIS Frame (dedicated for modems)
(1)	NT0X9504	Bus Bar Assembly

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(1)	NT0X88AF	Frame Supervisory Panel (FSP)
(1)	P0673914	FSP Cover
(2)	NT0X87AA	Inverter Unit
(1)	62005220	UDS RM16M Modem Shelf 23-inch
(2)	64565022	UDS 19.2K Modem Card
(2)	62125084	UDS 212A/D Modem Card
(4)	P0702320	Mounting Panel for LIUs
(4)	NTZX1701	LIU Mounting Panel Isolation Kit
(1)	NTZX1702	MIS Frame Cabling Kit For VSN
(2)	NT0X0053	Inverter Isolation Kit
(1)	NT0X0050	Modem Shelf Isolation Kit
(1)	P0709010	Modem Faceplate
(1)	NTNX1130	Modem Faceplate Kit

Configuration For DVS Cabinets:

CABINET NUMBER	SRU POS	MTG LOC	PEC CODE	DESCRIPTION
-----	-----	-----	-----	-----
01	01-04	04	NT4G25GA	Application Processor 68020-10 e/w NT4G91FF/HK DVIX Software
01	05-08	08	NT4G16EE	Primary Processor XP 68010-6
01	09-10	10	NT4G20LA	SCSI 80 MB Disk/Tape SRU (1/4)
01	11-14	14	NT4G25GA	Application Processor 68020-10
01	15-16	15	NT4G14DA	LANlink
02	01-02	02	NT4G50DA	-48V/+32 V Power Converter
02	03-04	04	NT4G50DA	-48V/+32 V Power Converter
02	05-08	--	----	----
02	09-16	10	# NT4G20TA	SCSI 350 MB Storage SRU
03	01-02	02	NT4G50DA	-48V/+32 V Power Converter
03	03-04	--	----	----
03	05-08	08	NT4G27BA	Voice Interface SRU
03	09-12	12	NT4G25GA	Application Processor 68020-10
03	13-16	14	NT4G23BA	Digital Trunk Link SRU (T-1)
04	01-02	02	NT4G50DA	-48V/+32 V Power Converter
04	03-04	--	----	----
04	05-08	08	NT4G27BA	Voice Interface SRU
04	09-12	12	NT4G27BA	Voice Interface SRU
04	13-16	16	NT4G25GA	Application Processor 68020-10
05	01-02	02	NT4G50DA	-48V/+32 V Power Converter
05	03-04	--	----	----
05	05-08	08	NT4G27BA	Voice Interface SRU
05	09-12	12	NT4G27BA	Voice Interface SRU
05	13-16	14	NT4G23BA	Digital Trunk Link SRU (T-1)
06	01-02	02	NT4G50DA	-48V/+32 V Power Converter
06	03-04	04	NT4G50DA	-48V/+32 V Power Converter
06	05-08	08	NT4G27BA	Voice Interface SRU

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06	09-12	12	NT4G27BA	Voice Interface SRU
06	13-16	16	NT4G25GA	Application Processor 68020-10
07	01-04	04	NT4G25GA	Application Processor 68020-10
07	05-08	08	NT4G27BA	Voice Interface SRU
07	09-12	12	NT4G27BA	Voice Interface SRU
07	13-16	14	NT4G23BA	Digital Trunk Link SRU (T-1)

Configuration For MIS Frame At VSN Site:

SHELF POS	CARD POS	QTY	PEC CODE	DESCRIPTION
--	--	(1)	NT0X02AB	MIS Frame (dedicated for modems)
--	--	(1)	NT0X9504	Bus Bar Assembly
--	--	(1)	NTZX1702	MIS Frame Cabling Kit For VSN
72	--	(1)	62005220	UDS RM16M Modem Shelf 23-inch
72	--	(1)	NT0X0050	Modem Shelf Isolation Kit
72	01	(1)	64565022	19.2K Modem for DMS Data Link A
72	16	(1)	64565022	19.2K Modem for DMS Data Link B
72	03	(1)	62125084	212A/D Modem for TAS Terminal
72	14	(1)	62125084	212A/D Modem for ASCII Dialup
52F, 54R	--	(2)	P0702320	Mounting Panel for LIUs
52F, 54R	--	(2)	NTZX1701	LIU Mounting Panel Isolation Kit
54R	--	(1)	NT4G46CA	LIU for DMS Data Link A (powered from A-Power Inverter)
54R	--	(1)	NT4G46CA	LIU for DMS Data Link B (powered from B-Power Inverter)
52F	--	(1)	NT4G46CA	LIU with alarms kit added (ALIU) (powered from A-Power Inverter)
52F	--	(1)	A0321335	Cross Connect Panel & Cover
38	--	(1)	NT0X88AF	Frame Supervisory Panel
38	--	(1)	P0673914	FSP Cover
0F, 22R	--	(2)	P0702320	Mounting Panel for LIUs
0F, 22R	--	(2)	NTZX1701	LIU Mounting Panel Isolation Kit
20F	--	(1)	NT4G46CA	LIU for TAS Terminal/Patcher (powered from A-Power Inverter)
22R	--	(1)	NT4G46CA	LIU for ASCII Dialup (powered from B-Power Inverter)
10	--	(1)	NT0X87AA	Inverter Unit (powered from A-Power PDC Fuse)

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10	--	(1)	NT0X0053	Inverter Isolation Kit	
+-----+	+-----+	+-----+	+-----+	+-----+	+-----+
03	--	(1)	NT0X87AA	Inverter Unit	
03	--	(1)	NT0X0053	(powered from B-Power PDC Fuse)	
03	--	(1)	NT0X0053	Inverter Isolation Kit	
+-----0-----0-----0-----0-----0-----+					

22.2.3.3 Voice Links

Voice communications between the DMS switch and the TOPS VSN will be provided via standard T1 (DS1) interfaces. Each T1 line provides 24 full duplex voice channels. A spare T1 line shall be provided for redundancy. The T1 links shall be located on separate cards for reliability purposes. par;Provide two (2) NT6X50AA, DS1 Interface CP, for each 24-Channel, 5-Cabinet TOPS VSN System being ordered. Provide three (3) NT6X50AA, DS1 Interface CP, for each 48-Channel, 7-Cabinet TOPS VSN System being ordered. The NT6X50AA packs shall be mounted in a DTC module of the associated DMS switch.

Since each NT6X50AA card has two T1 links available and only one is being used for TOPS VSN, the remaining T1 link can be used for another purpose. Also, existing NT6X50AA cards with available T1 links may also be used for TOPS VSN.

22.2.3.4 Data Links

Data communications between the DMS switch and the TOPS VSN will be provided via the X.25 interface. The data link interface will consist of a NT1X89AA multi-protocol card connected to the TOPS VSN System via back-to-back modems. Two data links will be used to connect the DMS switch to the TOPS VSN. The second data link is provided for redundancy. If a datalink fails, communications will be switched to the redundant datalink automatically.

Provide two (2) NT1X89AA, Multi-Protocol CP, for each TOPS VSN System being ordered. These NT1X89AA packs must be assigned to separate IOC modules for redundancy. Each NT1X89AA card has two () ports available for use. A NT1X89AA card used for TOPS VSN must be dedicated for TOPS VSN use only, and other applications cannot be provisioned on this card. However, the same NT1X89AA cards can be used to provide the data links for a second TOPS VSN System if so desired. The maximum call capacity of a NT1X89AA card is 20 messages per second, and this must be taken into consideration when provisioning multiple VSNs on the same NT1X89AA card. Refer to System Engineering Bulletin (SEB) 89-07-001 for detailed information.

Provide two (2) 64565022, UDS 19.2K Modem Card, for each TOPS VSN System being ordered. Also, provide one (1) 62005220, UDS Modem Shelf 23-inch to mount these modem cards. The 62005220 Modem Shelf shall be mounted in a MIS frame located at the associated

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DMS switch. In ISG offices, this MIS frame must be a Dedicated MIS Frame For Modems. The modems shall be cabled to the DMS Distribution Frame (DF).

22.2.3.5 Alarms

A total of six (6) signal distribution (SD) points are required to handle the alarms related to the AABS application. Also, one () scan point is required for each signal distribution (SD) point.

22.2.3.6 TOPS 04 Keycaps For VSN

For BCS-30 offices with TOPS VSN, provide one (1) P0710773 AABS Keycap for every TOPS 04 position in the network. These keycaps are required for the VSN 0- Handoff Feature, and they shall be sent directly to the TOPS 04 office. AABS Keycaps are not required for TOPS MP positions.

22.2.3.7 Multiple VSNs

A single or multiple VSNs can be connected to the same DMS switch. The DMS will support up to sixteen (16) VSNs within an office if one datalink per VSN is used. However, the recommended maximum is eight (8) VSNs within an office. This allows for two data links between the DMS switch and the TOPS VSN. The second data link is provided for reliability purposes, i.e. if a data link fails, communications will be switched to the redundant data link automatically.

Each VSN will be separately interfaced to the DMS and identified by a unique VSN number. Trunk members will serve as voice links to the VSNs, and the DMS will need to know which trunk member, or voice link, goes to which VSN. The NTXA17AA AABS software provides the DMS with the capability to select the voice and data connections necessary to connect the DMS with a VSN. When a new call arrives to be handled by the AABS application, the selection of the voice connection is done on a 'most idle' basis (i.e. the call may be handled by any VSN which has the 'most idle' voice connection). Once the DMS has selected the most idle voice link to a VSN, it must map this particular voice link to a VSN number. The DMS uses this VSN number to ensure the voice and data links associated with a particular call go to the same VSN. The call is then processed.

22.2.3.8 Traffic Provisioning

TOPS Voice Service Node (VSN)

The traffic throughput of the various sizes of VSNs are as follows:

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NO. OF CHANNELS	TRAFFIC HANDLING CAPABILITY
24	507 CCS 14.08 Erlangs
48	1201 CCS 33.36 Erlangs

To traffic provision VSNs, it is necessary to determine how many 0+ Calls Per Hour (CPH) of each type are anticipated to be handled in the office. The call types used are Calling Card, Collect, Third Number Billing, and Time-Out To Operator. It is also necessary to calculate the Average Holding Time (AHT) of each call. The following formulas can be used in determining the amount of traffic presented by each call type:

$\text{Traffic (in CCS)} = \text{No. CPH} \times \text{AHT} / 100$
$\text{Traffic (in Erlangs)} = \text{No. CPH} \times \text{AHT} / 3600$

The total traffic is equal to the sum of the individual traffic amounts.

Three Party Conference Circuits (CF3P)

The AABS feature also requires additional 3 Party Conference Circuits (CF3P). Provisioning of 3 Party Conference Circuits (CF3P) for AABS applications takes into account the particular mix of calls and is based on the following conditions:

- CF3P is not required for Credit Card Calls.
- CF3P is required 70% of the time during a Collect Call.
- CF3P is required 70% of the time during a Third Number Billing Call.

After determining the traffic for each call type, use the following equations to determine the amount of traffic on the CF3P's for Collect and Third Number Billing calls:

+-----+			
	TC3	= Traffic On CF3P	= (Collect Call) x 0.7
	(in CCS)	For Collect Calls	(Traffic)
+-----+			
	TTN3	= Traffic On CF3P	= (Third Number) x 0.7
	(in CCS)	For Third Number	(Traffic)
+-----+			
	Add TC3 and TTN3, then go to a Poisson Table and use		
	this result, with a probability of 0.001 blocking, to		
	find the number of 3 Party Conference Circuits (CF3P)		
	required.		
	NOTE: Poisson Tables can be found in the NT8620 Reference		
	Manual (U.S. Only) and the NTP 297-1001-450.		
	+-----+		

Traffic Provisioning Example:

+-----+			
	CALL TYPE	AHT	CPH
+-----+			
	Calling Card	30 sec	1200
	Collect	68 sec	800
	Third Number Billing	80 sec	300
	Time-out to Operator	20 sec	185
+-----0-----0-----+			
	NOTE: These are example AHTs and CPHs		
	+-----+		

CALCULATIONS:

$$\begin{array}{rclclcl} \text{Calling Card} & = & 1200 \times 30 & = & 360 \text{ CCS} & \text{or} & 10.0 \text{ E} \\ \text{Traffic} & & \text{-----} & & & & \\ & & 100 & & & & \end{array}$$

$$\begin{array}{rclclcl} \text{Collect Call} & = & 800 \times 68 & = & 544 \text{ CCS} & \text{or} & 15.1 \text{ E} \\ \text{Traffic} & & \text{-----} & & & & \\ & & 100 & & & & \end{array}$$

$$\begin{array}{rclclcl} \text{Third Number} & = & 300 \times 80 & = & 240 \text{ CCS} & \text{or} & 6.7 \text{ E} \\ \text{Billing Traffic} & & \text{-----} & & & & \\ & & 100 & & & & \end{array}$$

$$\begin{array}{rclclcl} \text{Time-out to} & = & 185 \times 20 & = & 37 \text{ CCS} & \text{or} & 1.0 \text{ E} \\ \text{Operator Traffic} & & \text{-----} & & & & \\ & & 100 & & & & \end{array}$$

```

+-----+
|
|  TOTAL CCS = 1181          TOTAL Erlangs = 32.8
|
|  As shown in the traffic engineering tables, in
|  this document, a 48-channel TOPS VSN can
|  adequately support the traffic in the above
|  example.
|
+-----+

```

$$\begin{array}{rclclcl} \text{TC3} & = & (\text{Collect Call}) \times 0.7 & = & 544 \times 0.7 & = & 381 \text{ CCS} \\ \text{(in CCS)} & & \text{(Traffic)} & & & & \end{array}$$

$$\begin{array}{rclclcl} \text{TTN3} & = & (\text{Third Number}) \times 0.7 & = & 240 \times 0.7 & = & 168 \text{ CCS} \\ \text{(in CCS)} & & \text{(Traffic)} & & & & \end{array}$$

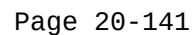
```

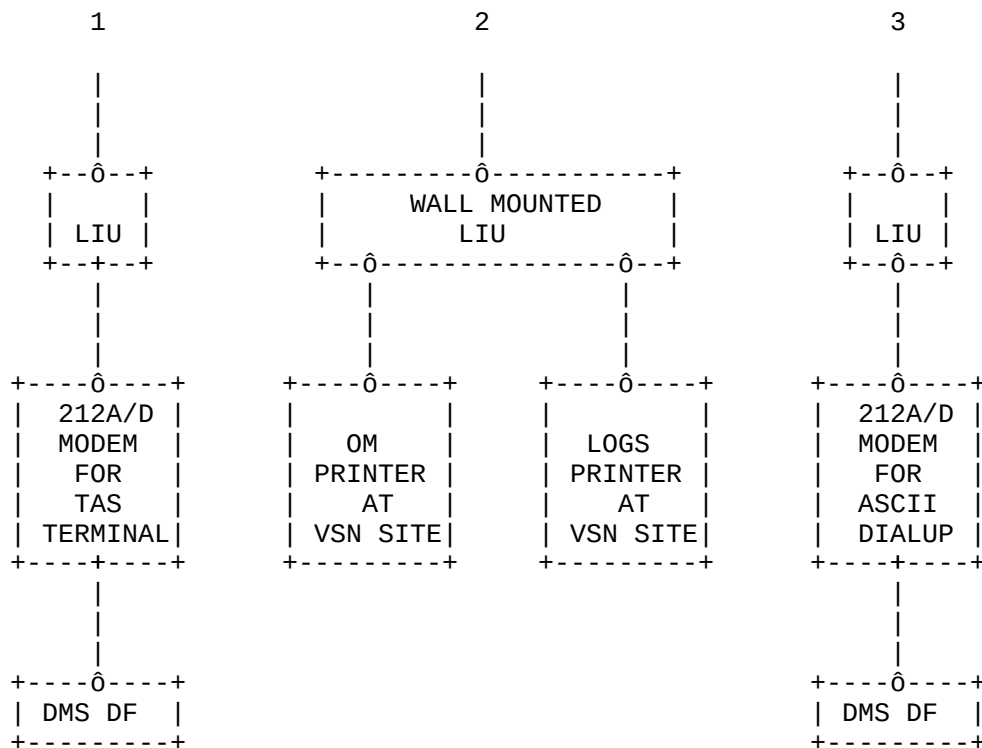
+-----+
|
|  Add TC3 and TTN3 = 381 + 168 = 549 CCS
|
|  Then refer to a Poisson Table at P = 0.001
|                                and CCS = 549
|
|  Which shows Number of CF3P's required = 30
|
+-----+

```

22.2.4 Office Layout Information

The following diagram shows the connections required between the DMS switch and the TOPS VSN System:





NOTE 1) TAS - Technical Assistance Service
OM - Office Maintenance

NOTE 2) The DVS cabinets in a TOPS VSN system shall be numbered from left to right when viewed from the front of the lineup. Each succeeding cabinet shall be attached to the right of the preceeding cabinet as viewed from the front of the lineup.

22.2.5 Traffic Tables

Not applicable.

22.3 Product/System Specification

22.3.1 Physical Characteristics

Not applicable.

22.3.2 EMI/Earthquake Information

Not applicable.

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22.3.3 Sparing Information

Apply standard sparing algorithms.

22.3.4 Power Feed and Fusing Requirements

The TOPS VSN shall be powered from -48 VDC direct from the Power Board and fused as follows:

A 24-Channel, 5-Cabinet System	45 Amps
A 48-Channel, 7-Cabinet System	60 Amps

Multiple VSN systems shall alternate between A-power and B-power.

The MIS Frame at the VSN site shall be powered from -48 VDC direct from the Power Board and fused as follows:

MIS Frame FSP: Two 20-Amp Fuses (1A and 1B)
MIS Frame Inverters: Two 20-Amp Fuses (1A and 1B)

If the customer prefers, an optional RME Frame can be provisioned as an intermediate power source. This RME Frame shall provide power for the TOPS VSN System and the VSN MIS Frame. The VSN Cabinets, VSN MIS Frame, and RME Frame shall be clustered together and kept a minimum of 7 feet from the DMS Switch. One (1) RME Frame can fuse a maximum of five (5) TOPS VSN Systems and five (5) VSN MIS Frames. Provision the following equipment for the optional RME Frame:

FUSES FOR VSN MIS FRAME:

(1) NT0X42UB Fuse Panel A-Feed	Shelf Pos. 67
(1) NT0X42UC Fuse Panel B-Feed	Shelf Pos. 63

FUSES FOR TOPS VSN SYSTEM:

(1) NT0X42AU Fuse Panel A/B-Feed Shelf Pos. 55

NOTE: On NT0X42AU, fuse positions 0-2 are A-Feed and fuse positions 3-5 are B-Feed.

22.3.5 Current Drain Information

A 24-Channel, 5-Cabinet System	30 amps
A 48-Channel, 7-Cabinet System	40 amps

22.3.6 POWER/HEAT DISSIPATION

A 24-Channel, 5-Cabinet System	70 watts/sq. ft.
A 48-Channel, 7-Cabinet System	75 watts/sq. ft.

22.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

22.4.1 Required Software Packages and Interdependencies

Not applicable.

22.4.2 Software Usage Restrictions

22.4.2.1 SOFTWARE PACKAGES

DMS Software

The software package required for the DMS switch is the NTXA17AA, Automated Alternate Billing Service (AABS). This package is applicable to the following host and remote TOPS switches: DMS-200 TOPS, DMS-200 Remote OC TOPS, DMS-100/200 Remote OC TOPS.

Software Interdependencies - The AABS package, NTXA17AA, requires the following software packages:

- NTXA28AA - TOPS AWT Enhancements
- NTX000AA - Bilge
- NTX001AA - Common Basic
- NTX030CC - TOPS Call Processing Features
(Upgrade of NTC030CB)
- NTX273AA - Multi-Protocol Controller Bx.25
- NTX801AA - Toll Features I
- NTX892AA - MPC Multilink Management

Either NTX171CA - MCCS Call Processing
(Order via master pkg NTX171BA)
Or NTX825AA - Exchange Alternate Billing Service

TOPS VSN Software

The software packages required for the TOPS VSN are:

- NTG230AA AABS TOPS Voice Service Node.
- NT4G91HK DVIX Software and License (VSN)
- NT4G95HK DVIX License Only (VSN)
- NT4G91FF DVIX Operating System (68020)

The NT4G91HK DVIX Operating System includes the tape cartridge, documentation, and the DVIX license. Order this package for each initial VSN system.

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The NT4G95HK DVIX Operating System comprises the tape cartridge only. Order this package for each VSN system being upgraded to software level VSN 32 or higher.

The NT4G91FF DVIX Operating System is used for software level VSN 3 or lower.

22.4.3 Memory Provisioning

Refer to MEMCALC.

22.5 Real Time Impact

Refer to the following System Engineering Bulletins (SEB):

88-09-004 NT40 CPU Call Timings

88-10-002 DMS-CORE CPU Call Timings

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23.0 ECM476 - CCI - AABS

23.1 Overview

Automated Alternate Billing Service (AABS) is a feature of the Traffic Operator Position System (TOPS). This feature provides the ability to fully automate operator-handled Collect and Billed-to-Third Number calls. In addition, the AABS feature will support all current automated calling-card service features, such as Mechanized Calling Card Service and Exchange Alternate Billing Service.

The CCI-AABS offering will comprise of a DMS switch connected to a CCI Interactive Voice System (IVS). In this document, the term CCI Interactive Voice System (IVS) is used to refer to the complete IVS/Gateway System offered by CCI (Computer Consoles Inc). The CCI IVS is an alternative to NT's TOPS VSN. In this alternative, the CCI IVS will provide the interactive voice technology and speech recognition that are required for the AABS feature. The AABS feature will integrate the call processing of automated TOPS Toll and Assistance calls with the CCI Interactive Voice System (IVS).

Automated Alternate Billing Service (AABS) is a feature of the DMS Traffic Operator Position System (TOPS). The AABS feature can be offered on DMS-200 TOPS, DMS-200 Remote OC TOPS, and a DMS-100/200 Remote OC TOPS.

23.2 Hardware Provisioning

23.2.1 Hardware Usage Restrictions

Not applicable.

23.2.2 Hardware Dependencies

Not applicable.

23.2.2.1 P and C Side Port Requirements

Not applicable

23.2.2.2 DMS BUS Port Requirements

Not applicable

23.2.2.3 Circuits Per Card

Not applicable

23.2.2.4 Discrimination Numbering

Not applicable

23.2.3 Provisioning Considerations

The provisioning of the CCI IVS System will be done by CCI and the Telco. NT will be responsible for provisioning the equipment in the associated DMS switch only. This mainly consists of the voice links, data links, 3 Party Conference Circuits (CF3P), and DMS software. The provisioning requirements for these items are detailed in the remaining sections of this document.

23.2.3.1 Voice Links

Voice communications between the DMS switch and the CCI IVS will be provided via standard T1 (DS1) interfaces. Refer to the Telco for the number of T1 links required for the CCI IVS. These required T1 links shall be provided via the NT6X50AA, DS1 Interface CP. A NT6X50AA, DS1 Interface CP, has two (2) T1 links, and each T1 link provides 24 full duplex voice channels. The T1 links for AABS shall be located on separate NT6X50AA cards for reliability purposes. Provide one (1) NT6X50AA, DS1 Interface CP, for each T1 link required by CCI IVS. Existing NT6X50AA cards with available T1 links may also be used for this purpose. The NT6X50AA packs shall be mounted in a DTC module of the associated DMS switch.

23.2.3.2 Data Links

Data communications between the DMS switch and the CCI IVS will be provided via the X.25 interface. The data link interface will consist of a NT1X89AA multi-protocol card connected to the CCI IVS System via back-to-back modems. Two data links will be used to connect the DMS switch to the CCI IVS. The second data link is provided for redundancy. If a datalink fails, communications will be switched to the redundant datalink automatically.

Refer to the Telco for the number of CCI IVS Systems being ordered. Provide two (2) NT1X89AA, Multi-Protocol CP, for each CCI IVS System. These NT1X89AA packs must be assigned to separate IOC modules for redundancy. Each NT1X89AA card has two (2) ports available for use. A NT1X89AA card used for AABS must be dedicated for AABS use only, and other applications cannot be provisioned on this card. However, the same NT1X89AA cards can be used to provide data links for a second CCI IVS System if so desired. The maximum call capacity of a NT1X89AA card is 20 messages per second, and this must be taken into consideration when provisioning multiple IVSs on the same NT1X89AA card. Refer to System Engineering Bulletin (SEB) 89-07-001 for detailed information.

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Provide two (2) 64565022, UDS 19.2K Modem Card, for each CCI IVS System being ordered. Also, provide one (1) 62005220, UDS Modem Shelf 23-inch to mount these modem cards. The 62005220 Modem Shelf shall be mounted in a MIS frame located at the associated DMS switch. In ISG offices, this MIS frame must be a Dedicated MIS Frame For Modems. The modems shall be cabled to the DMS Distribution Frame (DF).

23.2.3.3 Alarms

No signal distribution (SD) points or scan points need to be provisioned for the CCI IVS.

23.2.3.4 Multiple CCI IVSs

A single or multiple CCI IVSs can be connected to the same DMS switch. The DMS will support up to sixteen (16) CCI IVSs within an office if one datalink per CCI IVS is used. However, the recommended maximum is eight (8) CCI IVSs within an office. This allows for two data links between the DMS switch and the CCI IVS. The second data link is provided for reliability purposes, i.e. if a data link fails, communications will be switched to the redundant data link automatically.

Each CCI IVS will be separately interfaced to the DMS and identified by a unique IVS number. Trunk members will serve as voice links to the CCI IVSs, and the DMS will need to know which trunk member, or voice link, goes to which CCI IVS. The NTXA17AA AABS software provides the DMS with the capability to select the voice and data connections necessary to connect the DMS with a CCI IVS. When a new call arrives to be handled by the AABS application, the selection of the voice connection is done on a 'most idle' basis (i.e. the call may be handled by any CCI IVS which has the 'most idle' voice connection). Once the DMS has selected the most idle voice link to a CCI IVS, it must map this particular voice link to a IVS number. The DMS uses this IVS number to ensure the voice and data links associated with a particular call go to the same CCI IVS. The call is then processed.

23.2.3.5 Traffic Provisioning

The traffic provisioning to determine the type and number of CCI IVS Systems required for each site will be done by CCI and the Telco. However, the AABS feature requires additional 3 Party Conference Circuits (CF3P) at the associated DMS, and these must be provisioned by NT. Refer to the following section for details.

Three Party Conference Circuits (CF3P)

Provisioning of 3 Party Conference Circuits (CF3P) for AABS applications takes into account the particular mix of calls and is based on the following conditions:

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- „ CF3P is not required for Credit Card Calls.
- „ CF3P is required 70% of the time during a Collect Call.
- „ CF3P is required 70% of the time during a Third Number Billing Call.

From the Telco, obtain the 0+ Calls Per Hour (CPH) anticipated and Average Holding Time (AHT) for Collect and Third Number Billing Calls. The following formula shall be used to determine the amount of traffic presented by each call type:

$$\begin{array}{|c|c|c|c|c|c|c|} \hline \text{Traffic (in CCS)} & = & \text{No. CPH} & \times & \text{AHT} & / & 100 \\ \hline \end{array}$$

After determining the traffic for each call type, use the following equations to determine the amount of traffic on the CF3P's for Collect and Third Number Billing calls:

$\begin{array}{lcl} \text{TC3} & = & \text{Traffic On CF3P} \\ \text{(in CCS)} & \text{For Collect Calls} & = \text{(Collect Call)} \times 0.7 \\ & & \text{(Traffic)} \end{array}$
$\begin{array}{lcl} \text{TTN3} & = & \text{Traffic On CF3P} \\ \text{(in CCS)} & \text{For Third Number} & = \text{(Third Number)} \times 0.7 \\ & & \text{(Traffic)} \end{array}$
Add TC3 and TTN3, then go to a Poisson Table and use this result, with a probability of 0.001 blocking, to find the number of 3 Party Conference Circuits (CF3P) required. NOTE: Poisson Tables can be found in the NT8620 Reference Manual (U.S. Only) and the NTP 297-1001-450.

2.4.6 Traffic Provisioning Example:

CALL TYPE	AHT	CPH
Collect	68 sec	800
Third Number Billing	80 sec	300
NOTE: These are example AHTs and CPHs		

CALCULATIONS:

$$\begin{array}{rcl} \text{Collect Call} & = & 800 \times 68 = 544 \text{ CCS} \\ \text{Traffic} & & \text{-----} \\ & & 100 \end{array}$$

$$\begin{array}{rcl} \text{Third Number} & = & 300 \times 80 = 240 \text{ CCS} \\ \text{Billing Traffic} & & \text{-----} \\ & & 100 \end{array}$$

$$\begin{array}{rcl} \text{TC3} & = & (\text{Collect Call}) \times 0.7 = 544 \times 0.7 = 381 \text{ CCS} \\ (\text{in CCS}) & & (\text{Traffic}) \end{array}$$

$$\begin{array}{rcl} \text{TTN3} & = & (\text{Third Number}) \times 0.7 = 240 \times 0.7 = 168 \text{ CCS} \\ (\text{in CCS}) & & (\text{Traffic}) \end{array}$$

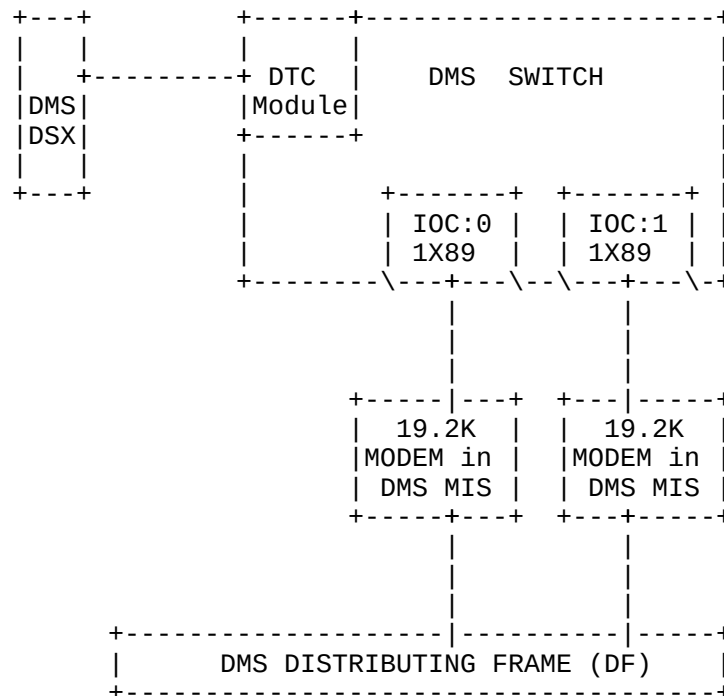
$$\text{Add TC3 and TTN3} = 381 + 168 = 549 \text{ CCS}$$

Then refer to a Poisson Table at $P = 0.001$
and $\text{CCS} = 549$

Which shows Number of CF3P's required = 30

| 23.2.4 Office Layout Information

The following diagram shows the NT connections required between the DMS switch and the CCI IVS System:

23.2.5 Traffic Tables

Not applicable.

23.3 Product/System Specification23.3.1 Physical Characteristics

Not applicable.

23.3.2 EMI/Earthquake Information

Not applicable.

23.3.3 Sparing Information

Not applicable.

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23.3.4 Power Feed and Fusing Requirements

The following fuses and feeds are required:

23.3.5 Current Drain Information

Current Drain for the circuit packs are:

23.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

23.4.1 Required Software Packages and Interdependencies

DMS Software

Software Package - The software package required for the DMS switch is the NTXA17AA, Automated Alternate Billing Service (AABS). This package is applicable to the following host and remote TOPS switches: DMS-200 TOPS, DMS-200 Remote OC TOPS, DMS-100/200 Remote OC TOPS.

Software Interdependencies - The AABS package, NTXA17AA, requires the following software packages:

- NTXA28AA - TOPS AWT Enhancements
- NTX000AA - Bilge
- NTX001AA - Common Basic
- NTX030CC - TOPS Call Processing Features
(Upgrade of NTC030CB)
- NTX273AA - Multi-Protocol Controller Bx.25
- NTX801AA - Toll Features I
- NTX892AA - MPC Multilink Management

Either NTX171CA - MCCS Call Processing
 (Order via master pkg NTX171BA)
Or NTX825AA - Exchange Alternate Billing Service

23.4.2 Software Usage Restrictions

Not applicable.

23.4.3 Memory Provisioning

Refer to MEMCALC.

23.5 Real Time Impact

The message flow of the CCI IVS System is the same as NT's TOPS VSN. Although the CCI IVS operates different from NT's TOPS VSN,

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the overall effect on DMS CC real time is the same as NT's TOPS VSN. This means that the addition of CCI IVS to a DMS TOPS switch will alter the real time characteristics of the DMS CC, and that the net impact will vary, depending on call mix. However, the DMS CC real time impact of handling IVS versus no IVS 0+ traffic is practically negligible.

Refer to the following System Engineering Bulletins (SEB) for details on the impact of AABS:

88-09-004	NT40 CPU Call Timings
88-10-002	DMS-CORE CPU Call Timings

24.0 ECM518 - Advanced Intelligent Networking (AIN) Rel. 0.0

24.1 Overview

Advanced Intelligent Networking (AIN) is an application on the Service Switch Point (SSP) in a CCS7 Network. The AIN software provides the ability to send, receive, process, and bill for queries/responses from/to a Service Control Point (SCP) database depending upon specific triggering events. AIN will also offer deployment of services in a centralized database accessible from all switches via standard interfaces and better provisioning, operations, and administration capabilities.

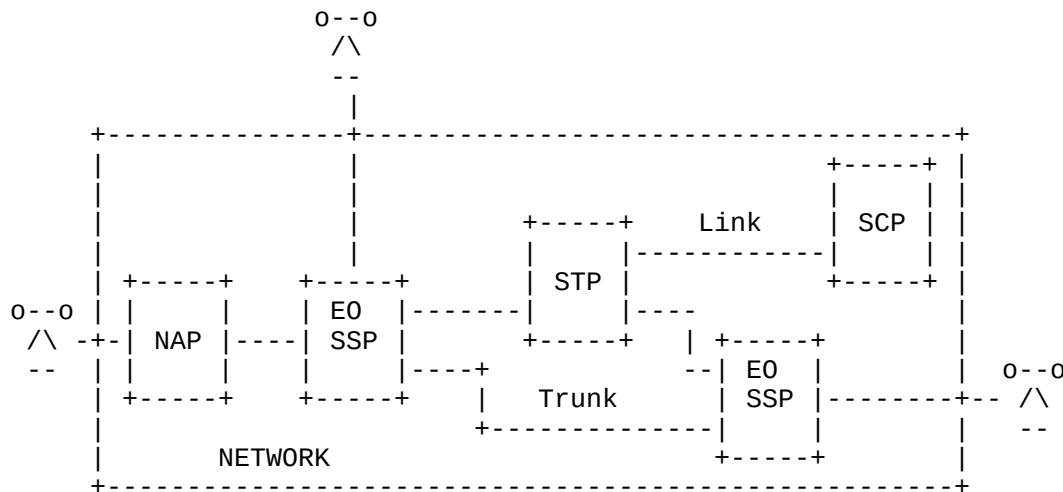


Figure 11. AIN Network

The AIN Network architecture is comprised of the Network Access Point (NAP), the Service Switch Point (SSP), the Signal Transfer Point (STP), and the Service Control Point (SCP).

The NAP is an End Office (EO) which supports AIN functionality but does not have the capability to access the SCP using the CCS7 Transaction Capability Application Part (TCAP) messages. Therefore, it must pass all AIN calls to the SSP either by way of Multi-Frequency (MF) Equal Access or CCS7 ISDN User Part (ISUP) trunk signalling. The SSP is the EO responsible for formulating the TCAP query to the SCP for subscribers connected directly to it or connected to subtending NAPs. Upon receiving a response from the SCP, the SSP routes the call to its appropriate destination based on information received from the SCP in the response message.

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The STP is responsible for routing the CCS7 TCAP messages to the appropriate SCP, based on Global Title Translations(GTT).

The SCP contains all the information required to provide the services to the customer. Once it receives the query from the SSP, it determines the service to be provided to the subscriber and provides the information required by the SSP to proceed with the call.

24.2 Hardware Provisioning

24.2.1 Hardware Usage Restrictions

| The NT1X75BA DRAM controller card for AIN announcement delivery
| must be used in any offices that contain BCS 34 and above. The
| NT1X75AA controller card cannot support AIN 0.0 announcement de-
| livery in BCS 34 and beyond.

AIN will be implemented using the DMS SuperNode only.

AIN CCS7 Messaging:

AIN will have an affect on the messaging capabilities of DMS CCS7 messaging peripherals (LIU7/LPP - Link Interface Unit No. 7 on Link Peripheral Processor and MSB7 - Message Switch and Buffer No. 7). The LPP is a Series 3 SOS-based peripheral whose performance characteristics have been documented in System Engineering Bulletin No. 90-06-001. The MSB7 is a Series 2 XPM peripheral whose performance characteristics have been documented in System Engineering Bulletin No. 90-08-001. These SEBs discuss the real time and messaging performance limitations/characteristics of both peripherals. They describe how to account for PVN messaging traffic when provisioning or analyzing the product. Since PVN is the forerunner/associate to AIN, the inputs to all engineering guidelines which call for PVN also apply to AIN. Specifically, the MSB7 has critical TCAP messaging capabilities/limitations which must be analyzed in conjunction with any AIN CM real time analysis. Please reference these SEBs for further specific LIU7 and MSB7 performance calculations.

24.2.2 Hardware Dependencies

Not applicable.

24.2.3 P and C Side Port Requirements

Not applicable.

24.2.4 DMS BUS Port Requirements

Not applicable.

24.2.5 Circuits Per Card

Not applicable.

24.2.6 Discrimination Numbering

Not applicable.

24.2.7 Provisioning Considerations

AIN does not include any new or specific hardware. It is strictly software only and uses hardware already available in the DMS.

The following describes the technical performance characteristic to support the near-term goals of Advanced Intelligent Network (AIN). The NT AIN project is primarily targetted to Ameritech and detailed specifications produced by them. The only development work under- taken by BNR/NT is in the SSP (Service Switching Point). The development in the DMS SSP allows Ameritech's telephone companies the ability to formulate, send, and receive information to/from an SCP (Service Control Point). The purposes of these transactions would typically be one of the following: request instructions, receive and process routing instructions, receive instructions to play announcements, and receive special billing instructions.

The product that NT is delivering for the AIN Release 0.0 project is a DMS SSP with enhanced software to support the required AIN functionality. An overview of the functionality is as follows:

Triggers: The DMS SSP will support a number of "triggers" that are points in the processing of a call where the SSP formulates a TCAP (Transaction Capabilities Application Part) message to be sent to the SCP. Typical information sent in a query are: calling number and called number (among others) that are required to drive service logic in the SCP. The SCP typically responds to these queries with appropriate instructions or further requests for information regarding the disposition of the call in progress.

Routing Instruction Processing: The usual response to a query is one to route the call somewhere. The SCP can specify the TCAP interface that the call be routed over either public or private facilities. The former is achieved by specifying an appropriate carrier and routing number, the latter is achieved by specifying a routing index and an outpulse number. It is the SSP's responsibility to act on either of these recommendations.

Announcements: The SCP can instruct the SSP to play an announcement for the user, for the purposes of terminating the call, or for collecting a piece of information from the user via the DTMF dialpad. It is the SSP's responsibility to play the announcement

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as instructed and report back any information collected to the SCP for further processing.

Billing: Upon completion of a call, the SCP can instruct the SSP how to bill the call, in terms of what BellCore AMA Call Code to be used when generating the billing record.

Termination Notification: The SCP can instruct the SSP to send what is known as termination information once the call is completed. Typical information is connect time, answer indication, etc., and is sent to the SCP from the SSP only when the call is completed. The SCP can use this information for whatever purpose it desires.

Call Gapping: As a form of overload control, the SCP can instruct the SSP to restrict calls from a particular NPA-NXX for a specified time. This mechanism allows the SCP a method by which to flow-control queries from particular central offices or geographic locations.

Error Handling: As a general statement, the SSP is responsible for handling all errors in messages that may be sent by the SCP. This includes protocol error handling (mis-encoded parameters, missing mandatory parameters, timeouts, out-of-sequence messages, etc.), and application level error handling. Also, the SSP must handle internal failures at the protocol and application level.

The background of the existing DMS SSP to support AIN functionality goes back to the days prior to the awarding of the contract for the U.S. Federal General Service Administration. This project was called FTS-2000. The DMS implementation of capabilities in the SSP to support the functionality required for this bid was the Private Virtual Networking (PVN) project and its associated BCS 24 - BCS 28 software. The PVN project was never taken to V0. Subsequently, in BCS 32, features are being introduced built upon that PVN platform.

Refer to the following documents for provisioning of existing hardware required for AIN:

ECM426 - Service Control Point (SCP)

ECM271 - Common Channel Signaling System #7

ECM620 - Building Block/Detail Engineering - LIM

24.2.8 Office Layout Information

Not Applicable

24.2.9 Traffic Tables

Not applicable.

24.3 Product/System Specification

24.3.1 Physical Characteristics

Not applicable.

24.3.2 EMI/Earthquake Information

Not applicable.

24.3.3 Sparing Information

Not applicable.

24.3.4 Power Feed and Fusing Requirements

Not applicable.

24.3.5 Current Drain Information

Not applicable.

24.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

24.4.1 Required Software Packages and Interdependencies

For AIN Rel.0.0 four different packages will be provided:

NTX983AB Service Switching Point Private Virtual Networking

NTXP01AA Intelligent Network 0.0 Base

NTXM26AA Announcements Enhancements

NTXN28AA Intelligent Network Billing Attributes

It should also be noted that AIN depends on the existing SS7 Software and Hardware as well as multiple Meridian Digital Centrex (MDC) packages.

24.4.2 Software Usage Restrictions

Not applicable.

24.4.3 Memory Provisioning

No significant CC DS or PS memory impacts have been noted to date for PVN or AIN.

24.5 Real Time Impact

The following generic performance information is for AIN Rel 0.0 triggering. Specific AIN capabilities/features will be evaluated as applicable.

The AIN SSP-SCP query/response messaging functionality is the critical DMS performance criterion when analyzing AIN offices because of its' additional real time impact to the base Super Node Compute Module (CM) Central Processing Unit (CPU) call timings. For AIN Release 0.0, the estimated SuperNode MC68020 (SR20) CM CPU real time additive for processing the AIN portion for any applicable call type is approximately +7.0 ms per TCAP message added to any base call timing. For example, a two message TCAP query/response AIN messaging exchange would mean an additional +14 ms.

Refer to SEA 91-03-002 for further information

25.0 ECM532 - Automatic Coin Toll Service (ACTS)

25.1 Overview

25.1.1 Functional Description - ACTS

When a subscriber dials a 1+ a 7- or a 10-digit number from an ACTS compatible coin phone, the charge for the call is computed by the DMS. ACTS then connects a CDC and an ACTS DRAM to the call. The DRAM is used to prompt the caller to deposit coins to the computed amount. As the subscriber deposits coins, the CDC counts each coin and causes the ACTS DRAM to provide intercoin announcements as the coins are deposited.

If the caller dials a 0+ or 0 - call from an ACTS compatible coin phone, the call is routed to an operator. ACTS also connects a CDC to the caller. The computed charge appears on the operators screen and the operator instructs the caller to deposit coins. The CDC counts the coins and ACTS updates the operator screen to show the remaining charges due. After the correct amount is deposited, the operator completes the call.

If the caller dials a 1+ call from an ACTS compatible coin phone, the call is handled in a manner similar to the 0+, 0- calls and ACTS connects a CDC to the caller to aid the operator by counting and reporting the deposited amount.

Other factors which affect call flow and duration are:

- Caller errors, e.g. not depositing coins as requested.
- Coins required exceed paystation coin hopper capacity. In this instance, the operator is required to intervene.

25.1.2 ACTS Recorded Announcements

ACTS announcement prompts are generated by DRAM circuit packs. The recorded announcements played back during different stages of a call are determined by telco datafill. For the provisioning of sufficient DRAMS to handle expected traffic loads, details of the announcements and coin call mix should be considered.

The announcements contained within the ACTS DRAM are as follows:

In the following description the variables W, X, Y and Z can have values from 1 to 99.

1. Initial Deposit Request

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- <X dollar><s><and><Y cents> please. (two second pause) Please deposit <X dollar><s><and><Y cents> for the first Z minute<s>.
2. Initial Coin Prompt
Please deposit <X dollar><s><and><Y cents>.
 3. Intercoin Prompt
Please deposit <X dollar><s><and><Y cents> more.
 4. Acknowledgement of an Overdeposit
Thank You. You have W cents credit toward overtime. (Since the largest coin which will be accepted by an ACTS coin phone has the value of one (1) dollar, it is not possible for the overtime credit to exceed one (1) dollar.
 5. Acknowledgement of Correct Deposit
Thank You.
 6. Notification at End of Initial Period
Z minute<s> has ended Please signal when through.
 7. Overtime Charge Prompt
<X dollar><s><and><Y cents> please.(2 second pause) Please deposit <X dollar><s><Y cents> for the past Z minute<s>.
 8. Overtime Charge with Credit Prompt
<X dollar><s><and><Y cents> please. (2 second pause) Please deposit <X dollars><s><and><Y cents> for the last Z minutes.
 9. Time and Charge Quotations
The charges are <X dollar><s><and><Y cent><s> plus tax for Z minute<s>. (note the possibility for the need of both the singular and plural of the word "cent".
 10. Customer Requested Notification
Z minute<s> has ended.
 11. Coin Station test Call
Coin test. (1 second pause) Please deposit <Nickel, Dime, Quarter>.
 - a. Coin Station Test Acknowledgement
<Nickel, Dime, Quarter>

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b. Coin Station Test End

Test has ended.

| 25.1.3 Functional Description - Revenue Collection

| ACTS compatible calls going over trunks have LAMA (Local Automatic
| Records Accounting) records generated if coins are collected dur-
| ing the call.

| A separate pool of CDCs located at the local office is required
| to determine the number of 5 cent deposits collected on each call.
| At the termination of the call a LAMA billing record is derived
| from the number of 5 cent deposits detected by the CDC.

| 25.1.4 CDC Enhancements

| The NT3X08AB CDC is a functionally enhanced version of NT3X08AA.
| The NT3X08AB provides the following improvements:

- | • Better coin tone detection capability providing better fraud
| prevention and spurious audio filtering.
- | • Better maintenance capability allowing coin circuit testing
| on individual lines without the need for busyng out all eight
| companion coin detection circuits on the same CDC.

| The improved coin detection performance of the CDC does not require
| changes in feature software. However, the maintenance enhancement
| of the NT3X08AB requires maintenance software changes to exploit
| the improvement.

25.2 Hardware Provisioning

25.2.1 Hardware Usage Restrictions

None identified.

25.2.2 Hardware Dependencies

| None identified: refer to "Provisioning Considerations"
| on page 20-163

25.2.3 P and C Side Port Requirements

N/A

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25.2.4 DMS BUS Port Requirements

N/A

25.2.5 Circuits Per Card

N/A

25.2.6 Discrimination Numbering

N/A

25.2.7 Provisioning Considerations

25.2.7.1 Automatic Coin Toll Service DRAM Circuit Pack

The ACTS announcement cp mounts in a standard DRA-MTM and requires a DRA controller. ACTS requires a dedicated DRA-MTM, i.e. mixing of MCCS DRA announcement or standard office announcement with the ACTS cp's is not permitted.

The ACTS DRAM does not broadcast messages. Instead, any one of several announcements may be directed to 29 time slots available in each DRAM. It is considered a service circuit in that a particular time slot or announcement port is connected to an ACTS call only when required.

The average announcement is approximately 12 seconds in length. However, the ACTS DRAM will remain connected as long as the coin detection circuit. Therefore the holding time for DRA provisioning should be 38 seconds.

One (1) ACTS DRA cp is required on the ACTS DRAM. The slot location for the DRA cp should follow the controller cp. Recommended card slot locations are:

- for the controller card slot five (5)
- for the ACTS DRA circuit pack card slot six (6).

Assume regular DRA sparing procedures. MTBF (Mean Time Between Failure) and MTTR (Mean Time To Repair) parameters are not available for accurate sparing calculations.

25.2.7.2 Coin Detection Circuit (CDC)

A coin detection circuit pack physically occupies one card slot in an MTM.

A CDC uses eight time slots and, therefore, four (4) consecutive card slots are required. A maximum of three (3) CDC circuit pack's can be mounted in any MTM. the slot assignment being

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card slots 05,09 and 13. If desired, the CDC card may be placed on an MTM with other cards, provided the next three () slots following each CDC pack are empty and that the provisioning rules for these other packs are followed.

Digitone or rotary coin stations may be used, however all stations MUST be able to provide dual frequency coin deposit signals to allow detection by the CDC circuit pack.

The CDC contains eight (8) coin detection circuits provisionable for ACTS on each circuit pack.

The CDC requires no distributing frame cabling.

A 3-port conference circuit will be required for all "recall" activity (i.e. overtime notification, intercoin prompt, etc.). The current provisioning of 3-port conference circuits (for TOPS) is one per position plus five percent. This quantity is sufficient to handle the ACTS traffic. Therefore, no additional 3-port conference circuits will need to be provisioned.

Each NT1X76AE is a two virtual card credit, i.e. 256 kbyte, double-density cp. When provisioning an ACTS DRA-MTM, the total allowable virtual card credit limit is eight. The EEPROM (NT1X79AA) is a 128 kbyte, one (1) virtual card credit, single-density cp.

25.2.7.3 ACTS CDC Provisioning

CALL TYPE	A ABSBH CCS	B CALL HT/100	C=A/B CALLS	D CDC HT/100	E=CxD CDC CCS USAGE
1+7D					.38
0+7D					.38
1+10D					.38
0+10D					.38
1+12D					.38
0+12D					.38
0	0	0	0	0	0
TTL ABSBH CDC USAGE					

Figure 12. ACTS CDC Provisioning

1. Number of Coin Detection Circuits, NT3X08, based on traffic (CCS Capacity Tables P.001)
2. Number of NT3X08 = ((1)____)/8 -----

NOTE The above calculations are required for both the ACTS feature running in the TOPS office and for the Improved Coin Service Revenue Collection Feature running in associated End Offices.

End Office CDC should be provisioned to accommodate the expected inter- LATA originated coin call traffic.

25.2.7.4 ACTS DRA Provisioning

1. Number of coin lines -----
2. Calling rate -----
3. Number of calls ((1)*(2)) -----
4. HT/100 (Default=38 sec.) -----
5. CCS of announcements ((3)*(4)) -----
6. Number of announcements based on traffic
(CCS Capacity Tables P.001) -----
7. Number of ACTS DRA ((6)____)/29 -----

25.2.8 Office Layout Information

Not applicable.

25.2.9 Traffic Tables

Refer to CCS Capacity Tables, P.001.

25.3 Product/System Specification25.3.1 Physical Characteristics

Not applicable.

25.3.1.1 Coin Detection Circuit NT3X08--

Input Voltage..... V at _____ Hz
Power Consumption.....15 watts
Current Drain..... Amps
Thermal Dissipation..... BTU/hr
Fusing Requirements.....

MECHANICAL DIMENSIONS

Height	_____	Width	_____	Length	_____
Weight	_____	Depth	_____		

25.3.2 EMI/Earthquake Information

Not applicable.

25.3.3 Sparing Information

| Assume regular sparing procedures. MTBF (Mean Time Between Fail-
| ure) and MTTR (Mean Time To Repair) for the ACTS DRAM (NT1X76AE)
| and the CDC (NT3X08--) cp's. Parameters are not available for ac-
| curate sparing calculations.

25.3.4 Power Feed and Fusing Requirements

N/A

25.3.5 Current Drain Information

N/A

25.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond
refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

25.4.1 Required Software Packages and Interdependencies

The software package for ACTS is NTX208AA or NTX208AB.

| The NTX208AB software package contains maintenance related en-
| hancements which are not provided with the NTX208AA package

| The NTX208AB enhancement provides telcos the capability of dialing
| a seven- digit test number from a coin phone to determine whether
| the coin box is sending the proper signaling to the ACTS system.
| The feature also offers the capability of identifying defective
| coin detection circuits from the MAP without having to busy out
| all the circuits on the affected CDC. Only the circuit under test
| need be busied.

| The maintenance enhancement of the NTX208AB package requires the
| provisioning of CDC NT3X08AB. The NT3X08AA CDC will operate
| compatibly with NTX208AB package but this configuration will not
| have the enhanced maintenance capability. To get the full benefit
| from the enhanced maintenance capability of the NTX208AB package,
| all ACTS CDCs must be NT3X08AB.

| The NTX208AA package operates compatibly with either NT3X08AA or
| NT3X08AB CDCs. The improved coin toll fraud prevention capability
| of the NT3X08AB CDC card is effective when configured with either
| the NTX208AA software package or the NTX208AB package.

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25.4.1.1 End Office CDCs

The CDCs required for the Improved Coin Service Revenue Collection feature AF1400 in the end office are either NT3X08AA or NT3X08AB. The use of NT3X08AB provides the improved fraud prevention capability. The improved maintenance functionality of the NT3X08AB CDC is not implemented in the end office configuration.

For ACTS software status, refer to the SMS database.

MMCCS and CCIS are not software prerequisites for ACTS operation.

25.4.2 Software Usage Restrictions

None identified.

25.4.3 Memory Provisioning

The ACTS feature requires 3K words of program store.

25.5 Real Time Impact

The ACS feature has no real time impact.

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26.0 ECM551 - AIN Essentials (Rel 0.1) and AIN Service Enablers (Rel 0.2)

26.1 Overview

Product/System Overview

26.1.1 AIN Essentials

AIN Essentials is a Nortel AIN DMS-100 SSP product that offers AIN 0.1 functionality to operating companies. The following Bellcore documents provide most of the AIN Essentials requirements:

- Advanced Intelligent Network (AIN) 0.1 Switching Systems Generic Requirements. TR-NWT-001284, Issue 1. Bellcore, August 1992.
- Advanced Intelligent Network (AIN) 0.1 Switch--Service Control Point (SCP) Application Protocol Interface Generic Requirements. TR-NWT-001285, Issue 1. Bellcore, August 1992.

AIN Essentials was first released in BCS36.

26.1.2 AIN Service Enablers

AIN Service Enablers is another AIN DMS-100 SSP product that offers AIN 0.2 functionality to operating companies. The following Bellcore documents provide most of the AIN Essentials requirements:

- GR-1298-CORE, AINGR: Switching Systems , Issue 3, Bellcore, July 1996
- GR-1298-CORE, AINGR: Switching Systems , Issue 3, Revision 1, Bellcore, November 1996
- GR-1299-CORE, AINGR: Switch--Service Control Point (SCP)/Adjunct Interface , Issue 3, Bellcore, July 1996
- GR-1299-CORE, AINGR: Switch--Service Control Point (SCP)/Adjunct Interface , Issue 3, Revision 1, Bellcore, November 1996
- GR-1129-CORE, AINGR: Switch--Intelligent Peripheral Interface (IPI) , Issue 2, Bellcore, July 1996
- GR-1298-ILR, Advanced Intelligent Network (AIN) Switching Systems Issues List Report, Bellcore, September 1996
- GR-2892-CORE, Switching and Signaling Generic Requirements for Toll-Free Service using Advanced Intelligent Network , Issue 1, Bellcore, April 1995

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Note1:

In AIN Service Enablers, the Specific_Digit_String (SDS) trigger is equivalent to the PODP trigger in AIN Essentials. TRAVER and other provisioning tools may use the term PODP to refer to the AIN Service Enablers' SDS trigger.

Note2:

In AIN Service Enablers, the Public_Feature_Code (PFC) trigger is equivalent to the PODPFeat trigger in AIN Essentials. TRAVER and other provisioning tools may use the term PODPFeat to refer to the AIN Service Enablers' PFC trigger.

26.2 Hardware Provisioning

26.2.1 Hardware Usage Restrictions

The following are hardware limitations:

- MSB7 is not supported. AIN and MSB7 cannot co-exist. Do not activate AIN if MSB7 is in service, as it adversely affects MSB7. See NTP297-5161-510, SSP Maintenance Manual and the Special Applications Manual for MSB7 to LPP Migration for the procedure to upgrade an MSB7 office to an LPP office.
- Only the Meridian Digital Centrex Data-Link attendant console is supported for SDS, N11 and encounter TAT triggers. Mini-consoles are not supported.

The AIN SSP does not require a set of announcements for AIN calls. However, the application on the off-board processor may require a set of announcements. Once the operating company determines that its AIN SSP will communicate with a certain AIN SCP application, the set of announcements (if any) required by the SCP service must be provisioned on the SSP. See the Enhanced DRAM (EDRAM) Engineering Change Memorandum for provisioning rules for standard and custom announcements for DRAM and EDRAM. Use the following guidelines to provision these announcements on the SSP:

- For recorded announcements, provision the Digital Recorded Announcement Machine (DRAM) NT1X75BA or Enhanced DRAM (EDRAM) NT1X80AA. The older DRAM NT1X75AA is not supported.
- To provide announcements with pronounced digits, do one of the following:
 - Use the digits PROM card NT1X76AG
 - Provide an EPROM card to record equivalent digital phrases.
 - Provide a RAM card to record equivalent digital phr

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For BRI agents that are indirectly supported for AIN through PRI looparound trunks, the ISDN sets must be equipped with release 1.53 or later of the MainROM to perform digit collection.

26.2.2 Hardware Dependencies

To use AIN Service Enablers, the DMS-100 SSP must use Supernode SR-50 and higher compute modules or processors. (This is an NA007 PCL requirement.)

In SuperNode offices AIN supports only the LIU7 for communicating with off-board processors over CCS7 links. LIU7 is installed on either the LPP, FLIS, or SNSE in the LIS (Link Interface Shelf).

26.2.2.1 P and C Side Port Requirements

Not Applicable

26.2.2.2 DMS BUS Port Requirements

Not Applicable

26.2.2.3 Circuits Per Card

Not Applicable

26.2.2.4 Discrimination Numbering

Not Applicable

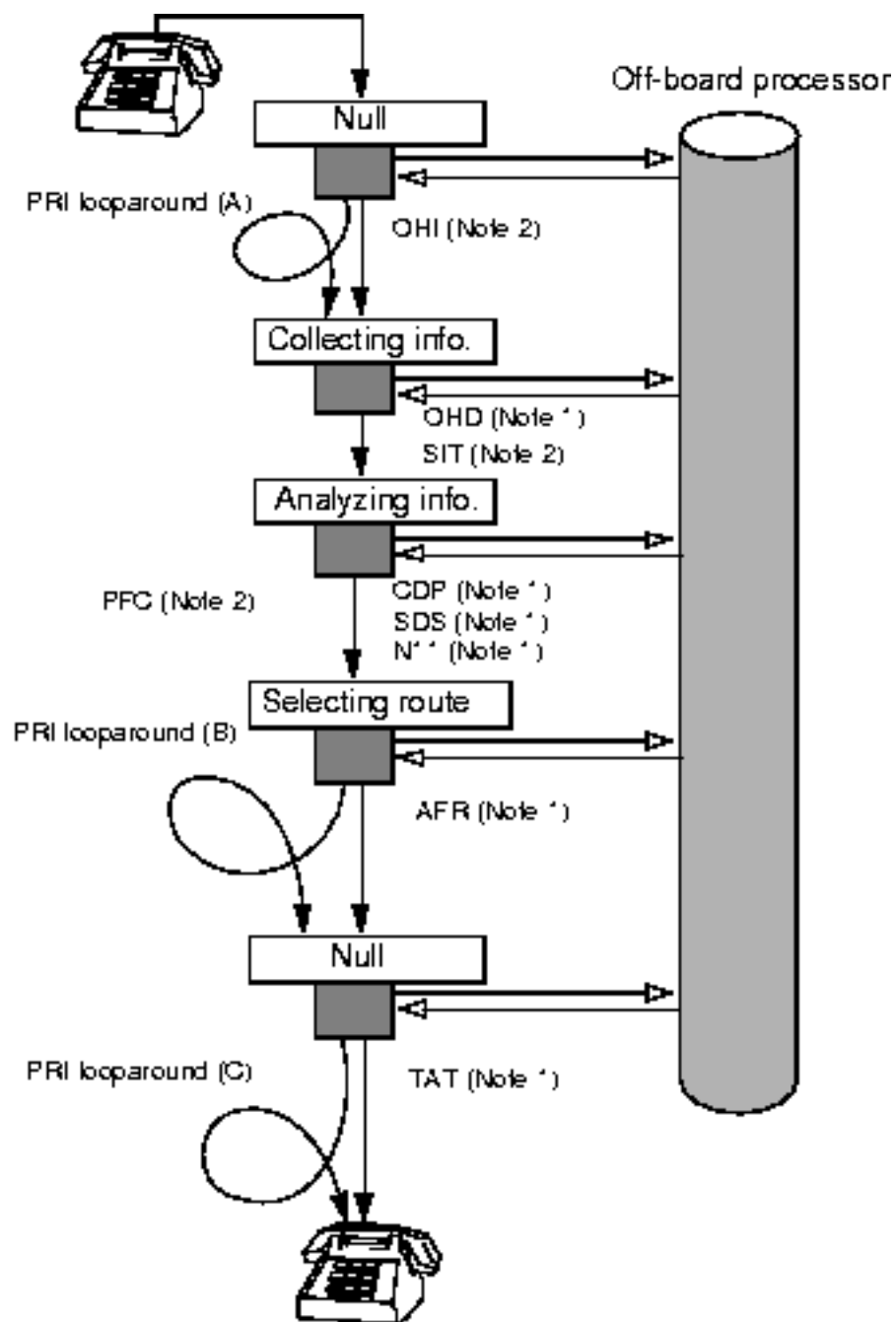
26.2.3 Provisioning Considerations

26.2.3.1 PRI looparounds

PRI looparound are a means of decreasing the limitations and restrictions associated with the current release of AIN. By using PRI looparounds, the current release of AIN can provide trigger support for several partially supported A IN agents.

The AIN Service Enablers SSP uses PRI looparounds to enhance its ability to provide AIN services. Points A, B, and C in Figure1 show the points in call (PIC) where a PRI looparound might be used.

Figure1 Categories of PRI looparounds



Note 1: accessible from PRI looparounds

Note 2: not accessible from PRI looparounds

Figure 13. CATEGORIES OF PRI LOOPAROUNDS

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Figure 1 shows only the points in call (PIC) that have trigger detection points (TDP) associated with them.

PRI looparounds allows indirect support of some agents. This support is accomplished by redirecting calls from the unsupported or partially supported agents to the PRI trunks and looping them back to the DMS SSP. As a result, these calls are given the same triggering potential as a directly supported agent.

Supported agents do not require a PRI looparound for origination triggers. However, both supported and indirectly supported agent calls must be routed over the PRI looparound trunks to encounter a Termination_Attempt trigger when there is at least one indirectly supported agent in the network. Only supported agents can subscribe to the Termination_Attempt trigger.

In addition, it is assumed that for the Termination_Attempt trigger, only one originating agent can be connected to the terminating agent; that is, agents that dial a busy Termination_Attempt trigger subscriber are assumed not to require a PRI trunk. This assumption does not take into account the cases where the multiple termination calls can take place such as hunt groups, ACD, UCD, or Send_To_Resource announcements.

Trigger support for partially supported or unsupported agents

PRI looparounds are used to ensure that non-AIN agents, such as Telex, can encounter the triggers in the originating and the terminating call models. See point A and point B in Figure1. See also Table2.

As of release NA009, each agent is at least partially supported by at least one trigger. There are currently no plans to increase the support of the Telex agent. Partially supported agents can still be considered for PRI looparound solution. See "Agents where PRI looparound trunks can be used,".

26.2.3.2 PRI looparounds - Restrictions and limitations

The PRI looparound cannot provide unsupported AIN agents with access to all triggers. Three triggers, Off-hook_Immediate, Public_Feature_Code, and Shared_Interoffice_Trunk, cannot be accessed by PRI trunks. For further information on triggers, see AIN Enablers Service Implementation Guide : Chapter 7.: "Originating call model triggers" and AIN Enablers Service Implementation Guide : Chapter 9.: "Terminating call model triggers".

PRI does not carry all the information contained in AIN parameters. The ChargePartyStationType, RedirectingPartyID, and TCM parameters are completely unsupported by PRI. The ChargeNumber, PrimaryCarrier, and RedirectionInformation parameters are sup-

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ported in a limited manner. For further information on parameters, see AIN Enablers Service Implementation Guide : Chapter 6.: "Generic SSP procedures" and AIN Enablers Service Implementation Guide : Chapter 17.: "Additional messages" .

For calls originating from attendant consoles going over PRI looparound trunks, subsequent digit collection is not performed once the call has routed over the trunk. Two examples of this restriction are:

- For the Customized_Dialing_Plan (CDP) feature access code (FAC) trigger, if additional digits are to be collected after encountering the refinable translation result selector, the attendant console is not able to enter these digits .
- If an attendant console originates a call over a PRI looparound to AIN and a Send_to_Resource message is returned from the SCP requesting digits to be entered, the announcement is heard but the digits cannot be entered from the key pad of the attendant console.

The integrated services digital network (ISDN) sets that require MainROM must be equipped with release 1.53 or later to perform digit collection across a PRI trunk when no answer supervision is previously sent.

The following are two examples of call scenarios in which release 1.53 or later is required to perform digit collection:

- A call from an ISDN set routes over PRI. The incoming PRI trunk triggers and sends a query to the database. A Send_to_Resource message is received without the AnswerIndicator and requests digit collection.
- A call from an ISDN set routes over PRI. The incoming PRI trunk performs Integrated Business Network (IBN) translation and encounters the FTR selector with NORM, VAR, or FIXED digit collection.

26.2.3.3 PRI looparound Required hardware

The use of PRI looparound trunks also requires the use of Digitone Receivers (DTR) to collect digits since the Universal Tone Receiver (UTR) is not supported by PRI.

When a call originates from a PRI trunk and results in a Send_to_Resource response, the SSP plays the designated announcement, and if specified in the response, collect digits. In this case, the DTR must be attached to the PRI trunk to collect the digits. Similarly, when a call originates from an ISUP trunk, a UTR or the GTR (NT6X92EA) must be provisioned to allow for digit collection from the ISUP trunk. The only difference between GTR and UTR is that the GTR is LSSGR/CCITT compliant. Note that the

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UTR and GTR cannot exist in the same module. In an upgrade situation, the existing UTRs must be removed and replaced by GTRs. See the appropriate peripheral Engineering Change Memorandums for more UTR or GTR information.

The DTR is found in the maintenance trunk module (MTM). It receives digitones and produces a decoded binary output. The Nortel engineering code for the DTR is NT2X48AB. The number of required DTRs is equal to the number of DRAM or E DRAM announcements that are designated to collect digits. For example, if the office is engineered for 10 announcements or channels that are designated to collect digits, then 10 DTRs are required. See the Building Block Engineering - DRAM Engineering Change Memorandum and the Enhanced DRAM (EDRAM) Engineering Change Memorandum for DRAM and EDRAM engineering information.

26.2.3.4 PRI looparound Provisioning information

Trunk groups assigned with a common language location identification (CLLI) can exist only within the same peripheral module and require their own separate D-channel and perhaps backup D-channel for each trunk group.

A backup D-channel is also useful for DS-1 maintenance on the port. However, the prime channel must be set on a lower-numbered port card.

Unlike ISUP trunks, PRI does not provide the continuity check feature. For more information about how to datafill the extended peripheral module (XPM) for PRI, see NTP 297-2401-360, Integrated Services Digital Network Primary Rate Interface Translation Guide.

26.2.3.5 PRI looparound calculations

The following sections explain how to calculate the required number of PRI looparound trunks based on the indirectly supported agent traffic and the traffic for the Termination_Attempt trigger.

Assumptions

While performing these calculations, the following is assumed:

- The per agent type traffic is composed of 50% originations and 50% terminations.
- The penetration of 3W CF and 6W CF is assumed negligible for originations from indirectly supported agents.
- All calls originating from an indirectly supported agent invoke an AIN service.
- All agents require only one PRI looparound for all services.

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- Any agent may be assigned to any PRI looparound. Termination_Attempt trigger PRI looparounds are different from originating PRI looparounds. This assumption does not take into account any requirement for varied customer group and agent restriction access through separate PRI looparound trunk groups.
- The blocking probability or Grade Of Service is 5% or 0.005.
- Each PRI P-side link facility has a 23B + 1D channel ratio.
- DTCI supports 20 PRI P-side link facilities. DCHs are not required.

Step 1: Calculate the Century Call Seconds for each agent

For each of the agents in Table2 , calculate the Century Call Seconds (CCS), using the following formula:

$$T_n = (C * HT * N) / 100$$

where:

- C is the number of calls for each agent in calls/hr for busy hour (for originating calls only)
- N is the number of agents (lines or trunks) of this type
- HT is the average holding time for each call in seconds. The default is 180s.
- T_n is the traffic for each indirectly supported agent type in CCS

Note:

The PRI looparound trunk is held for the duration of the call.

Step 2: Calculate the CCS for Termination_Attempt calls

Determine the traffic in CCS for calls encountering the Termination_Attempt trigger using the following formula:

$$T_{tat} = T_{ain} / 2 * X$$

where:

- T_{ain} is the AIN traffic in CCS (all agents)
- X is the percentage of traffic that is encountering the Termination_Attempt trigger. The default is 2% or 0.02 if the percent penetration or planned number of Termination_Attempt trigger service agents is unknown.

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- Ttat is the traffic in CCS for calls encountering the Termination_Attempt trigger

Tain is divided by two for terminations only.

Note:

As of release NA009, attendant console is the only agent which may be considered for PRI looparound calculations for the encounter Termination_Attempt trigger, and only if Send_To_Resource (STR) functionality is required on these calls.

If STR support is not required for calls that originate on an attendant console, or if the office does not use attendant consoles, no PRI looparound trunks are required for encountering the Termination_Attempt trigger and Ttat is zero.

Step 3: Calculate the total traffic

Calculate the total traffic in CCS requiring PRI looparound trunks. This involves adding the traffic for each agent to the traffic for the Termination_Attempt trigger and multiplying by two for the PRI looparound. Use the following formula:

$$Tt = (T1 + T2 + T3 \dots + Tn) + Ttat) * 2$$

where Tt is the total traffic requiring PRI looparound trunks

See Table 7 Service Circuit Capacity (Poisson Theory) in the Simplified Traffic Provisioning Engineering Change Memorandum to determine number of circuits required. Look down column under 0.005 and find the CCS that is equal or larger to Tt. Look to the left and the number of circuits or PRI trunks is indicated.

Step 4: Determine the number of required DTCI modules

Use the following formula:

$$\text{Number of DTCI modules} = DS1/20 \text{ (round up to nearest whole \#)}$$

where DS1 is the number of PRI facilities calculated by:

$$\text{number of circuits}/23 \text{ B-channels (round up to nearest whole \#)}$$

Refer to the Domestic XPMS and Subscriber Carrier Modules Engineering Change Memorandum for additional DTCI provisioning information.

Calculation example

The following subsections illustrate how to calculate the required number DTCI modules.

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Step 1: Calculating the CCS for each agent

The raw data is summarized in Table 1 .

Table1 Raw data for example

Call type	Number of calls (calls/hour)	Average holding time (seconds)	Number of agents or trunks
Cell	2	180	5 trunks
OWT	2	180	5 lines
CCF	5	180	10 lines

Using the formula gives us:

- $T = (20 * 180 * 50)/100 = 1800 \text{ CCS}$
- $T = (20 * 180 * 50)/100 = 1800 \text{ CCS}$
- $T = (5 * 180 * 100)/100 = 900 \text{ CCS}$

Step 2: Calculating the CCS for Termination_Attempt calls

The raw data is:

- $T_{ain} = 5000 \text{ CCS}$
- $X = .02$

Using the formula give us: $T_{tat} = 5000/2 * .02 = 50 \text{ CCS}$

Step 3: Calculating the total traffic

Using the formula give us:

$$T_t = ((T_1 + T_2 + T_3) + T_{tat}) * 2 = (4500 \text{ CCS} + 50 \text{ CCS}) * 2 = 9100 \text{ CCS}$$

Step 4: Determining the number of required DTCI modules

From Table 7 of the Simplified Traffic Provisioning Engineering Change Memorandum and using 0.005 blocking, the number of circuits is 281, because 9100 CCS is off the table, in which case you divide T_t by 32.4.

Using the formulas gives us:

- $DS_1 = 281/23 = 12.21$ rounded up to 13
- Number of DTCI modules = $13/20 = .65$ rounded up to 1

Therefore, the requirement is for one DTCI that is 65% equipped.

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26.2.3.6 PRI looparound Agent groups

There are three groups of agent types:

- directly supported by AIN
- unsupported by AIN
- partially supported by the AIN

Directly supported agents can use the AIN application without requiring PRI looparound trunks.

Calls from unsupported agents do not trigger at the AIN trigger detection points. Therefore, by redirecting the calls from the unsupported agents to the PRI trunks (which are supported) and looping them back to the DMS SSP, these calls are given the same triggering potential as a directly supported agent, except for Off-hook_Immediate (OHI), Public_Feature_Code (PFC), and Shared_Interoffice_Trunk (SIT). A PRI looparound trunk may be used provided the trigger access from the agent over the PRI looparound is supported on the DMS SSP.

Partially supported agents can be fully supported for some triggers, unsupported for other triggers, and partially supported for still other triggers. A PRI looparound trunk may be used for the partially supported and unsupported triggers, provided that:

- missing functionality for the partially supported trigger is accessible through the PRI looparound trunk
- access to the trigger is supported through the PRI looparound trunk

In the termination phases of a call, some calls are redirected to the PRI trunks and others are directly supported by the Termination_Attempt trigger.

For a view of trigger support for each type of agent, see AIN Enablers Service Implementation Guide : Chapter 4.: "Agent support" .

As of release NA009, there are no plans to increase the level of support for agents that are currently unsupported. Partially supported agent have at least one trigger that is partially supported. Table2 provides a list of partially supported agents that can use a PRI looparound trunk to access certain triggers which are not directly supported.

26.2.3.7 Agents where PRI looparound trunks can be used

This section lists agents that are partially supported by AIN, and that can gain access to further AIN triggers through the PRI looparounds, if necessary. However, the use of PRI looparounds is not recommended if it can be avoided. See Table2 . In Table2 , supported triggers do not require PRI looparound trunks.

Table2 AIN indirectly supported agents through PRI looparounds

Agents	Line class code and trunk group type	Off-hook Delay	Customized Dialing Plan	Specific Digit String	N 1	Automatic Flexible Routing	Encounter Termination Attempt
8-Party flat rate	8FR	PL	N/A	PL	PL	PL	S
1 -Party flat rate	1 FR	PL	N/A	PL	PL	PL	S
POTS Coin	CCF CDF CSP ZMD ZMZPA	PL	N/A	S	S	S Note 1	S
POTS WATS	2WW EOW ETW INW OWT	PL	N/A	S	S	S Note 1	S
Attendant console	Line Other	PL	PL	P Note 2	P Note 2	PL	P Note 2
OutgoingCAMOC	MAOC	N/A	N/A	S	S	PL	S
N/A_-- not applicable P_-- partially supported PL_-- supported through primary rate interface (PRI) looparound trunks S_-- supported Note 1:Group based subscription is and individual subscriptions are not applicable. Note 2:Send_To_Resource is not supported on calls from an attendant console.							

26.2.3.8 Agents not supported by AIN

Table 3 lists the trunks agents that are not supported by AIN. There are currently no plans to increase the level of support for these agents.

Table3 Trunk agents not supported by AIN

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Agent type	Agent name	Agent purpose
LPBK	ISDN Loop Back	Test trunk
RONI	Remote Operator Number Identification	Operator intervention for ANI digits
NFA	NFA	DMS to IP communications
X75	X.75 Protocol	Trunk to packet handler
TOPSARU	TOPS Automatic Response Unit	Used for directory assistance
TOPSVL	TOPS Voice Link	Interface to Voice Service Node
LOOPA	Loop Around	Test trunk
IBNT0	IBN Trunk Outgoing	Outgoing trunk
SOCKT	Transmission Test Circuit	Test trunk
MAINT	Maintenance Trunk	Test trunk
ROTL	Remote Office Test Link	Test trunk
TDD0	Two State Direct Dial Overseas	Tandem trunking
TTL2	Tone Test Line	Test trunk
T 01	1 1	Test trunk
T 05	1 5	Test trunk
DS0	Digital Signaling	SS7-STP link
AI	Automatic Intercept	Route to announcement system
AN	Automatic Number Announcement	Plays back ANI information
DA	Directory Assistance	Operator services
ES	Emergency Services	9 1 outgoing from end office
IR	Intercept/Repair	6 1 and service bureau
NU	Nail Up	Permanent connections
OS	Operator Service	Operator services
TD	Test Desk	Repair service testing
TL	Transmission Link	SS7 signaling link
TO	Trunk Out	End office outgoing trunk

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TwX	Telex	Telex services

26.2.3.9 PRI Looparounds for NA03-NA08

PRI Looparounds for AIN Essentials BCS36&NA003

The table shown in this section lists the agents indirectly supported through PRI looparounds for BCS36 and NA003 AIN Essentials originating call types. This table also represents the list of indirectly supported agents to access the Termination Attempt Trigger for BCS36 and NA003.

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Agents	Line Class Code & Trunk Group Type	Type
2-Party Flat Rate, 4-Party Flat Rate , 8-Party Flat Rate, 10-Party Flat Rate	2FR, 4FR , 8FR, 10FR	Line/Party
Coin Dial Tone First	CDF	Line/Coin
Coin Coin First	CCF	Line/Coin
CoinFree Dialing	CFD	Line/Coin
Coin Semi Post Pay	CSP	Line/Coin
Zero-Minus Denied	ZMD	Line/Coin
Zero-Minus/Zero Plus Allowed	ZMZPA	Line/Coin
2-Way WATS, Enhanced 2-WAY Wats, INWATS, OUTWATS Service, En- hanced OUTWATS Service	2WW, ETW, INW, OWT, EOW	Line/WATS
PBX/DID	P /PX	Trunk
Access to Carrier	ATC	Trunk
Super CAMA	SC	Trunk
Cellular	CELL	Trunk
OutgoingCAMA,	OC	Trunk
POTS Data	PDATA	Line/Data
Telex	TWX	Line/Other
DATAPATH	DATA	Line/Other
Basic Rate Interface NI-1	NI-1 BRI	Line/Other
Attendant Console (Note- Attendant Con- sole end-to-end sig- nalling does not work over PRI trunks)	AC	Line/Other

PRI Looparounds for AIN Essentials NA004B

This section includes the delta between PRI Looparounds for AIN Essentials

BCS36&NA003 and NA004B. This delta is:

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ATC Trunks are now directly supported in AIN Essentials NA004B.

VLN (for RCF) are directly supported agents and do not require PRI Looparound trigger support.

All agents except Attendant Consoles are supported to encounter TERMATT in NA004B. There are three different methods of dealing with Attendant Consoles in this case:

If your office does not require Attendant Consoles to encounter the TERMATT, then the Tt portion of the Total traffic requiring PRI Looparounds is no longer required. If your office has AIN Essentials in NA004B and no Attendant Consoles need to encounter TERMATT, then the equation in the section "PRI Looparounds Calculations" would become: $Tt = (T1 + T2 + T3... + Tn) * 2$

If your office requires Attendant Consoles to encounter TERMATT, then the TAT Looparound may be used in the terminating side of the call. In this implementation, all agents encountering the TERMATT trigger will need to be routed over PRI Looparound Trunks and the Tt equation variables will remain the same as in "PRI Looparounds Calculations"

If your office requires Attendant Consoles to encounter TERMATT without affecting the operation of directly supported agents, then all calls originating from an Attendant Console must be routed over a PRI Looparound Trunk. Since the looparound will occur in the originating side of the call, it will be independent of the other agents encountering TERMATT. This method eliminates the need for PRI Looparounds in the terminating side of the call, so equation in "PRI Looparounds Calculations" would become: $Tt = (T1 + T2 + T3... + Tn) * 2$

PRI Looparounds for AIN Essentials NA005B

This section includes the delta between PRI Looparounds for NA004B and NA005B. This delta is:

2-Party and 4-Party Flate Rates (2FR and 4FR) are partially supported AIN Agents.

VAPN trunks are partially supported for encountering TERMATT

A partially supported agent MAY require a PRI trunk to access an unsupported trigger). Note that the calculation would be the same for partially supported agents as for indirectly supported agents and calculation should not consider which of the triggers are accessible via PRI trunks

PRI Looparounds for AIN Essentials NA06B-NA07

The table in this section lists the agents that are partially supported by AIN. For each agent, there is a list of supported originating

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triggers. These triggers may be encountered without the use of PRI looparounds. All remaining originating triggers may only be encountered via a PRI looparound trunk.

A partially supported agent MAY require a PRI trunk to access an unsupported trigger). Note that the calculation would be the same for partially supported agents as for indirectly supported agents and calculation should not consider which of the triggers are accessible

Agents	Line Class Code & Trunk Group Type	Type: Supported Orig- inating Triggers
Coin Dial Tone First	CDF	Line/Coin: CDP, PODP, N 1, AFR(office-based)
Coin Coin First	CCF	Line/Coin: CDP, PODP, N 1, AFR(office-based)
CoinFree Dialing	CFD	Line/Coin: CDP, PODP, N 1, AFR(office-based)
Coin Semi Post Pay	CSP	Line/Coin: CDP, PODP, N 1, AFR(office-based)
Zero-Minus Denied	ZMD	Line/Coin: CDP, PODP, N 1, AFR(office-based)
Zero-Minus/Zero Plus Allowed	ZMZPA	Line/Coin: CDP, PODP, N 1, AFR(office-based)
Basic Rate Interface NI-1	NI-1 BRI	Line/Other: CDP, PODP, N11, AFR(office-based), AFR(group-based)
DATAPATH	DATA	Line/DATA: OHI, OHD, PODP, N11, CDP AFR(office-based)
2-Party Flat Rate, 4-Party Falt Rate	2FR, 4FR	Line/Party: OHI, OHD, PODP, N11, AFR(office-based)
2-Way WATS, Enhanced 2-WAY Wats, INWATS OUTWATS Service, En- hanced OUTWATS Service	2WW ETW INW OWT EOW	Line/WATS: CDP, PODP, N11, AFR(office-based) , AFR(group-based)
Virtual Facility Group	VFG	IBN/POTS: CDP, PODP, N 1, AFR(office-based), AFR(group-based)
Operator , SuperCAMA, OutgoingCAMA, Operator Incoming	OP. SC. OC, OI	Trunk: PODP, N11
Cellular, PBX/DID	CELL , P2/PX	Trunk: PODP, N11, AFR(office-based)
Virtual Acc. to Pri.NTWK	VAPN	Trunk: PODP, AFR(office-based)

PRI Looparounds for NA08

OHD and PODPFEAT are supported for RES Coin and WATS agents beginning in NA08.

26.2.4 Office Layout Information

Not Applicable

26.2.5 Traffic Tables

Not Applicable

26.3 Product/System Specification

26.3.1 Physical Characteristics

Not Applicable

26.3.2 EMI/Earthquake Information

Not Applicable

26.3.3 Sparing Information

Not Applicable

26.3.4 Power Feed and Fusing Requirements

Not Applicable

26.3.5 Current Drain Information

Not Applicable

26.4 Software Provisioning

26.4.1 Required Software Packages and Interdependencies

AIN SSP software has been grouped into SOC options that control the activation of the AIN product. Each SOC option controls specific functions and exists in one of two states: ON or IDLE. There are also track options identified as "T RAK" and counter options identified as ">LIM". An example of the various options and their relative states is shown in Figure88 . The options are:

- AIN00001: AIN Primer. This is a track option associated with AINPrimer.
- AIN00002: AIN Essentials Option, controls basic AIN functionality.
- AIN00006: AIN Call Management option. This controls all AIN Essentials functionality. It is dependent on the AIN00002 option.

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- AIN00007: AIN Call Model Control Option. This is a track option associated with features brought forward to enhance AINEssentials functionality.
- AIN00008: AIN Display Services Option. This controls "Display Text to Terminating RES and MDC agents" functionality.
- AIN00009: AIN Services Supporting Option. This is a track option associated with features that provide support for services on AIN.
- AIN00010: AIN Default Routing option. This controls Default Routing functionality. It is dependent on the AIN00006 option.
- AIN00011: AIN SSP Service Enhancement Option. This is a track option associated with features delivered in NA005 to enhance SSP functionality.
- AIN00015: AIN Network Services Enhancements option. This is a track option associated with features that Enhances network Services.
- AIN00018: AIN ACB/AR Premium Option. This option controls the "ACB/AR" enhanced functionality. It is dependent on AIN00007.
- AIN00022: AIN Maintenance Enhancement option. This is a track option associated with features that enhances maintenance.
- AIN00026: AIN Translations Simplification option. This option controls the response translations simplification functionality. It is dependent on AIN00009.
- AIN00027: AIN Office Trigger Flex option. This option is a track option associated with the response translation enhancement feature.
- AIN00210: AIN Service Enablers Option, controls AIN Service Enablers Release 1 (NA007) functionality.
- AIN00211: AIN Service Enablers Release 2 (NA008) Option, contains the office-based counts for all office-based messaging.
- AIN00212: AIN Service Enablers Release 2 (NA008) Option, contains the subscription-based counts for all subscription-based messaging.
- AIN00213: AIN Service Enablers Release 2 (NA008) Option, contains the noncall-related (NCR) based counts for all NCR-based messaging.
- AIN00220: AIN Service Enablers Option, controls AIN Service Enablers Release 2 (NA008) functionality.
- AIN00230: AIN Service Enablers Option. This is a track option associated with AIN Service Enablers Release 3 (NA009) functionality.
- AIN00231: AIN Service Enablers Option, controls AIN Service Enablers Alternate Carrier Routing functionality.

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To activate AIN SSP call processing, both AIN00002 and AIN00006 SOC options must be in the ON state. When these SOC options are ON, triggering is enabled at the TDPs, thus making database queries possible. When they are IDLE, triggering is disabled and only datafilling and testing are allowed.

The Display Services SOC option (AIN00008) controls the "Display Text to Terminating RES and MDC agents" functionality and must be in the ON state if Display Text is desired.

The Default Routing SOC option (AIN00010) controls the default routing functionality and must be in the ON state if default routing functionality is desired with AIN SSP.

The ACB/AR SOC option (AIN00018) controls the ACB/AR enhanced functionality and must be in the ON state if ACB/AR functionality is desired.

The Translations Simplification option (AIN00026) controls the response translations simplification functionality and must be in the ON state if it is desired.

The Event-Usage Counters SOC options (AIN00211, AIN00212 and AIN00213) maintain the office-based, subscription-based and noncall-related (NCR) counters. All AIN Service Enablers call related messages and all AIN Service Enablers and AIN Essentials noncall-related messages are counted. The NCR messages are counted regardless of the states of AIN00210 and AIN00220.

The Service Enablers SOC option AIN00210 controls AIN Service Enablers Release 1 (NA007) functionality and must be in the ON state if AIN Service Enablers functionality is desired.

The Service Enablers SOC option AIN00220 controls AIN Service Enablers Release 2 (NA008) functionality and must be in the ON state if Release 2 (NA008) functionality is desired.

The Service Enablers SOC option AIN00231 controls AIN Service Enablers Alternate Carrier Routing functionality and must be in the ON state if it is desired.

26.4.2 Software Usage Restrictions

Refer to Hardware limitations.

26.4.3 Memory Provisioning

There are three types of memory that should be taken into account for the AIN Service Enablers SSP:

- Program store -- AIN Service Enablers increases the amount of program store required. The program store value represents the amount

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of code that is specific to AIN Service Enablers. Changes to AIN Essentials or base code are not included in these program store measurements. However, it must be noted that AIN Essentials software is a prerequisite for AIN Service Enablers software.

The AIN Service Enablers program store requirement for this release is less than 200kbytes.

- Data store -- AIN Service Enablers increases the amount of data store required. This storage amount is constant for the load and is not dependent on the number of calls taking place.

The AIN Service Enablers data store requirement for this release is less than 20kbytes.

Note:

The estimated amount for data store excludes any storage requirements for provisioning data, which varies for each central office.

- Data Structure Store -- This includes data storage that is allocated on a per call basis, usually in the form of extension blocks. This impact depends on usage of AIN Service Enablers. The allocation of this memory is constrained by engineering rules documented in AIN Enablers Service Implementation Guide : Section " 2.2. Parameters with adequate default values" and in AIN Enablers Service Implementation Guide : Chapter32.: "Datafilling for the general office" .

26.5 Real Time Impact

Refer to SEB 94-05-005 AIN 0.1 on DMS for real time information and to SEA 94-11-001 ISDN PRI DTCTI (MP/SP) Call Timings for real time impact of PRI.

Due to the numerous possibilities in operating companies designing services using AIN Service Enablers functionality, it is not possible to define a representative call model that can be used for evaluating processing time impact on an AIN SSP.

26.5.1.1 AIN Service Enablers real time impact

ATTENTION

The information in this sub-section is preliminary. It provides only an estimate of real time impacts. At the time this section was written, the software providing the AIN Service Enablers functionality was not yet available and hence lab call timings were unavailable. This section must be updated to replace the estimates with measured numbers.

Current Nortel call models used for capacity estimation and engineering do not include call scenarios specific to AIN Service Enablers. How-

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ever, these models are being revised to include a subset of AIN Service Enablers call scenarios which are expected to have at least 1% penetration by the NA010 time frame. The only AIN Service Enablers call scenarios predicted to fall in this category are those involving AIN Service Enablers' toll-free service (TFS). See AIN Enablers Service Implementation Guide : Chapter18.: "Toll-free service" . Historically, TFS has been based on a E800 (TR-533) platform. Over time, it is expected that TFS will migrate from TR-533 to AIN. Note that database queries for TFS calls typically occur in end-offices, not at the access tandem switch.

An AIN-based TFS call uses more real time than does E800-based call. Hence, if AIN-based TFS calls start to replace a significant percentage of E800 calls in any given office there will be an impact on office capacity. This impact is currently restricted to the U.S., since AIN-based TFS is unlikely to replace the Canadian 8 0 Plus offering.

AIN-based TFS can co-exist with E800 in an SSP. The check for E800-based TFS versus AIN-based TFS involves a three or six-digit digitation. The cost of a six-digit digitation is expected to be less than 100 microseconds (0.1mil liseconds) on an SR60 processor.

In general there is no big change to the real time cost of an AIN Service Enablers call relative to an AIN Service Enablers call in NA007.

Other real-time impacts of AIN Service Enablers are listed here:

- New AIN Triggers (O_Called_Party_Busy, O_No_Answer, Specific_Feature_Code) and AIN Events (Network_Busy, T_Busy, T_No_Answer). Real time impact to calls in offices with AIN enabled is as follows:
 - For line or trunk originators which encounter busy treatment or no-answer or dial a specific feature code, AIN TDP Analysis is performed. Cost is estimated to be < 0.1% if the originator does not subscribe to the new triggers. Cost is estimated to be < 0.04 ms on an SR70 processor if the new triggers are subscribed to by the originator but the criteria are not met (that is, no AIN query is launched).
 - The new AIN events can only be encountered in certain scenarios where a call has already become an AIN call (that is, a query has been sent to the SCP, and the SCP has armed a dynamic AIN event on the affected call). Hence the new AIN event support does not in general impact the existing call models (cost estimated to be < 0.1%).
- Send to Outside Resource (AIN Intelligent Peripheral) enhancements. New functionality added here can only be encountered in certain scenarios where a call has already become an AIN call (that is, a query has been sent to the SCP, and the SCP directs the call to local or remote IP). Hence the existing call models are not greatly impacted (cost estimated to be < 0.1%).

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- Various GR1298 compliancy items, notably new AIN parameter support for messages sent-to/received-from the SCP. New functionality added here can only be encountered in certain scenarios where a call becomes an AIN call (cost estimate d to be < 0.1% for non-AIN calls).
- In release NA009, the real time impact on the residential call model from AIN Service Enablers is estimated to be approximately 0.33%.

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27.0 ECM579 - Usage Sensitive Three-Way Calling

27.1 Overview

The Three-Way Calling feature has previously been available only through subscription, with an associated monthly charge. The Usage Sensitive Three-Way Calling feature provides Three-Way Calling (3WC) on a pay-per-use basis, making the feature available for the occasional user. The user is charged every time the 3WC feature is requested, rather than on a monthly basis. In addition, the telco is given two options for how the feature will be activated:

1. Flash only - identical to current 3WC
2. Access code - user dials code prior to adding on third party.

Usage Sensitive 3-Way Calling is available on POTS or RES type lines only and is not applicable to ISDN lines or lines with MDC features. Users of Three-Way Calling must cancel their subscription to 3WC in order to access the Usage Sensitive Three-Way Calling feature.

27.2 Hardware Provisioning

27.2.1 Hardware Usage Restrictions

Not applicable.

27.2.2 Hardware Dependencies

| A Three-Port Conference Circuit is required for each call utilizing the Usage Sensitive Three-Way Calling feature. Refer to the Provisioning Considerations section of this ECM for provisioning information.

27.2.2.1 P and C Side Port Requirements

Not applicable

27.2.2.2 DMS BUS Port Requirements

Not applicable

27.2.2.3 Circuits Per Card

The DMS can use the 10 circuit per card Conference Trunk Module (CTM) or the older 6 Port Conference Circuit Pack (6PORT) which has 2 three-port conference circuits. The predecessor to the 6PORT was the Three Port Conference Circuit (3PORT). Both the 6PORT and the 3PORT cards have been Manufacturer Discontinued.

Refer to Table A in the Engineering Manual for appropriate conference circuit provisioning.

27.2.2.4 Discrimination Numbering

Not applicable

27.2.3 Provisioning Considerations

The Usage Sensitive 3-Way Calling feature has the same hardware requirements as the 3WC feature. Additional 3-port conference circuits must be provided to handle the additional requirements introduced by U WC. If the user does not want access to this feature, the user's POTS or RES line can be assigned the DENYU3WC option.

The additional number of 3-port conference circuits needed to support Usage Sensitive 3-Way Calling can be determined as follows:

	1. Total number of POTS and RES lines.	_____
	(Do not include ISDN or MDC lines)	
	2. Average number of calls (HDBH) per line	_____
	3. Average holding time per U3WC call (in sec.)	_____
	4. Percentage of calls utilizing U3WC	_____
	If U3WC is required and the percentage of	
	calls is not known, a default percentage	
	of 10 may be used.	
	5. U3WC CCS	_____
	$Q1 \times Q2 \times (Q3/100) \times (Q4/100)$	
	6. Reference the Service Circuit Capacity Tables	
	(Poisson Theory), determine the number of	
	circuits required by looking up the number	
	equal to or greater than the U3WC CCS in	
	the P = .05 column. Reference ECM 497.	_____
	7. CTM Circuit pack provisioning.	_____
	Q6/10	
	8. 6PORT Circuit pack provisioning.	_____
	Q6/2	
	Note that the NT3X67__ CPs are MD.	
	9. Circuits required for U3WC feature impact.	_____
	Use Item 7 or 8 above to determine the	
	additional number of cards required.	

27.2.4 Office Layout Information

Not applicable.

27.2.5 Traffic Tables

| Reference the Service Circuit Capacity Tables in ECM 497. (Poisson Theory).

27.3 Product/System Specification

27.3.1 Physical Characteristics

Not applicable.

27.3.2 EMI/Earthquake Information

Not applicable.

27.3.3 Sparing Information

Standard sparing algorithms apply.

27.3.4 Power Feed and Fusing Requirements

Not applicable.

27.3.5 Current Drain Information

Not applicable.

27.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

27.4.1 Required Software Packages and Interdependencies

Three-Way Calling for POTS and RES users and Local Automatic Message Accounting (LAMA) are provided with the following Functional Groups:

BAS00003 - BAS Generic
MDC00001 - MDC Minimum
RES00006 - RES Service Enablers

27.4.2 Software Usage Restrictions

Usage Sensitive 3-Way Calling is not available to 3WC subscribers, MDC subscribers or ISDN lines.

27.4.3 Memory Provisioning

Not applicable.

27.5 Real Time Impact

Not applicable.

Chapter 21

SYSTEM ENGINEERING

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SYSTEM ENGINEERING

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12.5 Real Time Impact 21-158

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1.0 ECM271 - Common Channel Signaling System

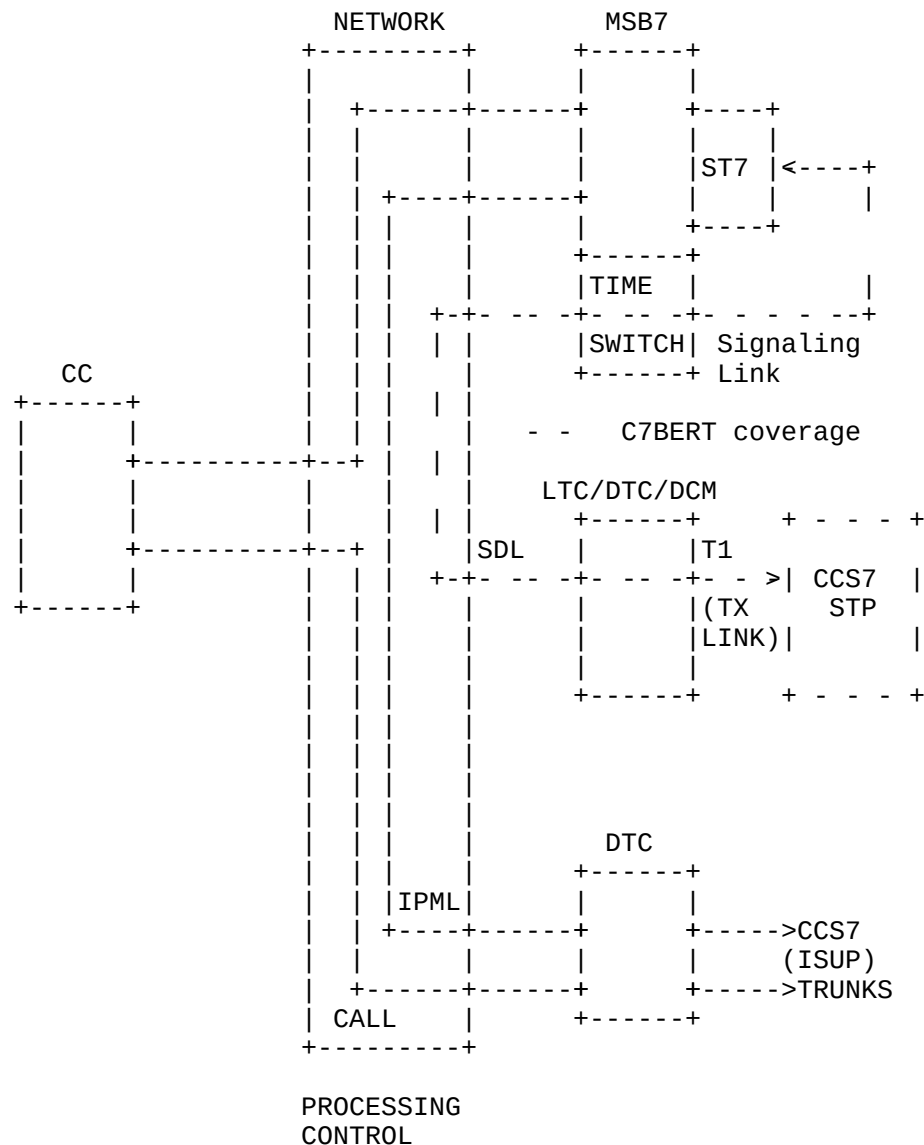
1.1 Overview

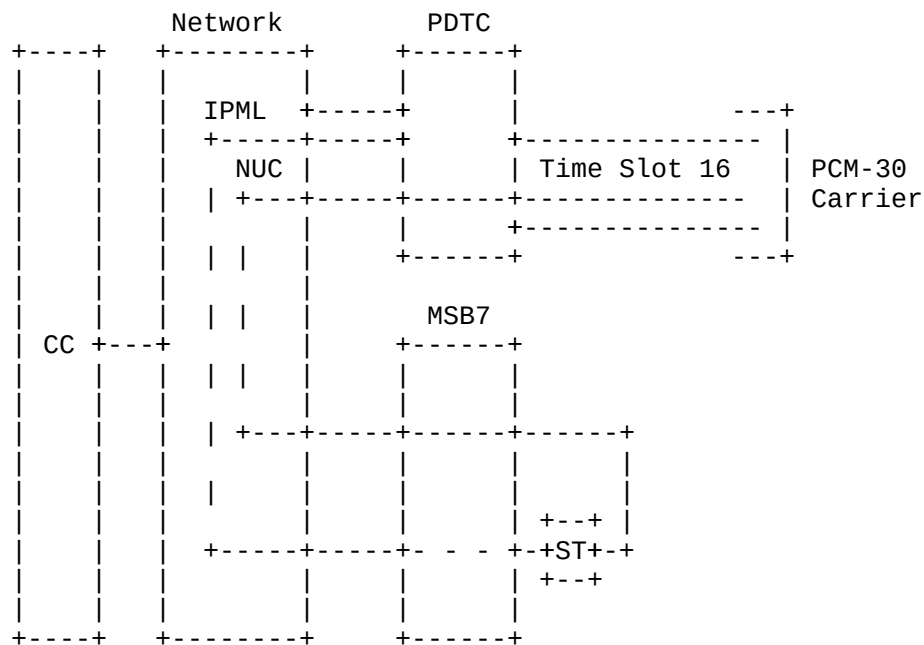
Figure 1. CCS7 CONFIGURATION MODEL

Digital Private Network Switching System #1

Digital Private Network Signalling System #1 (DPNSS #1) is a UK common channel signalling standard for a network of digital PBX's.

DPNSS allows advanced network features to be supported in a multi-vendor private network.

The hardware implementation of DPNSS is almost identical to domestic CCS7 see Figure 2



IPML - Inter Peripheral Message Link

NUC - Nailed Up Connection

Figure 2. DPNSS #1 MODEL

In the DPNSS configuration, Time Slot 16 of the incoming PCM-30 span carries the associated signalling information for the thirty channels in the PCM-30 span. Therefore, the Signalling Terminal (ST) and Signalling Data Link (SDL) will handle only thirty trunks.

The maximum number of DPNSS signalling data links is 255, therefore, the DPNSS configuration is limited to a maximum of $30 \times 255 = 7650$ trunks.

Provision one (1) NT6X66CA DPNSS Signalling Terminal CP for each PCM-30 span. Note that the DPNSS signalling terminals are not provisioned in pairs as is the case in domestic CCS7.

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The MSB7 Common CP fill for DPNSS is NT6X32BA. Provide one (1) NT6X32BA to equip each MSB7. Each MSB7 can accommodate up to 72 ST's. The maximum number of DPNSS MSB7's on a DMS switch is five. Each MSB7 can support up to thirty-five PDTC modules.

The IDTC (PDTC) circuit pack fill that should be ordered for DPNSS applications is NT6X02BN. This includes new messaging protocol and tones circuit pack NT6X69DA and NT6X40AC, DS30 Network Interface CP.

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

When utilizing CCS7, the following restrictions must be considered:

-) CCS7 trunks must terminate on DTCs ONLY. Signaling Links can terminate on LTCs, DTCs or DCMs. Signaling links and CCS7 trunks can be assigned to the same DTC.

-) CCS7 trunks can be mixed with PTS trunks on the same DTC, however both cannot be in the same trunk group.

-) DTC modules supporting CCS7 trunks must be equipped with Extended Memory and Enhanced Messaging.

- 4) Currently, a maximum of four MSB7s is allowed per office.

1.2.2 Hardware Dependencies

CCS7 trunk signaling requires Message Signaling 7 and DTC hardware.

Message Signaling 7 Equipment

The MS7E Frame is composed of one MSB7 and up to one signaling terminal 7 Group Shelf to house up to 24 signaling terminals.

The Signaling Terminal Extension Frame (NT6X09AA) is required when the number of Signaling Terminals (ST) exceeds 24. This frame accommodates an additional 48 STs.

The MSB7, which contains enhanced messaging circuit packs, must be updated in BCS27 for expanded memory. The NT6X32CA, which contains the NT6X46BA, satisfies this requirement. New MSB7s should be provisioned with NT6X32CC. The PC Kit NT6X02ZJ is used to upgrade existing NT6X32AA to the NT6X32AB for BCS27 expanded memory requirement.

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Digital Trunk Controllers (DTC)

Maximum number of DTCs utilizing CCS7, is 60 per office based on each DTC requiring 2 IPMLs per MSB7.

In an LPP based office, there is a maximum of 140 DTCs utilizing CCS7.

DTCs utilizing CCS7, must be equipped with Enhanced Messaging (NT6X69), Extended Signal Processor Memory (NT6X46) and in BCS 27 Extended Master Processor Memory (NT6X47). Refer to ECMS 211, 241 and 373 for more detailed information on the DTCs.

Product change kits must be ordered for existing offices to upgrade the DTCs with Enhanced Messaging and Extended Memory. Refer to the following ECMS for more detailed information on DTC provisioning;

- 1) ECM 211 New Circuit Pack Fills for DTC, LTC, LGC
- 2) ECM 241 PC Kit for New Circuit Pack Fills
- 3) ECM 373 Peripheral Controller Module
Initials (NT6X02IA, LA, MA)
Extensions (NT6X02AS, AT, AU)

For applications in BCS23 and earlier, each DTC utilizing CCS7 requires two NT6X70AA Continuity Tone Detector CP for continuity checking on ISUP trunks. In BCS24 and later, the software requirement for Continuity Cards was removed so that customers requesting the cost reduction when testing is not required are not required to order the cards.

For U.S. applications only, since the NT6X70-- is required for the COT test, it is recommended that continuity cards continue to be provisioned in most cases. Provisioning Continuity Cards on SS7 DTCs should be considered standard. Only per customer request can they be omitted.

For Canadian applications only, many customers have a high penetration of digital trunk facilities and do not require the Continuity card. Provision these cards only on DTCs whose trunks support analog facilities at some point in the end-to-end connection of the trunk.

1.2.2.1 P and C Side Port Requirements

N/A

1.2.2.2 DMS BUS Port Requirements

N/A

1.2.2.3 Circuits Per Card

N/A

1.2.2.4 Discrimination Numbering

N/A

1.2.3 Provisioning Considerations

The NT6X66AC replaces NT6X66AA for all applications of the MS7E frame and also has the C7BERT capability.

1.2.4 PROVISIONING CONSIDERATIONS

The following information is used to provision CCS7 and the associated components of the network.

The new NT6X32DB MS7B (DPNSS) packfill which uses the NT6X69LB Message Interface circuit pack to allow the module to function in ENET applications. The NT6X32DB packfill is provisioned to the NT6X31AA Message Switching 7 Equipment (MS7E) frame.

In order for customers with existing NT6X32DA packfills (which use the NT6X69AA Message pack) to upgrade to the new NT6X32DB packfill, a new NT6X32ZA Product Change (PC) Kit has been created and introduced in this ECM. This will allow the packfill to be used in ENET applications.

Finally, this engineering change provisions the NT6X69LB Message Interface to the existing NT6X32CE (CCS7) common packfill. This packfill previously used either NT6X69MA or NT6X69AC circuit packs. Allowing the use of the NT6X69LB pack will reduce customer spares by them not having to stock NT6X69ACs.

1.2.4.1 MDC LINE/CCS7 TRUNK INTERCONNECTION

Calls originating from or terminating on standard and/or featured MDC POTS lines can be interconnected directly with CCS7 trunks without utilizing loop-back trunks. Most MDC line features are directly supported. There are a few exceptions which require loop-back trunks between the MDC line and the CCS7 trunk. Those features may include the following, depending on BCS:

- 1) POTS lines equipped with basic 3-Way Calling feature require loop-back trunks for interconnection with CCS7 trunks.

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2) Coin lines with the Local Coin Overtime (LCO) option require loop-back trunks for interconnection with CCS7 trunks. Coin lines without this option will interconnect directly.

3) Calls originating from POTS lines equipped with Auto Identified Outward Dialing (AIOD) require loop-back trunks to interconnect with CCS7 outgoing trunks. Incoming calls from CCS7 trunks terminating on AIOD lines interface directly without loop-back.

4) Calls incoming from CCS7 trunks terminating on POTS coin lines with the Free Number Termination (FNT) option require loop-back trunks for interconnection. Calls originating from FNT lines may be interconnected directly with CCS7 trunks without utilizing loop-back.

5) Calls terminating on Emergency Service Lines (ESL) from CCS7 trunks require loop-back trunks for interconnection.

6) Calls terminating on Direct Inward System Access (DISA) directory numbers over a CCS7 trunk require loop-back trunks at the terminating office.

Provisioning calculations for loop-back trunks are as follows:

$$\frac{(A+B+C+D+E+F \text{ calls/hour}) \times \text{Average Hold Time (sec)}}{100} = \text{CCS Loop-Back}$$

Where:

A = HDBH calls utilizing CCS7 trunks that originate from and terminate on POTS and/or MDC lines equipped with Basic Three Way Call.

B = HDBH calls utilizing CCS7 trunks that originate from coin lines with LCO feature.

C = HDBH calls utilizing CCS7 trunks that originate on POTS lines with AIOD.

D = HDBH calls utilizing CCS7 trunks that terminate on POTS and/or MDC lines with FNT.

E = HDBH calls utilizing CCS7 trunks that terminate on MDC lines via DISA.

F = HDBH calls utilizing CCS7 trunks that terminate on ESL lines

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Refer to traffic provisioning tables for trunk capacities to determine the required trunk quantities for POTS/MDC loop-back trunks.

1.2.4.2 LOOP-BACK TRUNK REQUIREMENT (BCS-24)

The following MDC features are incompatible with CCS7 trunks in BCS-24 and will require loop-back trunks between the MDC line and the CCS7 trunk:

- 1) Basic 3-Way Calling (3WC)
- 2) Free Number Termination (FNT)
- 3) Direct Inward System Access (DISA)

1.2.4.3 LOOP-BACK TRUNK REQUIREMENT (BCS-25)

Loop-back trunking is required for the following conditions;

- 1) ISUP to DISA (trunk is released after digits are collected)
- 2) ISUP to LCO
- 3) ISUP to AIOD

1.2.4.4 LOOP-BACK TRUNK REQUIREMENT (BCS-26)

Loop-back trunking is required for the following conditions;

- 1) ISUP to DISA (trunk is released after digits are collected)
- 2) ISUP to LCO
- 3) ISUP to AIOD

1.2.4.5 LOOP-BACK TRUNK REQUIREMENT (BCS-27+)

Loop-back trunking is required for the following conditions;

- 1) ISUP to DISA (trunk is released after digits are collected)
- 2) ISUP to LCO

1.2.4.6 LOOP-BACK TRUNK REQUIREMENT (BCS-31)

Loop-back trunking is required for the following conditions;

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- 1) ISUP to DISA (trunk is released after digits are collected) only if there are no UTRs provisioned on the DTC terminating the ISUP trunk.

1.2.4.7 INTERCONNECTIONS NOT SUPPORTED

Only two call types are not supported with CCS7 signaling or loop-back trunking. They are as follows;

) CCS7 trunks/Emergency Service Bureau (ESB) line inter-connection is not supported.

) Circuit Switched Digital Data Service (CSDDS) calls are not supported (Note: CSDDS is not the same as Datapath. Datapath and the CCS7 network are compatible).

1.2.4.8 INCOMPATIBLE CONSOLE FEATURE

When a console feature that is not compatible with an Integrated Services Network User Part (ISUP) trunk is activated, a loop-back trunk is required.

1.2.4.9 CONSOLE LOOP-BACK TRUNK PROVISIONING (BCS-24)

Loop-Back trunks must be provisioned for all ISUP trunks which require access to the console. These can be divided into four categories;

-) ISUP trunk to console requiring call extension
-) ISUP trunk to console not requiring call extension
-) Console extended to an ISUP trunk
- 4) Console originated to an ISUP trunk

The call rate for console calls can be calculated based on the number of attendant consoles (AC) in the office, the average length of all console queues in the office (QL) and the average time required for a console to process a call (T), by using the following formulas;

$$\text{Terminating Call Rate} = \frac{\#AC \times QL}{T}$$

$$\text{Originating Call Rate} = \frac{\#AC}{T}$$

These call rates can be multiplied by the percentage of calls in each of the four categories to determine the call rate for each category.

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The holding times may be different for each of the four call types.

) For ISUP Trunk to console calls that do require extending, the holding time is equivalent to the average holding time of the call plus the average console call handling time (T).

) For ISUP trunk to console calls that do not require extending, the holding time is equivalent to the average console call handling time (T).

) For console extending to an ISUP trunk, the holding time is equivalent to the average holding time of an ISUP trunk to console call that requires extension less the average console call handling time.

4) For console originating to an ISUP trunk, the holding time is equivalent to the average holding time of the call plus the average console call handling time (T).

The total console loop-back load required can be calculated by adding the required load for each of the four categories. The loop-back load for each category can be calculated using the following;

Loop-Back Trunk Load per Category = Call Rate X Holding Time

Total Loop-Back Load = Category 1 + Category 2 + Category 3
+ Category 4

After the total console loop-back load is determined, the total number of trunks can be calculated using the Poisson Tables. The number of loop-back trunks should not exceed the number of ISUP trunks.

1.2.4.10 CONSOLE LOOP-BACK TRUNK PROVISIONING (BCS-25)

For BCS 25, all attendant calls and features require loop-back treatment only when the calls are being extended. The loop-back trunk requirement is reduced because the loop-back trunk is released after the call is extended.

1.2.4.11 CONSOLE LOOP-BACK TRUNK PROVISIONING (BCS-26 to BCS-31)

For BCS 26 to BCS 31, the loop-back requirement is reduced. The Code Calling feature, the Conference Hold & Release feature (AD0363) (AD0363), and the End-to-End Signaling feature (AD0363) is the only requirement for loop-back treatment.

1.2.4.12 LOOP-BACK SPAN PROVISIONING

$$\# \text{ Loop-back T1 spans} = \frac{\# \text{ Console Loop-back Trunks} + \# \text{ POTS-MDC Loop-back Trunks}}{24} \quad (\text{ROUND UP})$$

#TOTAL T1 Spans Required = #Loop-back T1 Spans X 2

1.2.4.13 MSB7 PROVISIONING INFORMATION

1.2.4.14 DS30 Ports (MSB7)

The MSB7 Peripheral communicates with the Central Control (CC) and other peripherals via DS30 ports to the network.

The number of MSB7 DS30 ports to the Network is determined by the following calculation;

$$\frac{(\text{No. DTC's terminating CCS7 trks} \times 2) + (\text{No. Signaling links})}{30 \text{ Channels/Port}}$$

A minimum of three DS30 ports are required and eight ports are maximum.

1.2.4.15 MULTIPLE MSB7 PROVISIONING

The maximum number of MSB7s per office is 4. The required number of MSB7s can be determined using the following calculations.

A) $\frac{\text{ISUP HDBHCA}}{3600} \times (6 \text{ or } 12) = \text{ISUP msg/sec}$

NOTE: When calculating the ISUP msg/sec in an Access Tandem office, 12 msg/CA must be used due to the incoming and outgoing portions of the message for the MSB7 in the Access Tandem office. For an end office, 6 msg/sec must be used.

$$\text{B) DB Query HDBHCA} \times 2 = \text{DB Query msg/sec}$$

$$\frac{\text{-----}}{3600}$$

NOTE: Types of DB Query messages may include the following:

E800/800+/E008
ACCS
BNS

C) PVN wo PIN HDBHCA

----- X 2
3600

= PVN wo PIN msg/sec

D) PVN with PIN HDBHCA

----- X 4
3600

= PVN with PIN msg/sec

E) RAG HDBHCA

----- X 4
3600

= RAG msg/sec

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F) ACB HDBHCA
----- X (13 or 8) = ACB msg/sec
3600

NOTE: Use 13 for U.S. applications, or 8 for Canadian applications.

G) AR HDBHCA
----- X 2 = AR msg/sec
3600

H) CLI HDBHCA
----- X 2 = CODP msg/sec
3600

I) NMS HDBHCA
----- X 4 = NMS msg/sec
3600

J) DN Validation HDBHCA
----- X 2 = DN Validation
3600 msg/sec

K) B + C + D + E + F + G + H + I + J = TCAP msg/sec

L) 1. If $A + 2 \cdot K \leq 135$ and $K \leq 31$,
MSB7s required = 1.

2. If $A + 2 \cdot K \leq 205$ and $K \leq 46$,
MSB7s required = 2.

3. If $A + 2 \cdot K \leq 340$ and $K \leq 76$,
MSB7s required = 3.

4. If $A + 2 \cdot K \leq 460$ and $K \leq 107$,
MSB7s required = 4.

1.2.4.16 SIGNALING DATA LINKS (SDL)

A Signaling Link (SL) is a bi-directional transmission path for transferring trunk signaling information from an end-office Service Switching Point (SSP) to another SSP or a Signal Transfer Point (STP). Each SL is comprised of a Signaling Data Link (SDL) and a Signaling Terminal (ST) (NT6X66). A linkset is a set of links to be used as a group, each equally capable of carrying traffic between the origination point and a destination point.

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For redundancy, a pair of SLs is composed of two Signaling Terminal (ST) cards and two T1 links. The maximum number of STs per MSB7 is 72. Therefore, the maximum number of redundant Signaling Links is 36.

A single pair of CCS7 links can handle the throughput of an MSB7. Therefore, link quantities can be determined by the quantity of MSB7s (minimum one pair of links/MSB7) and the number of nodes associated with the DMS 100 and/or DMS 200.

Signaling Links (Terminals) must be provided as redundant pairs, therefore the number of ST cards (NT6X66AC) equals the number of Signaling Links times 2.

CCS7 signaling links utilize digital T1 trunks as the physical transmission medium to the CCS7 Signaling Network. These T1's may terminate on either a DTC, LTC, or DCM.

The number of DS1 circuits required =

No. of calculated Signaling links (terminals) X 2 (redundancy)

24 Channels

NOTE: Refer to SEB 89-05-001 (U.S. applications) or SEL 89-01-014 (Canadian applications) for CCS7/MSB7 throughput and capacity data.

1.2.4.17 NAILED-UP CONNECTIONS

Inter-Peripheral Message Links (IPML) are nailed-up connections that allow the DTCs to communicate with the MSB7s through the network. Each DTC utilizing CCS7, requires two IPMLs to each MSB7. The maximum number of Interperipheral Message Links (IPML) per MSB7 is 120 based on the maximum number of channels on the enhanced messaging card being 128. (8 ports reserved for future use)

Each ST requires one nailed-up connection.

The total number of nailed-up connections required is calculated as follows;

(# of DTCs x 2 x # of MSB7s) + (Total # of STs (all MSB7s))

The maximum number of nailed-up connections is 768. To ensure that degradation of network throughput does not occur, no more than 100 nailed-up connections per network module should be utilized.

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1.2.4.18 ROUTING INFORMATION

Routing information for calls utilizing a CCS7 trunk is transferred between Switching Offices via the CCS7 Signaling Data Links rather than via the actual voice trunk as with PTS. Theoretically, the average hold time for CCS7 trunk calls should be slightly less than for PTS trunk calls. However, theoretical studies and actual measurements have not been performed to quantify the reduction. Therefore, existing PTS circuit provisioning should be used in the interim. Actual CCS7 trunk circuit provisioning information will be published as soon as studies are performed.

1.2.5 Office Layout Information

Not applicable

1.2.6 Traffic Tables

For traffic calculations, use the Credit System (ECM 350) or equivalent standard traffic provisioning method.

1.3 Product/System Specification

1.3.1 Physical Characteristics

1.3.1.1 POWER REQUIREMENTS

Power consumption for the ST module is 228 watts. Power consumption for the ST7E frame (3 ST modules) is 684 watts.

Power consumption for the MSB7 module is 211 watts. Power consumption for the MS7E frame (ST module and 2 MSB7s) is 650 watts.

HEAT DISSIPATION

An MS7E frame dissipates 650 watts/hr.

CURRENT DRAIN

The current drain for an MS7E frame is 15 amps.

REQUIREMENTS

An MS7E frame requires six 20 amp fuses and two 5 amp fuses.

1.3.2 EMI/Earthquake Information

Provide earthquake equipment per customer requirements.

1.3.3 Sparing Information

Standard sparing algorithms shall apply.

1.3.4 Power Feed and Fusing Requirements

N/A

1.3.5 Current Drain Information

N/A

1.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

If this section is inapplicable or the information is unavailable, use one of the following:

Not applicable.

This information is unavailable at this time.

1.4.2 Software Usage Restrictions

Not applicable.

The following basic packages provide CCS7 functionality. In addition, there are many optional CCS7 features. Refer to the appropriate Software ECM or Marketing publications for the latest information.

Required Packages

NTX041AA - CCS7 MTP/SCCP (Rated A+M with BCS26)

OR

NTX041AB - CCS7 MTP/SCCP

Optional Packages

NTX167AB - CCS7 - TRUNK SIGNALING

NTX550AA - CCS7 TRANSACTION SERVICE SUPPORT

NTX554AA - CCS7 - ENHANCED 800/SERVICE SWITCHING POINT

1.4.3 Memory Provisioning

For memory provisioning, use the MEMCALC tool.

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1.5 Real Time Impact

Processing is distributed over the Central Processing Unit (CPU) and the Peripheral Processors (PP) in the peripheral modules. Real Time is one of the measurement that is utilized to determine the loading characteristics of these devices for specific applications. Real Time is the amount of time required for these processors to perform a function such as establish a call or activate a feature.

For a detailed calculation of CPU real time, use the REAL::TIME program issue 4A or later. Refer to System Engineering Bulletin (SEB) 87-02-004 for more details on REAL::TIME and operational instructions. For a detailed calculation of PP real time, use the PRTCALC program issue 1C or later. Refer to SEB 86-10-004 for more details on PRTCALC and operational instructions.

To measure the CPU real time for an inservice switch, use the ACTIVITY TOOL. Refer to SEB 86-11-005 for more details on the ACTIVITY TOOL and operational instructions. To measure the PP real time for an inservice switch, use the NEW PERIPHERAL ACTIVITY and PERFORMANCE TOOL for the new peripherals. Refer to SEB 87-02-004 for more details in the NEW PERIPHERAL ACTIVITY and PERFORMANCE TOOL.

Refer to SEB 86-11-001 (U.S. applications) or SEL 88-01-015 and SEL 88-10-018 (Canadian applications) for a complete listing of CPU call timings.

Refer to SEB 88-06-001 (U.S. applications) for a complete listing of BCS 25 call timings for the new peripherals. Refer to SEL 89-01-23 (Canadian applications) for CCS7 DTC/LTC call timings.

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2.0 ECM274 - Integrated Bit Error Rate Test Facility (IBERT)

2.1 Overview

2.1.1 Introduction to IBERT

The Integrated Bit Error Ratio Test Facility or IBERT is an optional maintenance feature which can be ordered for testing the data loops in a DMS office (i.e. office with DATAPATH features).

IBERT is necessary to fulfill two distinct requirements:

1. Datapath Bit Error Rate Testing

In conjunction with Datapath maintenance software, it will provide the DMS craftsperson with the ability to monitor and diagnose from the MAP, the data transmission quality of a selected Datapath line. Current methods of testing Datapath circuits and equipment requires the use of cumbersome external test sets, inaccessible from a MAP and outside the control of any automated DMS/SL-100 maintenance process.

A Bit Error Rate Test is a test used to measure the transmission quality of a loop. The basic idea of a BERT is to send a known stream of data over a given loop, and to have this data reflected back to the sender. The received data is then compared with the sent data thereby giving a measure of the transmission quality. By looping back data at different points in the loop and measuring the quality of transmission at each point, faults which may exist on the loop can be isolated.

At present, the only capabilities provided are for an external BERT. An external BERT is a piece of test equipment which is not a part of the DMS. Regular methods are used to establish a connection between a line to be tested and this external piece of test equipment. An integrated BERT, i.e. resident piece of equipment in the DMS, has been developed. The purpose of this feature will be to provide access to this integrated BERT by means of a single command located at the LTPMAN level of the MAP. The benefit of this will be a simpler method of testing Datapath loops as well as dropping the need for any external test equipment.

2. Datapath Extension (DPX) Maintenance Messaging

The IBERT will also be used as a 64 kbps inband signalling interface to the Datapath Extension System (DPX) based on the DE-4E channel bank, providing a maintenance messaging channel between the DMS/SL-100 central control and the DPX. This will give the MAP-situated craftsperson the ability to diagnose the DPX card and the associated Data Unit/Data Line Card (DU/DLC) facility with di-

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agnostics similar to the existing Datapath maintenance or to test the error rate performance of the entire DS1/DPX/DLC/DU facility.

3. The IBERT can be used to test virtually any type of data line connected to the DMS which supports the TLINK protocol. This includes Data Unit, AIM, Data Above Voice, coax eliminator Data Units and loop extended Data Units (those extended using the Line Interface Unit and Data Terminating Unit method).
4. Note that the intent of providing an integrated BERT is to enhance the maintenance capabilities for datapath. This is not meant to be used as a tool for networks or speech links within the DMS. No attempt is made by this feature to provide a BERT while a data unit is involved in a call with another data unit. For this type of testing, an external BERT must still be used.

2.1.2 Product Features

The IBERT will perform the following functions:

- 1) transmit standard 511 or 2047-bit data test pattern at 50 bps to 19.2 kbps asynchronous or 1.2 kbps to 64 kbps synchronous using T-link
- 2) transmit standard 511 or 2047-bit data test pattern at 64 kbps without T-link handshaking
- 3) transmit standard 511 or 2047-bit data test pattern at 56 kbps with a ones density suitable for T-carrier, without T-link handshaking
- 4) receive data in any of the above formats and detect bit errors and sync losses in the bit stream
- 5) count the number of error free seconds and total number of seconds in a test
- 6) derive data timing from the 64 kbps channel rate with the option to derive clocking from the received data stream if the far end uses external clocking (indicated in T-link handshake)
- 7) when in T-link mode adapt the data transmission and reception rate to the far end equipment
- 8) allow the MAP user to do the following:
 - activate a loopback at the line card or set to be tested
 - start BERT as one of the following:
 1. 64 kbps (no T-link handshake)

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2. 56 kbps (no T-link handshake)
 3. T-link adaptive data rate
 4. default to (1), (2), or (3) according to type of loopback selected
- inject error(s) in the transmitted data pattern
 - stop BERT
 - display test results (bit error count, sync loss count, total number of bits, etc.)
 - display the operating data rate of the test

9) support the inband signalling scheme used for DPX maintenance

- on request from DMS/SL-100 send pattern at the start of the call to put the DPX into maintenance mode
- accept messages from DMS/SL-100 addressed to the DPX and transmit them on transparently via inband signalling
- detect inband messages from DPX and send them to the DMS/SL-100

2.1.3 Product Description

2.1.3.1 Datapath Bit Error Rate Testing

A pictorial representation of an Integrated BERT is in Figure 3

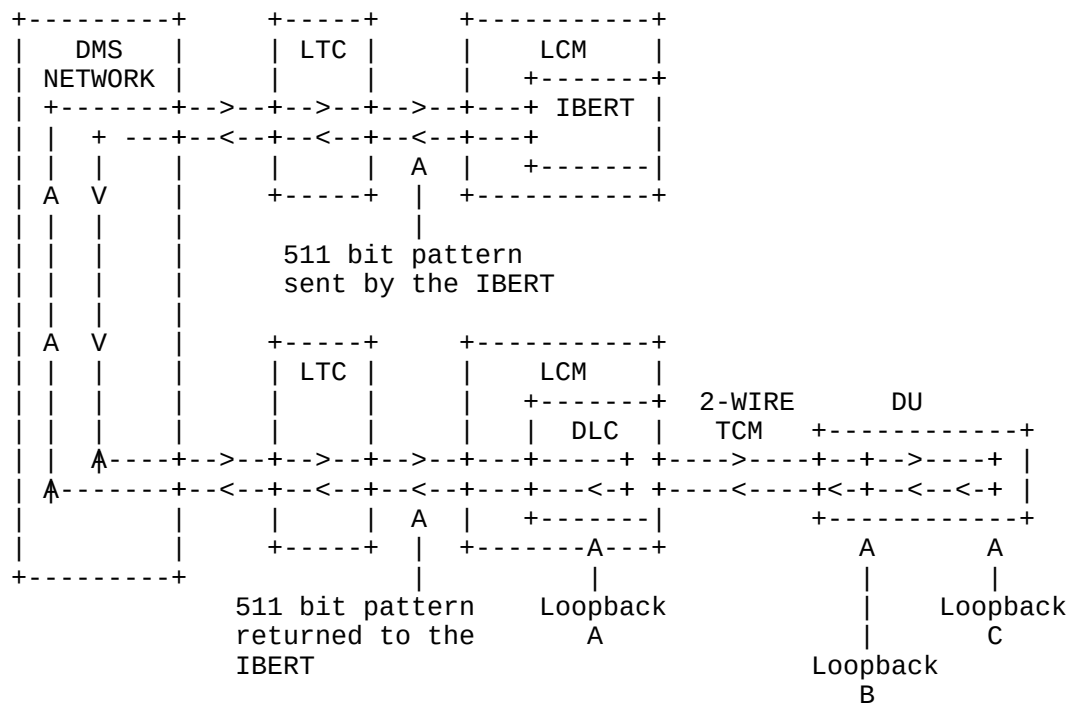


Figure 3. Typical Datapath Bit Error Rate Test Setup

The loopbacks labelled A, B and C are respectively a 64 Kilo-bit loopback at the Data Line Card (DLC), a 64 Kilo-bit loopback at the Data Unit (DU) and a loopback at the RS-232C interface of the Data Unit. These loopbacks correspond respectively to the LOOPBK DLC, LOOPBK DU_64K and LOOPBK DU commands at the LTPMAN level of the MAP.

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As can be seen from the diagram, the 511 bit pattern is sent from the IBERT through the network, out to the line in question and is looped back from wherever the loopback is set (either A, B or C) through the network to the IBERT where it is compared with the pattern that was sent.

Optionally, no loopback may be set. This is referred to as a straight away test. In this case, an external BERT is connected to the Data Unit being tested. An external BERT takes care of receiving the bit pattern sent by the IBERT and sending its own bit pattern back. This scenario is generally used for verifying the accuracy of the IBERT. The external BERT would be used in this case to inject errors into the pattern sent back to the IBERT so that it can be verified that in fact the IBERT detected the error and reported it. Note that in this case the external BERT used must conform to CCITT standards so that it will generate the same 511 bit pattern used by the IBERT.

A list of Datapath products and the loopback points supported by each is shown in Figure 4

Datapath Product	Loopback A: DLC Loopback	Loopback B: 64kb Loopback	Loopback C: DU Loopback
Low Speed Data Unit	DLC cutoff relay	DU TCM interface	RS232 interface
High Speed Data Unit	DLC cutoff relay	DU TCM interface	V35 interface
Coax Eliminator	DLC cutoff relay	DU TCM interface	Not Supported
AIM/AILC	AILC cutoff relay	Not Supported	RS422 firmware I/F
DPX	DLC cutoff relay	DU TCM interface	DU RS232/V35 interface
LIU/DTU	DLC cutoff relay	LIU TCM interface	DTU RS232/V35 interface

Figure 4. Datapath Products and Supported Loopback Locations

Note: The LIU/DTU combination also supports several other loopbacks including loopbacks within the loop extension data facility. For more information see "Datapath Loop Extension Maintenance", by J. Henderson, FDOC BV1342, October 1985.

2.1.3.2 Datapath Extension (DPX) Maintenance Messaging

A pictorial representation of a DPX Maintenance Messaging setup is in Figure 5 on page 21-22

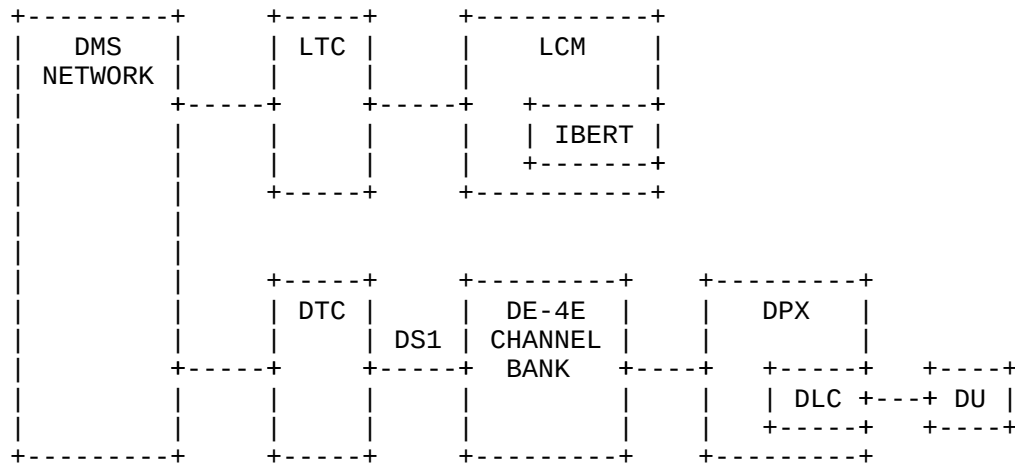


Figure 5. Typical DPX Maintenance Messaging Setup

To perform maintenance diagnostics on the DPX/DLC/DU facility shown above, the craftsperson would post the associated DU on the MAP and enter the diagnostic command. The maintenance software recognizing this as a DPX would automatically connect an available IBERT to the DPX. All maintenance messages are subsequently sent to the IBERT but addressed to the far end DPX, DLC, or DU and encoded in the W78 bulk data transfer format. The IBERT removes the messages from the bulk data transfer format and passes them on transparently to the DPX via the inband signalling protocol. All messages addressed to the DLC or the DU are passed on transparently by the DPX.

In this example the DLC/DU configuration illustrated could refer to a DLC/low speed DU, DLC/high speed DU, or DLC/coax eliminator.

2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

Not applicable.

2.2.2 Hardware Dependencies

Not applicable.

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| 2.2.2.1 P and C Side Port Requirements

| Not applicable.

| 2.2.2.2 DMS BUS Port Requirements

| Not applicable.

| 2.2.2.3 Circuits Per Card

| Not applicable.

| 2.2.2.4 Discrimination Numbering

| Not applicable.

2.2.3 Provisioning Considerations

The hardware of the Integrated BERT (NT6X99AA) resides in the line drawer (NT6X05AA) of an LCM in a Host office, in an RSC site, or in an OPM site (or RLCM) taking the physical space of a two slot line card. The two vertical slots in the LCM line drawer must be in the same logical line drawer subgroup (i.e., in the same line subgroup (LSG)).

The IBERT must be located in a Line Concentrating Module (LCM) or Remote Line Concentrating Module (RLCM) which may or may not be the same LCM or RLCM as the one which the line it is testing resides. Even though the IBERT may be located on the same LCM as the line which it is testing, intraswitching for the connection is not used. This means that a connection between the IBERT and the line it is testing will be established through the DMS network. No connection between the IBERT and the line it is testing in the LCM, without going through the DMS network, can be established at the present time.

Although the appearance of the IBERT is that of a line card, the IBERT is NOT a line card in the normal sense as there is no subscriber loop or set associated with it. The only interaction with an IBERT is achieved from a MAP through the DMS/IBERT messaging interface.

While BER testing can be performed by either the NT6X99AA card, which mounts in an LCM, or by the NT4X23AA card, which mounts in an MTM, there is a software problem that prevents the NT4X23AA from successfully testing Datapath Extension trunks. Therefore, it is recommended that the NT6X99AA be used for DMS-100 and DMS-100/200 offices (local and local/toll applications) and the NT4X23AA be used for DMS-200 offices (toll applications).

A minimum of one (1) NT6X99AA per LCM or 24 per office (whichever is larger) should be provisioned for basic test capability in

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DMS-100 or DMS-100/200 offices. Higher quantities of test cards will provide faster office coverage.

For datapath loop testing, due to a high volume of messaging traffic, it is recommended that one (1) IBERT line card (NT6X99AA) be provisioned per LCM equipped with a data line card.

For switch bit error rate testing (in NTX881AC) it is recommended that one (1) IBERT line card (NT6X99AA) be provisioned per LCM for every LCM in the office.

Up until BCS-24 the maximum number of IBERT line cards (NT6X99AA) and DTU BERT Unit circuits (NT4X23AA) (i.e. 2 circuits per card) allowed in an office (Host plus all associated remotes) is 64.

For more information on DTU BERT Unit card (NT4X23AA), see ECM-352 on subject Digital Test Unit BERT Unit CP, NT4X23AA.

As of BCS-25, the maximum number of NT6X99AA cards and NT4X23AA circuits allowed in an office is 128.

For Canadian Applications Only

If the IBERT line card requirement exceeds the above software limitations of 64 and 128 respectively in an office, it is permissible to perform the associated tests by restructuring the associated software data tables accordingly (i.e. perform the required test for the first group of 64 or 128 IBERT line cards, restructure applicable software data tables for the next group of 64 or 128 IBERT line cards, perform the required test, and so on).

The data rates supported by IBERT are shown in Figure 6 on page 21-25

Data Rate (bps)	Asynchronous	Synchronous
50	"	
75	"	
110	"	
134.5	"	
150	"	
300	"	
600	"	
1200	"	"
1800	"	
2000	"	
2400	"	"
3600	"	
4800	"	"
7200	"	
9600	"	"
19200	"	"
48000		"
56000		"
64000		"

Figure 6. IBERT Data Rates.

2.2.4 Office Layout Information

Not applicable.

2.2.5 Traffic Tables

Not applicable.

2.3 Product/System Specification

2.3.1 Physical Characteristics

Not applicable.

2.3.2 EMI/Earthquake Information

Not applicable.

2.3.3 Sparing Information

Normal sparing algorithms apply.

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| 2.3.4 Power Feed and Fusing Requirements

| Not applicable.

| 2.3.5 Current Drain Information

| Not applicable.

2.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

2.4.1 Required Software Packages and Interdependencies

The applicable software is in the following software packages:

NTX259AA DATAPATH Extension - DPX

* NTX881AC Switch Bit Error Rate Maintenance
 (Upgrade of NTX881AB)

* NTX885AB Switch Path Diagnostics (SPD)
 (Upgrade of NTX885AA)

* NTXP13AA ENET Switch Path Diagnostics (SPD)

* When ordering software package NTX881AC, it is recommended that NTX885AB/NTXP13AA be ordered as well.

When ordered by the Customer, the Switch Path Diagnostics (SPD) software package is to be furnished as NTX885AB for non-ENET SuperNode and NT-40 offices and furnished as NTPX13AA for ENET SuperNode offices.

If software package SPD exists in a DMS office prior to an ENET upgrade, then both NTX885AB and NTPX13AA are to be provided in the retrofit software load to provide both Network Module (NM) and ENET coverage. NTX885AB is to be removed on the next BCS application following the upgrade.

The above rules are an example of unautomated rules which are stored in a document entitled "SW Package Ordering Rules - Not Automated" in the SMS Documentation Menu in CODA.

Interdependencies for NTX259AA:

NTX000AA Bilge

NTX001AA Common Basic

NTX100AA Integrated Business Networks - Basic (IBN)

NTX106AA IBN - Proprietary Business Set

NTX250AA DATAPATH - Basic

NTX270AA New Peripheral Maintenance Package
NTX901AA Local Features 1

Interdependencies for NTX881AC:

NTX000AA Bilge
NTX001AA Common Basic
NTX270AA New Peripheral Maintenance Package
NTX901AA Local Features 1

Interdependencies for NTX885AB:

NTX000AA Bilge
NTX001AA Common Basic
NTX270AA New Peripheral Maintenance Package

Interdependencies for NTP13AA:

NTXE01AA Enhanced Network - Basic
NTX000AA Bilge
NTX001AA Common Basic
NTX270AA New Peripheral Maintenance Package

To determine/verify software package interdependency or master package content, refer to the reports available from the SOLID System.

2.4.2 Software Usage Restrictions

Refer to "Required Software Packages and Interdependencies" on page 21-26

2.4.3 Memory Provisioning

Normal memory algorithms apply.

2.5 Real Time Impact

Normal real time algorithms apply.

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3.0 ECM294 - Meeting Communication System (MCS)

3.1 Overview

The Meeting Communication System is a digital teleconferencing system. It provides high quality teleconferencing services.

The MCS may be configured as a single site stand alone system or as a multi site network with centralized operation.

This ECM addresses the provisioning for NSR-25 (Network Software Release) of the MS-1 system.

3.2 Hardware Provisioning

3.2.1 Hardware Usage Restrictions

Not applicable.

3.2.2 Hardware Dependencies

Not applicable.

3.2.2.1 P and C Side Port Requirements

Not applicable.

3.2.2.2 DMS BUS Port Requirements

Not applicable

3.2.2.3 Circuits Per Card

Not applicable.

3.2.2.4 Discrimination Numbering

Not applicable.

3.2.3 Provisioning Considerations

The MS-1 equipment is configured in a DMS-100 family frame called the Meeting Communication System Equipment Frame (MCS) as shown in Figure 7 :

Meeting Communication		MCA 04
Array Shelf		
+-----+	65	
Meeting Communication		MCA 03
Array Shelf		
+-----+	51	
FSP NT4G51BA		
+-----+	45	
Cooling Unit NT4G51AB		
+-----+	42	
Baffle P0675396		
+-----+	36	
Meeting Communication		MCA 02
Array Shelf		
+-----+	22	
Meeting Communication		MCA 01
Array Shelf		
+-----+	08	
Cooling Unit NT4G51AB		
+-----+	04	
+-----+		

Figure 7. MCS XX NT4G53FA

This frame includes DVS common framework NT0X25AQ. It may be used for common and earthquake/EMI applications. This frame comes complete with four (4) shelves, two (2) cooling units, one (1) frame supervisory panel, two (2) front doors and all internal wiring.

The MCS frame must not be positioned in an ordinary frame lineup on the floor plan because it uses an 8 inch extension. It must be positioned as a standalone system.

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The provisionable units on the MCA shelf are called Shared Resource Unit (SRU). They are assignable to slots 1-20 on the MCA shelf. The provisionable SRU's are listed below:

PEC NOTES	DESCRIPTION	NUMBER OF SLOTS
NT4G50DA 1	Rack Converter SRU	2
NT4G16HA 2	Primary Processor (5 MByte)	4
NT4G20FA 3	80 MByte Disk/Tape Storage	6
NT4G22BA 4	Network Services Module	2
NT4G23BA 5	Digital Trunk Link SRU	4
NT4G24CA 6	Conference Services SRU (24 Port)	4
NT4G49BA 7	Digital Tone Receiver	2
NT4G25CA 8	Application Processor (3 Mbyte)	2
NT4G14BA 9	Lanlink SRU	2
NT4G18BB 10	Analog Link SRU	6
NT4G29AJ	E&M Trunk Card	
NT4G29AH	GRD Start Card	
NT4G29AE	DTMF Receiver Card	

NOTES:

1. Provide one (1) Rack Converter SRU for each equipped shelf in a bay. Equip at slot 19.

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2. Provide one (1) Primary Processor SRU per stand alone system or node. It must be located directly above the storage SRU to accommodate the interconnecting cable.
3. Provide one (1) Storage SRU per stand alone system or node. This SRU should be mounted on the bottom shelf because it is heat sensitive.
4. Provide one (1) Network Services Module SRU per stand alone system or conference node.
5. Provide one (1) Digital Trunk Link for each DS-1 link providing twenty-four channels. For release two configuration, provide three (3) Digital Trunk Link SRU's.
6. Provide one (1) Conference Services SRU for twenty-four conference ports plus six additional ports which are available for the operator and for system use. An additional conference services SRU is required for forty-eight port capability.
7. Provide one (1) Digital Tone Receiver for sixteen channels of DTMF tone detection. The Digital Tone Receiver SRU is used for tone detection of the chairman DTMF commands. One SRU is used per system to serve up to sixteen (16) simultaneous conferences.
8. The Application Processor is an optional processor which operates independently of all other SRU's in the system. It may be used for special applications eg. X.25 data network access, proprietary Northern Telecom applications etc.
9. Provide one (1) Lanlink SRU to provide twelve (12) high speed ports for LIU's on M4020 terminals.
10. Each Analog Link SRU has a pullout drawer equipped with 3 connectors for C0 trunk cards and service cards.

Each C0 trunk card uses one connector. Provide one(1) card for each analog link to the host PBX or C0.

Each DTMF Receiver card uses two connectors. Up to 9 DTMF Receivers can be installed per MS-1 node (one each for up to eight simultaneous meetings) to support the chairman of the meetings, plus one DTMF receiver for internal call processing.

Shown in Table 1 is a guideline hardware configuration This may vary dependent on the application, however, the System Map must be reconfigured if the hardware configuration is changed. There is a default hardware configuration for each software release which is detailed in the Software Release Notes.

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TABLE 1

PEC SHELF	DESCRIPTION	SHELF POSITION	SLOTS ON
NT4G23BA 4	Digital Trunk Link SRU	08	1 -
NT4G25CA 6	Application Processor SRU (3M)	08	5 -
NT4G22BA 8	Network Services SRU	08	7 -
NT4G20FA 14	Storage SRU	08	9 -
NT4G24CA 18	Conference Services SRU	08	15 -
NT4G50DA 20	Power Converter SRU	08	19 -
NT4G49BA 2	Digital Tone Receiver SRU	22	1 -
NT4G14BA 4	Lanlink SRU	22	3 -
NT4G23BA 8	Digital Trunk Link SRU	22	5 -
NT4G16HA 12	Primary Processor SRU (5M)	22	9 -
NT4G25CA 14	Application Processor SRU (3M)	22	13 -
NT4G24CA 18	Conference Services SRU	22	15 -
NT4G50DA 20	Power Converter SRU	22	19 -
NT4G23BA 4	Digital Trunk Link SRU	51	1 -
NT4G25CA 18	Application Processor SRU (3M)	51	17 -
NT4G50DA 20	Power Converter SRU	51	19 -

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ALARMS

Provide the following hardware for alarms on the MS-1 equipment.

	QTY	PEC	Description
	1	NT4G46CA	Lanlink Interface Unit
	* 1	NT4G25CA	Application Processor SRU (3M)
	1	NT4G46BK	Alarm Option Kit
	** 1	NT4G51AC	Alarm Board for FSP
	1	NT4G51AD	FSP Alarm Cable
	1	NT4G46AW	FSP to LIU 50' Cable

* Assign to shelf position 51 slots 5-6 if hardware configuration guideline in Table 1 is being followed

** On new jobs it is not necessary to provision the NT4G51AC alarm board for the FSP.

The Alarm Lanlink Interface Unit is equipped on a common equipment shelf on the MIS frame.

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Miscellaneous Hardware

In addition to the MCS frame(s), there are the following hardware requirements:

Terminals and Printers

Provision the following as required:

M4020 Integrated Voice/Data Controller Terminal required for operator terminals and the system administrator function. Power cables and Teladapt cable are provided. The M4020 must be located within 2000 feet of the MS-1 equipment shelves. The seven foot Teladapt cable is connected to an RJ-11 or an RJ-14C jack.

For each M4020 terminal order the following:

NT0M90DA	M4020 Integrated Voice and Data Controller
NT0M92AA	Monitor
NT0M91BA	Keyboard
NT0M91CA	Keyboard Keycap Kit
NT2B36AA	Headset - optional

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Venture I headset - (optional for Bell Canada)
For each headset provide one (1)
NT4X7210 jack assembly.

NE-66QAB-25 - Connector Block - optional
This may be provided to terminate the lanlink
cable for the M4020 terminal(s) at the
operator room.

A0302323 Printer (letter quality) optional

A0317073 Desktop matrix printer - optional

A0317078 Pedestal Stand - optional

C2501313 Paper Catch Tray - optional

NT4X72AA A0SS Furniture

| NT4G46CA LIU - Lanlink Interface Unit

This is a Stand Alone Remote Resource Unit that provides two (2) RS-232C compatible connections with full modem capability plus one Centronics parallel port. LIU's must be located within 2000 feet of the MS-1 equipment shelves. Peripherals (eg. printers or modems) can be located up to 50 feet from the LIU. The LIU connects to the system via a 7 foot cord to an RJ-11 or RJ-14C jack. The LIU's may be located on a Common Equipment Shelf, NT3X25AA on a Miscellaneous Equipment Frame, NT0X02AB.

NT0X02AB - Miscellaneous Equipment Frame (MIS)

The following equipment may be provided on a miscellaneous equipment frame.

NT3X25BA - Terminal Block Assembly

This may be provided optionally for interconnection of the cables from the operator room M4020 terminals and the cables from the Lanlink SRU. The M4020 terminal may be connected directly to the Lanlink SRU if it is located within 100 feet of the MCS equipment frame.

NT3X25AA - Common Equipment Shelf

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Provide common equipment shelves (NT3X25AA) as required for locating LIU's, data sets or other miscellaneous equipment.

Extension Kits

Extension Kit (NT4G53FC)

Provide one (1) Extension Kit, NT4G53FC per frame (including MIS frame(s)) to enclose the back of the frame. The addition of this kit will increase the depth of the frame to 27 inches. The frame dimensions are as follows:

MS-1 Frame Dimensions

Height	84"
Width	27"
Depth	27"

End of Lineup Kit (NT4G53FB)

Provide one (1) end of lineup kit, NT4G53FB per lineup.

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Miscellaneous Hardware

Provide the following miscellaneous hardware as required where 'N' equals the number of frames:

QTY	PEC	CPC	DESCRIPTION
2N-2	NT0X72AB	B0209696	Frame Trim Panel
N-1	NT7X1604	B0222973	'T' Bar
2N	NT0X49AU	B0216851	Light Fixture Assembly
N	NT0X3203	B0218724	Cable Duct Front Cover
N	NT0X3204	B0218725	Cable Duct Rear Cover
N	NT0X31AD	B0206549	Cable Trough
4	NT0X49AH	B0208217	Light End Cap Assembly

Cabling

Provide the following cabling as required.

Digital Trunk Link SRU to DSX-1 cross connect.
(connectorized on one end)

NT4G23AD	50 ft
NT4G23BD	100 ft
NT4G23CD	250 ft
NT4G23DD	500 ft
NT4G23ED	750 ft

This cable may be ordered in bulk with termination kit.

R0061308 - Non connectorized dual twisted shielded pair cable
(NE-750A)

NT4G23AE - Termination Kit

Lanlink SRU and Analog Link SRU to Cross Connect Panel.

NT4G09BC	15 ft
NT4G09CC	30 ft
NT4G09DC	60 ft
NT4G09EC	100 ft

Terminal Block to M4020 terminal (via NE-66QAB-25 connector block)

R0105555 - 25 pair NED-25 inside wiring cable

Printer cable
25 foot parallel cable NT0M96DP
10 foot parallel cable NT0M96DN

Power Cabling

There are four (4) 20 amp fuses required at the PDC for the PNE frame plus four (4) 5 amp fuses for the two Cooling Units on the frame.

The power connections are as follows:

TB1-1 A Feeds

TB1-2

TB1-3 B Feeds

TB1-4

TB1-9,10 A Battery Returns

TB1-11,12 B Battery Returns

The Cooling Unit connections are as follows:

TB2-1 A Feeds

TB2-3 B Feeds

TB2-5 A Battery Returns

TB2-7 B Battery Returns

The ABS connection is at TB2-11 and the return is TB2-12.

Provide NT0X26AE cable to connect PNE frames to DMS family equipment frames (FSP-FSP).

Frame Labelling

Provide the following labels as required:

Frame FSP Labelling

P0671171 MCS : XX
P0671163 MCA : XX
P0671803 Product Line Logo

PDC Labelling

P0671162 MCS : XX

Spec Ordering

Order all of the MS-1 hardware on the MCS spec. This spec is routed to Minnetonka where the equipment is manufactured.

3.2.4 Office Layout Information

Not applicable.

3.2.5 Traffic Tables

Not applicable.

3.3 Product/System Specification

3.3.1 Physical Characteristics

Not applicable.

3.3.2 EMI/Earthquake Information

Not applicable.

3.3.3 Sparing Information

Not applicable.

3.3.4 Power Feed and Fusing Requirements

Not applicable.

3.3.5 Current Drain Information

Not applicable.

3.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

3.4.1 Required Software Packages and Interdependencies

Not applicable.

3.4.2 Software Usage Restrictions

Not applicable.

3.4.3 Memory Provisioning

Not applicable.

3.5 Real Time Impact

Not applicable.

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4.0 ECM419 - DIALAN Service

4.1 Overview

DIALAN service allows the telco to provide Integrated Voice and Data (IVD) service to Meridian Digital Centrex customers over existing voice lines and the public switched telephone network. DIALAN service offers the telcos easy, cost-effective IVD implementation, integration with existing DMS operations, administration and maintenance capabilities and full interworking with ISDN and all DMS-100 Datapath products.

The DIALAN implementation uses a customer-supplied Integrated Voice Data Modem (IVDM), which is available from a variety of vendors. This allows the telcos the flexibility to choose a preferred vendor from the many which offer DIALAN compatible IVDMs. These modules use a single two wire loop to transmit both voice and data.

IVDM Protocol

Integrated Voice Data Modems are available with various features and formats. The DIALAN feature uses the NT6X76AA Asynchronous Interface Line Card (AILC), the NT6X76AC Enhanced Asynchronous Interface Line Card or the NT6X76AD Hayes Supported Asynchronous Interface Line Card to terminate the data portion of the integrated voice/data and these cards utilize the RS422 data format. As a result, the choice of IVDM can cause compatibility problems unless this is considered. If the IVDM selected for use with DIALAN has an RS422 output, it may be connected directly to the NT6X76AA/AC/AD as shown in Figure 8 on page 21-43. If the data output of the selected IVDM is in RS232 format, it must be converted to RS422 format by a customer-supplied converter. Refer to Figure 9 on page 21-44.

The NT6X76AA/AC/AD is used to provide the DIALAN system with the data connection to the telephone network, and a voice line card is used to provide the voice connection. The Enhanced Asynchronous Interface Line Card NT6X76AC contains all of the basic functionality of the original AILC, NT6X76AA, plus support for the following:

1. DIALAN Messaging Protocol;
2. Profile Download Enhancement for DIALAN;
3. Datapath Closed User Group;

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4. Idle Timeout for Call Disconnection.

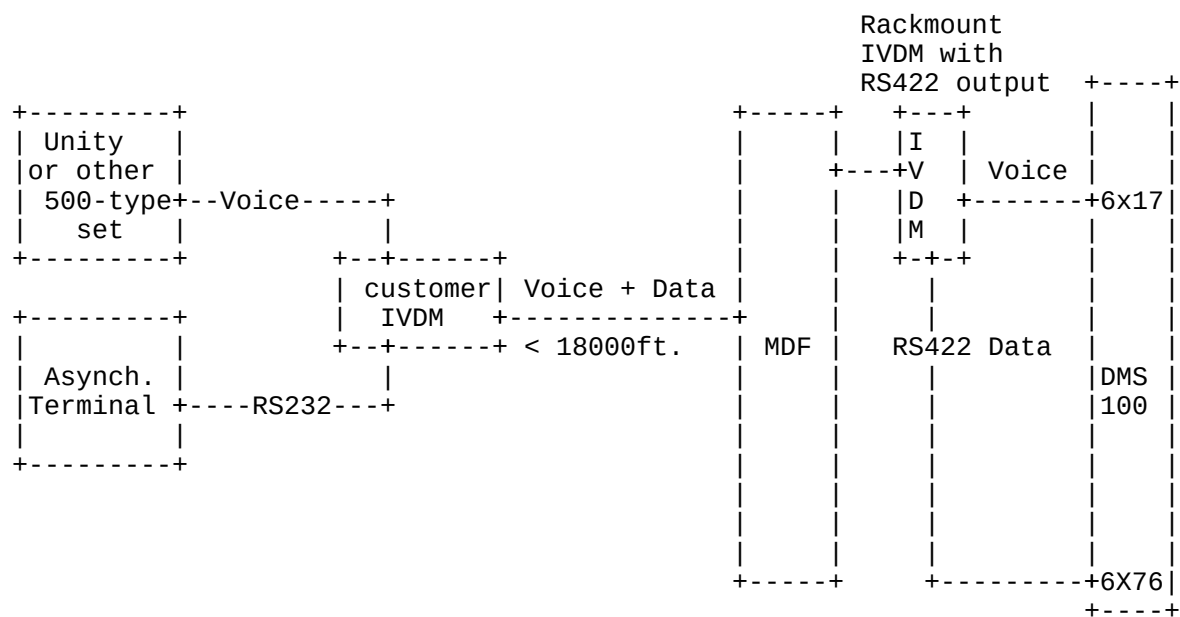
Note that these enhancements are only available with BCS-29 and subsequent software releases.

The NT6X76AC is completely compatible with the NT6X76AA. If the NT6X76AC is not configured for the additional functions mentioned above, it is functionally equivalent to an NT6X76AA. NT6X76AA is replaced by NT6X76AC.

The Hayes Supported Asynchronous Interface Line Card NT6X76AD contains all of the basic functionality of the existing NT6X76AC, plus the following feature improvement:

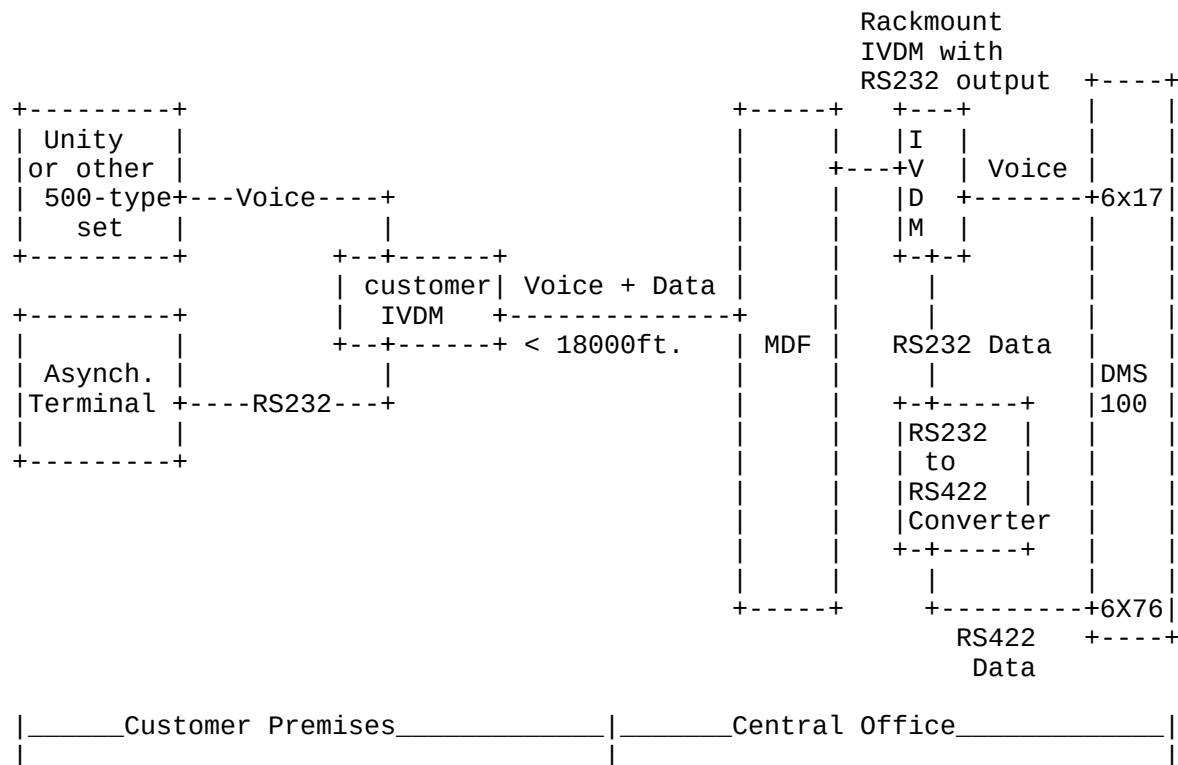
1. Support of Hayes command set;
2. Increased static memory;
3. Software support for the new PEC code.

The Hayes Supported AILC NT6X76AD is backward compatible with NT6X76AC and replaces NT6X76AC and all previous NT6X76__ cards. NT6X76AD supports both Hayes command set and NT symbolic dialing set, while the NT6X76AC only supports NT symbolic dialing set.



_____Customer Premises_____|_____Central Office_____|
 |
 DIALAN : IVDM with RS422 Output

Figure 8. DIALAN Configuration (RS-422)



DIALAN : IVDM with RS232 Output

Figure 9. DIALAN Configuration (RS-232)

4.2 Hardware Provisioning

4.2.1 Hardware Usage Restrictions

The AILC has one relay (cutover). It isolates both the transmit and receive paths of the RS-422 link from the AIM and connects the two paths together. Because there is no Test Access relay, the AILC cannot be connected to the Metallic Test Access. This, however, is not necessary as tests such as ringing and capacitance are not compatible with a RS-422 link.

4.2.2 Hardware Dependencies

N/A

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4.2.2.1 P and C Side Port Requirements

N/A

4.2.2.2 DMS BUS Port Requirements

N/A

4.2.2.3 Circuits Per Card

N/A

4.2.2.4 Discrimination Numbering

N/A

4.2.3 Provisioning Considerations

The NT6X76AA AILC is a two slot line card similar to regular data unit line cards except that it draws more of the 15V current supply per slot than normally allowed. The total 15V power capability of a line drawer would be consumed by twenty-one (21) NT6X76AAs.

If data penetration in an office is equal to or less than 1 % (total NT6X71 and NT6X76AA cards = or < 10% of total lines), then the NT6X76AA can be treated as a regular 2 slot circuit pack and all remaining line card slots can be provisioned as required. If data penetration exceeds 10%, the NT6X76AA must be treated as a three (3) slot circuit pack to prevent overextending the power supply in a partial failure mode.

This line card mix rule is based on 15V power consumption only and further consideration must be given to traffic factors.

The RS422 driver in the NT6X76AC has been changed to a low power CMOS unit so that the circuit pack can be provisioned as a standard two-slot line card. The NT6X76ACs should be spread evenly across the available line drawers but special power restrictions no longer apply.

The provisioning rules for Hayes Supported AILC NT6X76AD are the same as the rules for the Enhanced AILC NT6X76AC. NT6X76AD does not impose any new engineering limitations in addition to what is specified for the NT6X76AC in relation to such factors as power consumption, thermal dissipation or traffic. The NT6X76AD is compatible with all LCM drawers currently supported by the NT6X76AC.

4.2.4 Office Layout Information

N/A

4.2.5 Traffic Tables

DIALAN Traffic Provisioning

The Traffic Tables included in ECM-350 since Issue 04, provide provisioning rules for the DIALAN application. Use ECM-350 DMS-100 Traffic Provisioning "The Credit System" to determine appropriate traffic provisioning for all DIALAN applications.

4.3 Product/System Specification

4.3.1 Physical Characteristics

4.3.1.1 NT6X76AA Line Card Circuit Pack

Input Voltage.....15 Volt supply from LCM
170 ma at 5 volts at 75% efficiency
Power Consumption.....1.14 watts
Current Drain.....76 mAmps

4.3.1.2 NT6X76AC Line Card Circuit Pack

Input Voltage.....15 Volt supply from LCM
Power Consumption.....0.405 watts
Current Drain.....15 mAmps (at idle)
Current Drain.....27 mAmps (active)

4.3.1.3 NT6X76AD Line Card Circuit Pack

Input Voltage.....15 Volt supply from LCM
Power Consumption.....0.36 watts
Current Drain.....12 mAmps (at idle)
Current Drain.....24 mAmps (active)

MECHANICAL DIMENSIONS (NT6X76AA/AC/AD)

Height 6.0" Width 3.6"

4.3.2 EMI/Earthquake Information

N/A

4.3.3 Sparing Information

Standard sparing algorithms shall apply.

4.3.3.1 Power Feed and Fusing Requirements

N/A

4.3.3.2 Current Drain Information

N/A

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4.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

4.4.1 Required Software Packages and Interdependencies

The DIALAN application requires software feature package NTX426AA. Refer to applicable availability reports for ordering information.

Package NTX426AA requires the following packages:

NTX000AA	Bilge
NTX001AA	Common Basic
NTX100AA	IBN - Basic
NTX106AA	IBN - Proprietary Business Set
NTX250AA	Datapath - Basic
NTX270AA	New Peripheral Maintenance Pkg.
NTX901AA	Local Features I

The feature enhancements, as outlined in section 1.1 Product/System Overview, supported by NT6X76AC over the NT6X76AA are only available with BCS-29 and subsequent software releases. BCS-29 feature AC0545, "DIALAN Closed User Group and Maintenance Loopback Software for the NT6X76AC Enhanced Asynchronous Interface Line Card", which is part of NTX250AA allows access to these feature enhancements.

The Hayes Supported AILC NT6X76AD supports all the features that are supported by NT6X76AC. The software support for Hayes feature will be implemented in BCS-35. In BCS-34 and earlier software releases, NT6X76AD is datafilled as an NT6X76AC.

To determine package interdependency or master package content, the SMS89 document or SMSQUERY should be used.

4.4.2 Software Usage Restrictions

N/A

4.4.3 Memory Provisioning

Refer to MEMCALC for memory provisioning.

4.5 Real Time Impact

Processing is distributed over the Central Processing Unit (CPU) and the Peripheral Processors (PP) in the peripheral modules. Real Time is one of the measurements that is utilized to determine the loading characteristics of these devices for specific applications. Real Time is the amount of time required for these processors to perform a function such as establish a call or activate a feature.

For Canadian Applications

For a detailed calculation of CPU real time, use the CPRT program issue 03 or later. Refer to Systems Engineering Letter (SEL) 87-05-001 for more details and operational instructions. For a detailed calculation of PP real time, use the XPRT program issue 02 or later. Refer to SEL 87-05-002 for details and operational instructions.

To measure the CPU real time for an in-service switch, use the ACTIVITY TOOL.

To measure the PP real time for an in-service switch, use the NEW PERIPHERAL ACTIVITY and PERFORMANCE TOOL for the new peripherals.

For U.S. Applications

For a detailed calculation of CPU real time, use the REAL::TIME program issue 4A or later. Refer to System Engineering Bulletin (SEB) 87-02-004 for more details on REAL::TIME and operational instructions. For a detailed calculation of PP real time, use the PRTCALC program issue 1C or later. Refer to SEB 86-10-004 for more details on PRTCALC and operational instructions.

To measure the CPU real time for an in-service switch, use the ACTIVITY TOOL. Refer to SEB 86-11-005 for more details on the ACTIVITY TOOL and operational instructions. To measure the PP real time for an in-service switch, use the NEW PERIPHERAL ACTIVITY and PERFORMANCE TOOL for the new peripherals. Refer to SEB 87-02-004 for more details on the NEW PERIPHERAL ACTIVITY and PERFORMANCE TOOL.

For Canadian and U.S. Applications

The following Real Time information applies for DIALAN applications:

Central Control Real Time Engineering

Overheads: There are no additional CC Overheads associated with application of the DIALAN feature.

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Per Call Timings: Call types and timings associated with DIALAN are identical to those which exist today for DATAPATH.

LCM and XPM Real Time Engineering

Overheads: There are no additional LCM or XPM Overheads associated with application of the DIALAN feature.

Per Call Timings: Call types and timings associated with DIALAN are identical to those which exist today for DATAPATH.

The following are estimated Call Timings:

Call Type	ms/Call
DIALAN Line----Line	29.8
DIALAN Line----Non-LAMA (EAS)	31.0
DIALAN Line----LAMA	39.3

5.0 ECM503 - Alarm Provisioning

5.1 Overview

The various alarm configurations, dependent on office type and size, are shown in this document.

5.2 Hardware Provisioning

5.2.1 Hardware Usage Restrictions

Circuit cards referenced in this ECM are applicable to the MTM only, not the ISM. Refer to ECM557 for ISM Alarm provisioning information.

5.2.2 Hardware Dependencies

N/A

5.2.2.1 P and C Side Port Requirements

Not Applicable

5.2.2.2 DMS BUS Port Requirements

Not Applicable

5.2.2.3 Circuits Per Card

Not Applicable

5.2.2.4 Discrimination Numbering

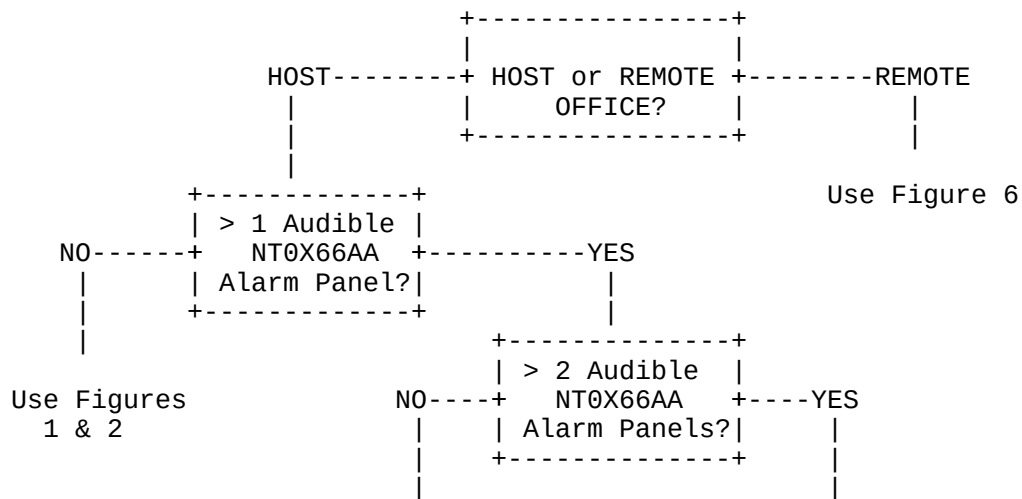
Not Applicable

5.2.3 Provisioning Considerations

Alarm hardware is required for a host office, with hardware choices dependent on office size and customer preference. Alarm hardware is optional for a remote office.

Figures 1 through 6 on the following pages depict the choices for alarm configurations. Rules follow to explain options within the figures. Use the following decision tree to determine which figures apply to a particular office.

Alarm Decision Tree



Use Figures 3 & 5 Use Figures 3 & 4
Please refer to Figure 10 on page 21-53, Figure 11 on page 21-54,
Figure 12 on page 21-55 , Figure 13 on page 21-56, Figure 14 on
page 21-57 , and Figure 15 on page 21-57.

The following figures depict alarm configurations. Refer to the
rules following the figures for explanation of optional hardware
within the figures.

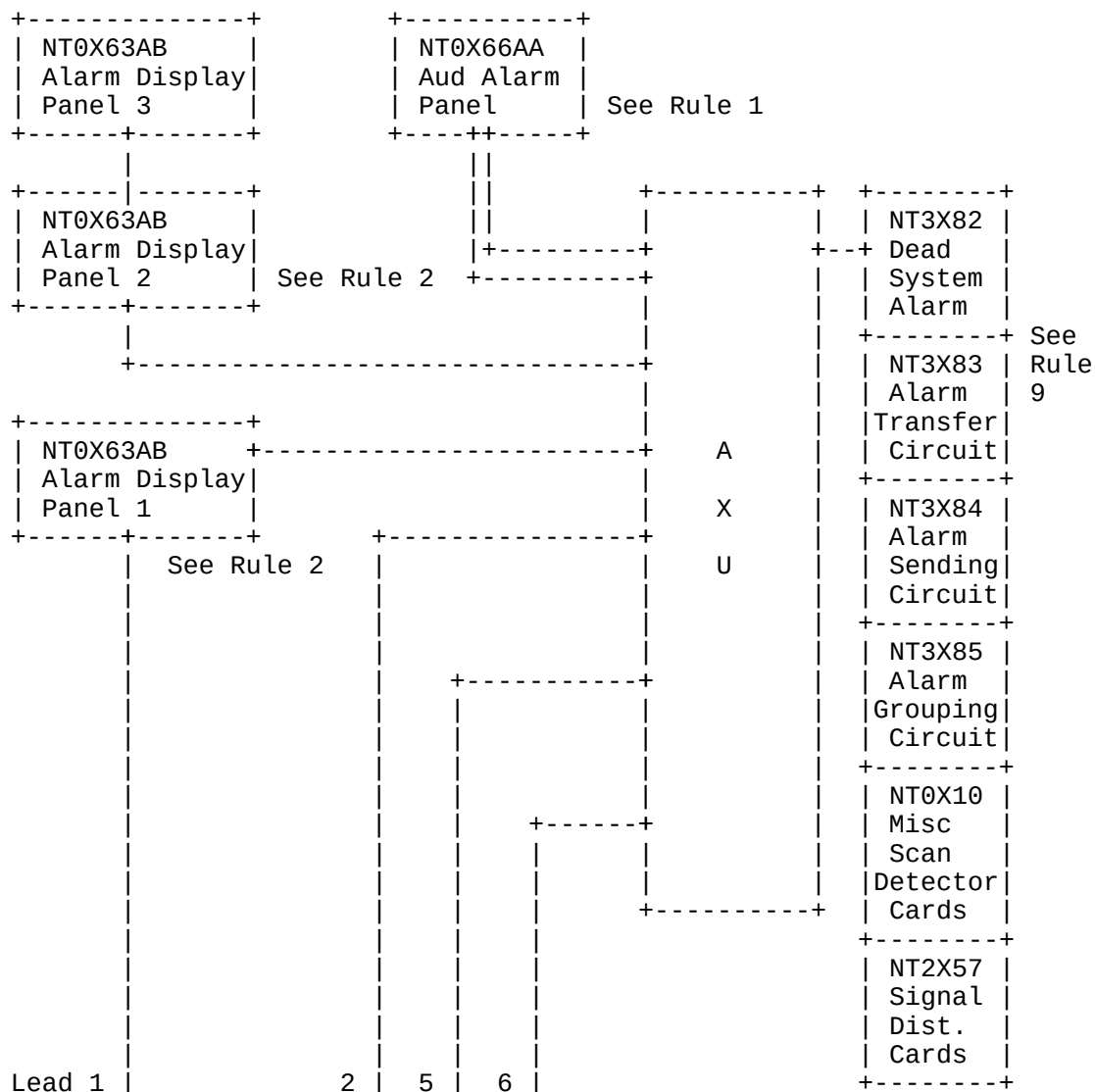
**Figure 10.**

Figure 10 depicts the alarm arrangement for a host office that requires only one NT0X66AA panel. This figure attaches to Figure 11 on page 21-54 .

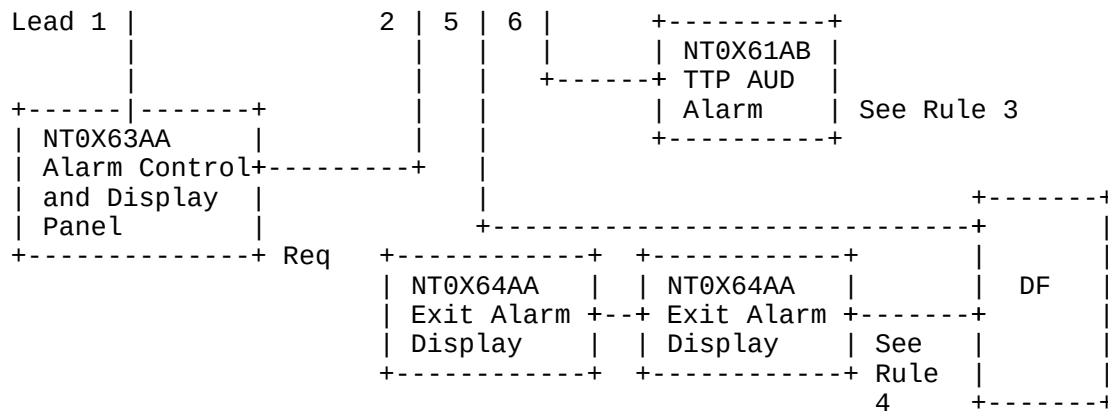
**Figure 11.**

Figure 11 depicts the basic arrangement of alarms required in a host office. This figure attaches to Figure 10 on page 21-53 when only one NT0X66AA panel is required or to Figure 12 on page 21-55 when more than one NT0X66AA panel is required.

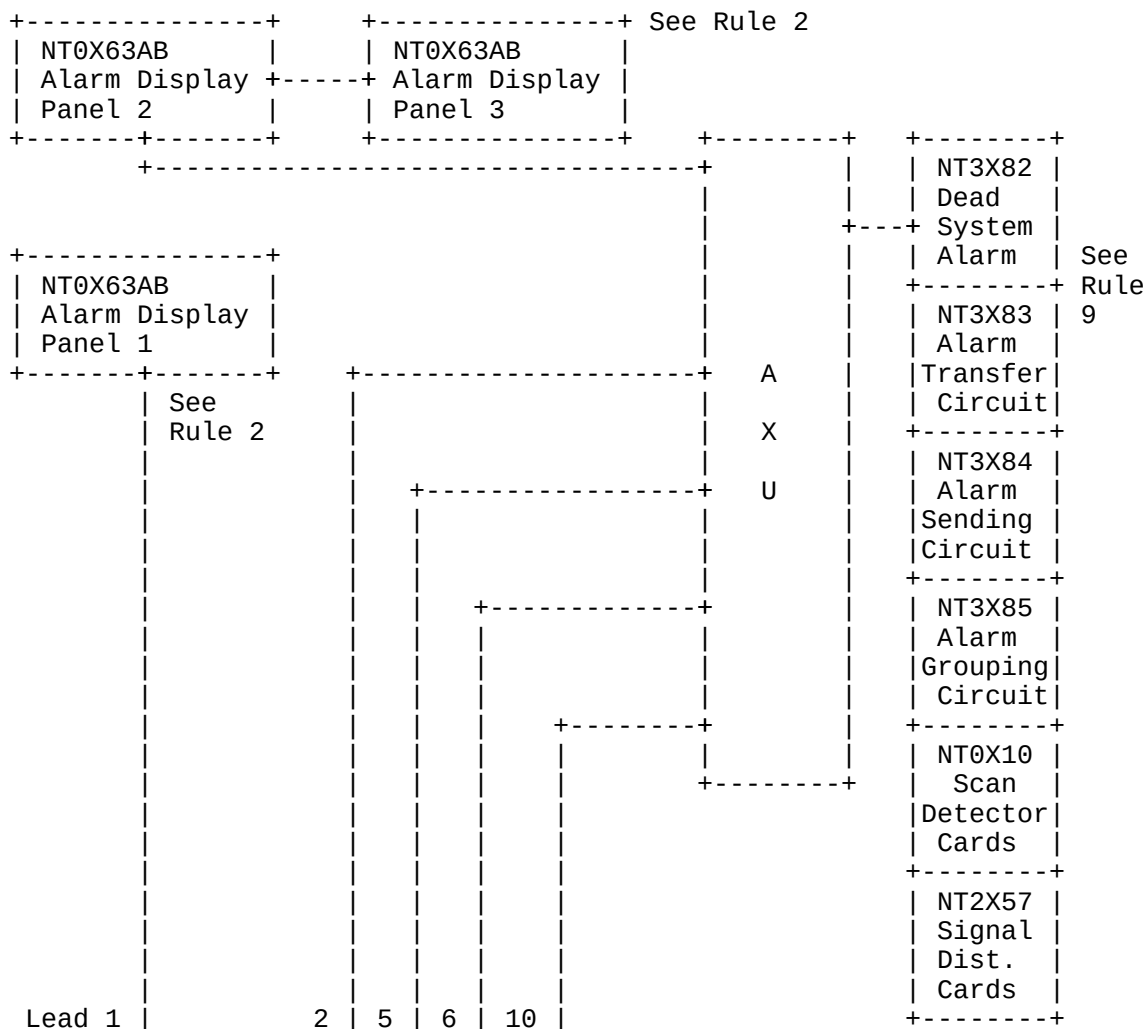


Figure 12.

Figure 12 depicts the alarm arrangement when more than one NT0X66AA panel is required. This figure attaches to Figure 13 on page 21-56 when from three to six NT0X66AA panels are required or to Figure 14 on page 21-57 when two NT0X66AA panels are required.

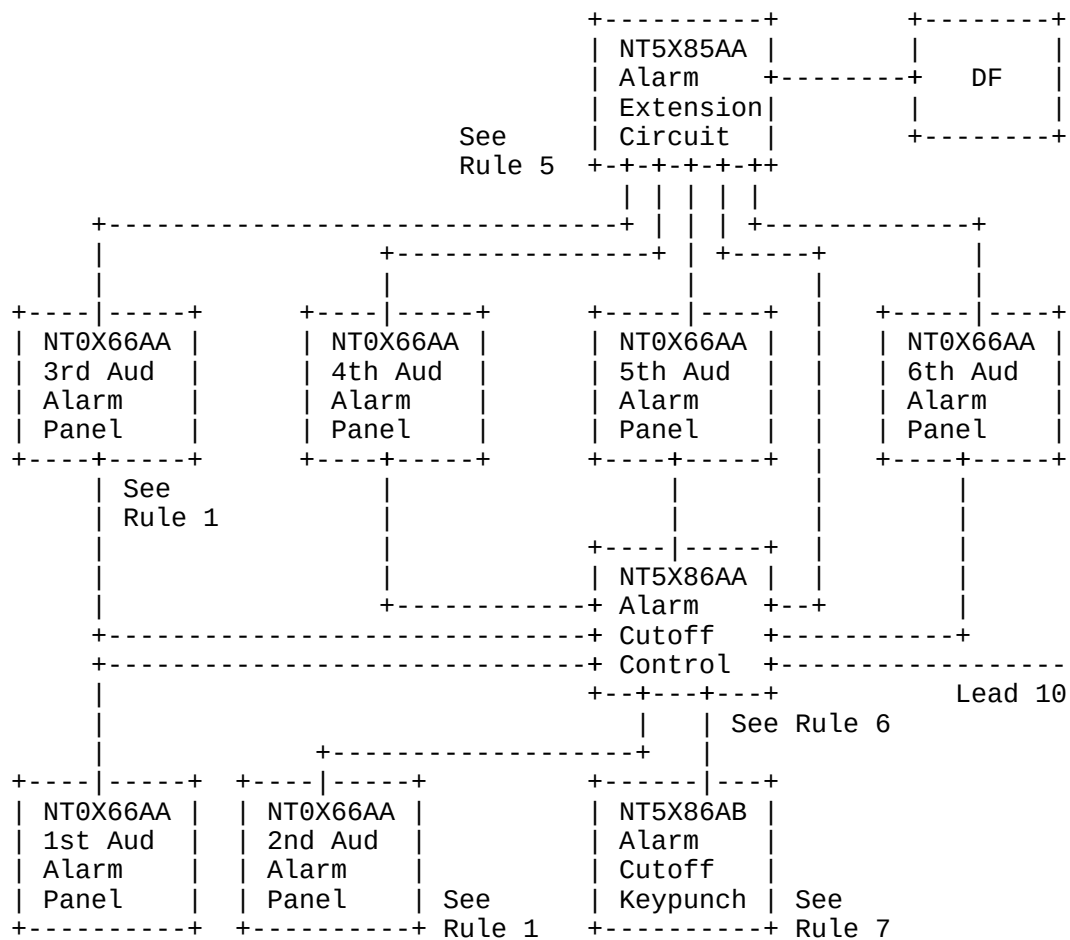
**Figure 13.**

Figure 13 depicts the alarm arrangement when from three to six NT0X66AA panels are required. It must work with Figure 12 on page 21-55 .

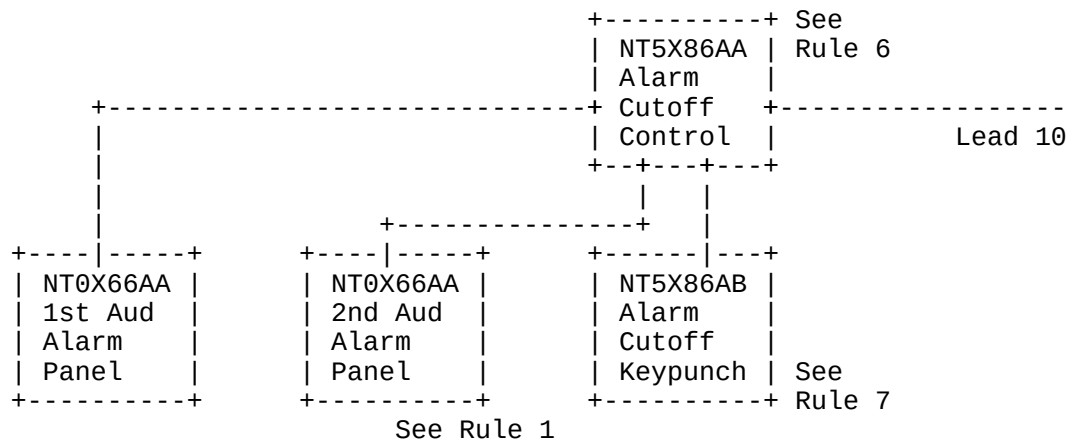
**Figure 14.**

Figure 14 depicts the alarm arrangement when two NT0X66AA panels are required. It must work with Figure 12 on page 21-55.

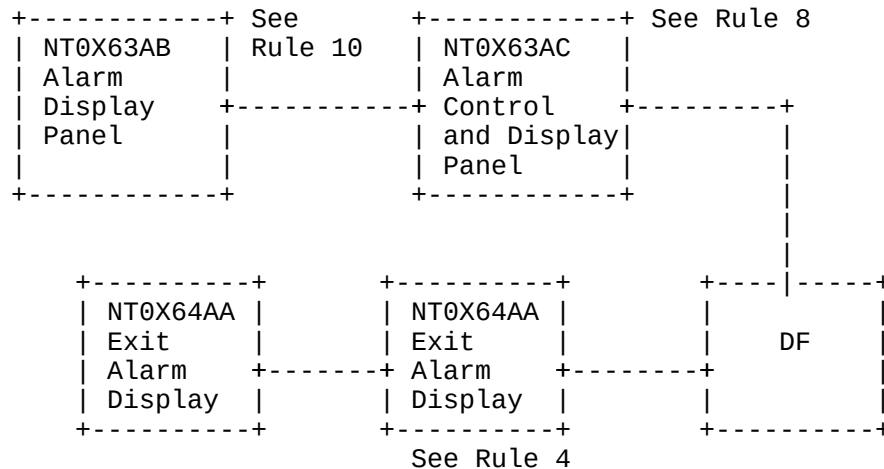
**Figure 15.**

Figure 15 depicts the alarm arrangement for a remote office. The second NT0X64AA panel is optional.

Refer to the following rules to determine how the optional hardware depicted in the figures should be ordered.

Rules

Req These circuits or panels are minimal requirements to make an alarm system operate.

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- Rule 1 The NT0X66AA Audible Alarm Panel is optional. They are orderable per customer requirement.
- Rule 2 The NT0X63AB Alarm Display Panels are optional. They are orderable per customer requirement.
- Rule 3 The NT0X61AB TTP Audible Alarm is optional and is orderable when TTPs are present in an office.
- Rule 4 The NT0X64AA Exit Alarm Display is optional and may be ordered as required to allow exit alarm display at main exit doors on floors of a multi-floored office. A maximum of four may be provisioned per office. This maximum may be extended to 14 with the use of an Audible and Visual Alarm Extension Unit, NT5X85AA.
- For remote offices, a maximum of five NT0X64AA can be provisioned. The Alarm Extension Panel, NT5X92AB must be provided and mounted on an RSE/RME frame if at least one NT0X64AA is provided for a remote office.
- Rule 5 The NT5X85AA Alarm Extension Circuit is optional and is to be ordered when from three to six NT0X66AA Audible Alarm Panels are required or (and) when five (four for OAS Version 1) to 14 NT0X64AA Exit Alarm Display Panels are required in an office. A maximum of one NT5X85AA circuit can be provisioned per office.
- Rule 6 The NT5X86AA Alarm Cutoff Control Circuit is optional and is to be ordered when from two to six NT0X66AA Audible Alarm Panels are required in an office.
- Rule 7 The NT5X86AB Alarm Cutoff Keypunch should be ordered with the NT5X86AA circuit.
- Rule 8 The NT0X63AC Alarm Control and Display Panel is optional for a remote office, but is the only alarm system choice at a remote site. This panel may also be used in a small host office, replacing the NT0X63AA panel.
- Rule 9 The following cards may apply to a host or a remote office, but will be assigned in the host office.

| NOTE: The NT3X82AC/AD, NT3X83AA/AB, NT3X84AA, and NT3X85AA CPs have
| been manufacture discontinued. These cards were
| provisionable only in MTM and related shelves. The re-

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| placements for these cards are provisionable only in ISM
| (see ECM557 for replacement information).

Two Dead System Alarm Circuits are required per office, one on the primary MTM and one on the secondary MTM. Either two NT3X82AA/AC Dead System Alarm Circuit Unique Audible cards, used with the NT0X63AA panel, or two NT3X82AB/AD Dead System Alarm Circuit Common Audible cards, used with the NT0X63AC panel, are to be provided.

Either one NT3X83AA Alarm Transfer Circuit or one NT3X84AA Alarm Sending Circuit is required per office. The NT3X83AA circuit is used to transfer major/minor alarms to a remote office receiving circuit; the NT3X84AA circuit is used to send a dead system alarm tone to a distance operator position.

One NT3X85AA Alarm Grouping Circuit may be provided in offices that occupy multiple floors. This card should be located on a different MTM than the MTM used for the NT3X83AA or NT3X84AA card.

For a basic alarm system, provide a minimum of one misc. scan detector card for rows A-F. Provide an additional NT0X10AA if a remote dist. bay (RDB) is to be provided and/or if any of equipment rows G,H,J through M are to be equipped. Provide another NT0X10AA if any rows N,P through Z,AA,BB are to be equipped. Provide another if at least one of the rows,CC

Remote offices require one NT0X10AA for every 14 scan points required in the office and one NT2X57AA for every 14 signal distributor points required in the office.

These versions of the NT3X82/83/84/85 cards may not be used in the ISM. Refer to ISM ECM557 and Eng Manual Section NTFX4101, EMA2-01-ISM-3 for ISM provisioning information. The ISM versions of these cards are backwards compatible and may be used in an MTM. Additional cabling may be required for power redundancy.

Rule 10 One NT0X63AB Alarm Display Panel can be supported from the NT0X63AC Alarm Panel, per customer requirement.

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5.2.4 Office Layout Information

Not Applicable

5.2.5 Traffic Tables

Not Applicable

5.3 Product/System Specification

5.3.1 Physical Characteristics

Not Applicable

5.3.2 EMI/Earthquake Information

Not Applicable

5.3.3 Sparing Information

Not Applicable

5.3.4 Power Feed and Fusing Requirements

Not Applicable

5.3.5 Current Drain Information

Not Applicable

5.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

5.4.1 Required Software Packages and Interdependencies

Not Applicable

5.4.2 Software Usage Restrictions

Not Applicable

5.4.3 Memory Provisioning

Not Applicable

5.5 Real Time Impact

Not Applicable

6.0 ECM549 - RT-1000 Engineering (MIS for NACD)

6.1 Overview

The non-DMS Central Office portion of this product is NOT to be ordered through NTACCESS/CADES, but will be ordered through a Purchase Planner.

6.1.1 RT-1000 Description

RT-1000 is an MIS (Management Information System) for NACD (Network Automatic Call Distribution). NACD is a network of MACDs (Meridian Automatic Call Distributor) and/or MACD Servers.

- An MACD is a DMS-100 performing ACD functions, in addition to normal switching functions.
- An MACD Server is a DMS-100 configured as a dedicated ACD. An MACD Server can be connected to virtually any central office switch.
- Each MACD or MACD Server in the network (of ACDs) is referred to as an ACD "node".

6.1.2 RT-1000 Function

The RT-1000 MIS allows supervisors to monitor the performance of agents, and to tune operating characteristics of the MACDs/MACD Servers to optimize call handling. Supervisors can monitor a group of agents who may be distributed among multiple ACD nodes.

6.1.3 RT-1000 Relationship To Other NT ACD MISs

Northern Telecom offers other Management Information Systems for ACDs (e.g. CC-MIS, which was formerly named MAX-100). These other products (e.g. CC-MIS) offer MIS capability for a nodal MACD and/or an MACD Server; however, only RT-1000 supports NETWORKED ACD.

6.1.4 Scope Of This Document

This ECM covers versions 30.2 and 32.0 of RT-1000; earlier versions of RT-1000 are not covered by this document.

- Provisioning of hardware and software for the RT-1000
- Provisioning of hardware and software in the MACD or MACD Server required for interfacing to RT-1000

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6.1.5 Primary Components Of The RT-1000

6.1.5.1 RT-1000 Host Computers - HP

The "heart" of the RT-1000 MIS is a group of four Hewlett Packard host computers. These four HP computers are required for every RT-1000 system. Of these four hosts:

- One handles communications with the DMS-100 ACDs, sends data to the other HP hosts, and formats the real-time displays to be sent to the supervisor terminals. This is called the RTDB (Real Time Database) server.
- Two handle communications with the supervisor terminals. These are called terminal servers.
- One is a database for historical data. This is called the Ingress server, or RDBMS (Relational Database Management Server).

Communication among the four HP host computers is via Ethernet and FDDI.

The HP hosts are items 1 through 4 on the system diagram (Figure 1). Each of the four HP hosts has a maintenance modem (item 5 in Figure 16 on page 21-64). Refer to the RT-1000 Engineering Manual Section for provisioning information.

6.1.5.2 X.25 Gateway Assembly

The X.25 gateway handles communications between the RTDB server (one of the four HP hosts) and the ACD nodes. There is only one X.25 gateway per RT-1000 system. The X.25 gateway is item 7 on the system diagram, Figure 16 on page 21-64. Based on traffic requirements, a single DMS-100 may have multiple links to the X.25 gateway. These links provide capacity, NOT redundancy.

The X.25 gateway is a Xyplex chassis with an Ethernet card (for communication to the RTDB server) and from two to twelve X.25 cards (one per DMS link). To determine the quantity of X.25 cards, refer to the RT-1000 Engineering Manual Section.

6.1.5.3 RT-1000 Communications Server

The primary function of the communications server is handling communications between the HP hosts and the controllers. The communications server also provides a connection for login terminals, see "RT-1000 Terminals" on page 21-63. There is one communications server per RT-1000 system. The communications server is item 10 on the system diagram, Figure 16 on page 21-64.

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The communications server consists of a Xyplex chassis, an Ethernet card for interfacing to the HP hosts, and from one to eight asynchronous communications cards (each of which has eight ports). The asynchronous communications cards interface to the controllers (through modems or direct connections) and to maintenance terminals. To determine the quantity of async communications cards, refer to the RT-1000 Engineering Manual Section.

6.1.5.4 RT-1000 Controllers

Each controller functions as a data switch to route data to the supervisor terminals it serves. There can be up to sixty controllers in an RT-1000 system. Each controller can support up to three terminals. Refer to the RT-1000 Engineering Manual Section to determine the number of controllers. A controller is shown as item 15 on the system diagram Figure 16 on page 21-64.

The controllers are PCs running RT-1000C controller software under XENIX.

6.1.5.5 RT-1000 Terminals

There are two types of terminals in an RT-1000 system: supervisor terminals and login terminals. Both types of terminals are PCs running RT-1000T terminal software under DOS. The same hardware and software are used for both supervisor terminals and login terminals; only the function is different. The terminals are shown as item 11 on the system diagram, Figure 16 on page 21-64. Refer to the RT-1000 Engineering Manual Section for provisioning information on terminals.

Supervisor terminals allow agent supervisors to view real-time displays created on the RTDB server, view historical reports created on the RDBMS server, print reports, and send keyboard input to the RT-1000 hosts. There can be up to one hundred and eighty supervisor terminals in an RT-1000 system. The actual quantity is determined by the customer.

Login terminals connect to the communications server, and are used for maintenance. Login terminals can be either local (i.e. direct connection) or remote (i.e. modem connection) to the communications server. One local login terminal and up to three remote login terminals may be provisioned per customer requirements.

6.1.5.6 DMS Hardware For Interface To RT-1000

To interface to the RT-1000, each MACD or MACD Server in an NACD system must be equipped with EMPC(s), EMPC cable(s), and 9600 baud Dowty synchronous modem(s). One EMPC, one EMPC cable, and one standalone Dowty modem is required for each link. Refer to the Engineering Manual Section of this document to determine the number of links.

Legend for :figref refid=FIRS549.

-
- 1 RTDB Server (HP)
 - 2 Terminal Server I (HP)
 - 3 Terminal Server II (HP)
 - 4 RDBMS Server (HP)
 - 5 Stand-alone Maintenance Modems for HP
 - 6 FDDI Concentrator
 - 7 X.25 Gateway
 - 8 Standalone Modems for Links to MACD or MACD Server
 - 9 MACD or MACD Server
 - 1 Communications Server
 - 1 Terminal (Supervisor, Login, or Remote Login)
 - 1 Stand-Alone Modems for Remote Login Terminals
 - 1 Modem or DSU for Comm Server <--> Controller
 - 14 Stand-Alone Modem or DSU for Comm Server <--> Controller
 - 15 Controller
 - 16 Maintenance Modem for Controller
 - 17 Optional Modem/Line Driver for Terminal <--> Controller
 - 18 Optional Add-On RDMS Disk Arrays
 - 19 Optional Add-On RTDB Disk

6.2 Hardware Provisioning

6.2.1 Hardware Usage Restrictions

The ACD nodes (MACDs and/or MACD Servers) interface to the RTDB Server (through the X.25 gateway) via EMPC (Enhanced Multi- Protocol Controller) cards. Only one of the two links on the EMPC can be active; therefore, one EMPC is required for each link from a DMS-100 to the X.25 gateway of the RT-1000 system. Refer to the Engineering Manual Section to determine the number of links.

The unused port of the EMPC can NOT be used for other applications. Port 2 or 3 of the EMPC must be used for the connection to RT-1000.

6.2.2 Hardware Dependencies

MPCs can NOT be used; EMPCs must be used.

6.2.2.1 P and C Side Port Requirements

Not applicable

6.2.2.2 DMS BUS Port Requirements

Not applicable

6.2.2.3 Circuits Per Card

Not applicable

6.2.2.4 Discrimination Numbering

Not applicable

6.2.3 Provisioning Considerations

The capacities of the RT-1000 system are:

- 60 Controllers
- 180 Supervisor Terminals
- 4 Login Terminals (1 local, 3 remote)
- 7500 Agents
- 192,000 Calls Per Hour
- 12 Links (to MACDs and/or MACD Servers)

6.2.4 Office Layout Information

The RT-1000 MIS will not be co-located with the switch, although it may be in the same building.

6.2.5 Traffic Tables

Each 9600 baud DMS EMPC link can support up to 24 NACD event messages per second. Since an average call requires 4 event messages, a link can handle 6 calls per second. If the traffic from any single ACD node (DMS-100) will exceed 6 calls per second, an additional link (or links) must be provisioned for that node.

Total messages from the ACD nodes to the RT-1000 MIS must not exceed 216 per second. Therefore, the total calls for the system must not exceed 54 per second. Refer to the Systems Engineering Bulletin 93-02-001, MACD, for additional information on messaging and link capacity.

6.3 Product/System Specification

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6.3.1 Physical Characteristics

CPC	DESCRIPTION	HEIGHT	WIDTH	DEPTH	POWER CONS.	CURRENT DRAIN
A0383956	RTDB SERVER	24.0"	8.7"	23.4"	310W	5.4A
	w/ 1350SX DISK	14.6"	7.5"	15.3"	70W	1.2A
A0383954	TERMINAL SRVR1	24.0"	8.7"	23.4"	310W	5.4A
A0384175	TERMINAL SRVR2	24.0"	8.7"	23.4"	310W	5.4A
A0383799	RDBMS SERVER	24.0"	8.7"	23.4"	310W	5.4A
	w/ 1350SA DISK	14.6"	7.5"	15.25"	70W	1.2A
A0384173	FDDI CONC.	5.0"	19.0"	18.0"	100W	
B0239141	XYPLEX CHASSIS	10.5"	19.0"	9.5"	600W	7.0A
C3550140	TELEBIT MODEM	2.4"	8.5"	13.0"		
A0351641	DOWTY MODEM	2.2"	6.8"	11.5"	9W	
C3550132	CABINET	78.25"	19.0"	24.0"		
B0239144	CONTROLLR	6.4"	21.3"	18.7"		
	w/ MONITOR	14.0"	14.0"	14.6"	80W	
A0386016	PRINTER, EPSON	5.9"	17.9"	14.2"	120W MIN	
B0239143	INTEL TERMINAL	3.9"	15.0"	15.0"		5.0A
A0322496	LINE DRIVER	.75"	2.0"	2.75"		0.0A

6.3.2 EMI/Earthquake Information

RT-1000 equipment is NOT earthquake compliant. RT-1000 equipment is FCC compliant.

6.3.3 Sparing Information

Provide spares per customer preference.

6.3.4 Power Feed and Fusing Requirements

Not applicable

6.3.5 Current Drain Information

Not applicable

6.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

6.4.1 Required Software Packages and Interdependencies

6.4.1.1 DMS-100 and MACD Server Nodes

In addition to ACD software, the following additional packages must be added. Refer ACD ECM for ACD software provisioning.

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ACD - Supergroup

(NTXE22)

One of the following two packages is also required.

Networked ACD on CCS7

(NTXN46)

Networked ACD on PRA

(NTXN47)

Refer to the SMS database for more information on software packaging.

6.4.1.2 RT-1000 Hosts (HP)

The HP UX (UNIX) operating system is included with the RT-1000 HP host hardware. It does not need to be ordered separately.

RT-1000H (application software for the HP hosts) includes software for all four HP hosts. One (1) RT-1000H software package is required per RT-1000 system, NOT one for each of the four HP hosts.

RT-1000H software is delivered on DAT (Digital Audio Tape). It is a universal load (the same software is installed at each site).

6.4.1.3 RT-1000 Controllers (PCs)

The SCO XENIX operating system is included with the Controller.

RT-1000C (application software for the controller) is included with the Controller. RT-1000C software is delivered on high density floppy diskette (both 3.5" and 5.25").

6.4.1.4 RT-1000 Terminals (PCs)

DOS version 3.3 or higher is required. The DOS operating system is included with the Terminal.

RT-1000T (application software for the RT-1000 Terminals) is included with the Terminals. RT-1000T software is delivered on high density floppy diskettes (both 3.5" and 5.25").

6.4.2 Software Usage Restrictions

All ACD nodes connected to the RT-1000 MIS must use the same data stream. RT-1000 supports BCS-30, BCS-31, and BCS-32 data streams. Since a BCS release allows the use of an earlier data stream (up to two releases back), the DMS-100 ACD nodes connected to the RT-1000 could be at different BCS releases. For example, one node could be running BCS-32 with BCS-30 data stream, and another node could be running BCS-31 with BCS-30 data stream.

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6.4.3 Memory Provisioning

All RT-1000 MIS components (HP hosts, controllers, terminals, X.25 gateway, and communications server) come with a standard memory configuration. Memory in these components is not provisionable.

Refer to MEMCALC for information on memory provisioning in the DMS-1 0 (for NACD).

6.5 Real Time Impact

Refer to the Systems Engineering Bulletin 93-02-001, MACD, for information on the switch side real time impact.

Real-time capacity of the RT-1000 HP host computers will not be exceeded if the RT-1000 configuration does not exceed the capacities given in "Provisioning Considerations" on page 21-66.

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7.0 ECM556 - Message Services Module Cabinet (MSMC)

7.1 Overview

The Message Services Module Cabinet (MSMC) is a voice processing server designed to provide call answering, voice messaging, and fax services to the private business and institutional customer. Meridian Mail Release 11 is the latest version of Meridian Mail software which operates on the MSMC to provide the voice processing and fax services. The MSMC is based on the same hardware platform as the Central Office Service Peripheral Module(NTGX01AA). The MSMC supports NT and non-NT switching systems. The MSMC can be utilized in the following configurations:

- * A private business that owns it's own PBX. In this CPE environment both the PBX and the MSMC are administered by the customer
- * A private business that does not own a PBX, but does have an MSMC. In this configuration the business is a Centrex customer. This is the CPE Centrex.
- * A DMS100 Central Office that requires advanced Voice Mail services. This need was previously satisfied with the DMS100 Mail products called SPM.

The Message Services Module Cabinet (MSMC) is designed for CO.and large CPE installations.The MSMC platform consists of the following features: (ref. HEC-110-101 Issue 1.02 pg.71 & 92 for more detail)

- * Up to 192 voice channels. This is based on 8 SPN 24-channel nodes, provisionable in increments of 24 ports (after the base 48 port system)
- * Up to 1200 hours of voice messaging storage. This is based on a maximum of 8 1400MB SPN disks (150 hours per disk).
- * Up to 4 languages on the system.
- * Up to 20 levels per voice menu.
- * Up to 999 messages per mailbox.
- * Up to 50,000 organizational directory entries per system.
- * Up to 42328 registered mailboxes per system:

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Max. Voice Ports	Max. Number of Storage Hours	Max. Number of Mailbox	Disk Mod. Ckt Pack (Shadowed)
48	150	5291	NTGX14AB
	300	10,582	NTGX14BB
72 or 96	300	10,582	NTGX14AB
	600	21,164	NTGX14BB
120 or 144	450	15,873	NTGX14AB
	900	31,746	NTGX14BB
168 or 192	600	21,164	NTGX14AB
	1200	42,328	NTGX14BB

NOTE: NTGX14AB 75HRS/NODE
NTGX14BB 150HRS/NODE

Figure 17. Message Services Module Cabinet (MSMC)

- * Up to 100 hrs of personal verifications.
- * Up to 100 hrs of voice menu definitions or forms definitions.
- * Up to 360 minutes per mailbox
- * Up to 120 entries per organization distribution list.
- * Up to 9 personal distribution lists per user.
- * Up to 99 entries per personal distribution list.
- * Up to 25 fax selections for each Fax on Demand session.
- * Up to 99 pages per fax.
- * Up to 2000 customer groups per system.
- * Up to 4 administrations positions (including maintenance console).
- * Up to 16 non-redundant or 8 redundant SMDI links with the Multi-SMDI feature.
- * Up to 2 maintenance ports.

- * 1 maintenance console.
- * 2 maintenance printers.
- * Up to 20 ports for proprietary networking.

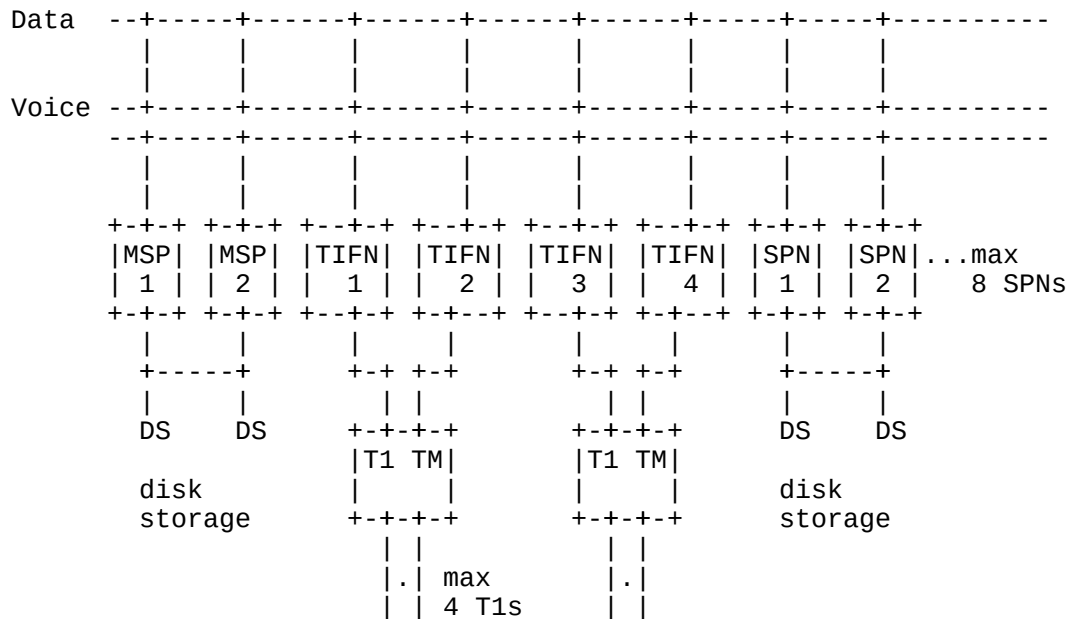
The following features are available on the MSMC:

- * Meridian Mail Networking
- * AMIS Networking
- * AdminPlus
- * Meridian Forms
- * Outcalling
- * Multiple Languages
- * Dual Language Prompting
- * Fax On Demand
- * Multi-Customer
- * Meridian ACCESS
- * Meridian Mail Connections
- * Multi-Admin
- * Disk Shadowing
- * SMDI/Multi-SMDI
- * Voice Messaging User Interface Forum (VMUIF)
- * 2.5 Gigabyte Tandberg TDC4220 Tape Drive
- * MM Rel.8 & MM Rel.9 conversion to MM Rel.10
- * ACCESS Enhancements
- * VMUIF on Application Module Link (AML)

The following features/enhancements were added with the release of MM Rel. 11:

- * NTZB61CA Meridian Proprietary & Enterprise Networking
- * NTZB54CA VMUIF, Family Mailboxes & Multi-Customer
- * NTZB57CA AdminPlus Enable & Reporter
- * NTZB60CA AMIS Networking
- * NTZB67AA Rls 8 to 11 Upgrade
- * NTZB67BA Rls 9 to 11 Upgrade
- * NTZB67CA Rls 10 to 11 Upgrade

7.1.1 HARDWARE DESCRIPTION



The Message Services Module consists of 3 types of nodes. They are the Multi-Server Processor (MSP), Signal Processing Node (SPN) and Telephony Interface Node (TIFN). There are two (2) voice buses and a data bus in an MSMC. An MSMC is populated with voice processor cards up to a maximum capacity of 24 channels per SPN. One or more TIFN are populated with Telephony Interface Cards up to the combined capacity of the SPNs. A storage module is associated with each MSP (for common & system data) and with each SPN (for user data).

Voice is transported from the TIFNs to SPNs over two voice buses. The voice buses are in parallel and connect to all nodes (MSP, TIFN, SPN). The two buses provide overall capacity and survivability. Use of a voice bus (as opposed to fixed connection) will allow future applications to switch in specialized signal processing capabilities as required (FAX or voice recognition).

MSP Overview

The MSP consists of two cards, the 68K card and the Bus Controller card. The 68K card provides the processing environment for the common system program such as directory, message transfer agent, etc. The 68K card supports 4 RS232 ports. Two MSPs are paired to provide redundancy and capacity for larger systems. The MSPs also support cross-linked disks for disk shadowing operations.

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The Bus Controller syncs the synchronous bus to a designated T1 master and provides all clock references. It also handles polling of active nodes and assigns bus mastership for data transmission to the next node in the polling sequence requesting service.

SPN Overview

The SPN has a 68K card and two VP12 cards. The 68K provides processing for the per-channel computing environments for the MSMC. The VP12 handles processing of up to 12 voice channels. Some of its resources may be used for other applications such as FAX or voice recognition in the future.

The RS232 ports of the 68K card in the SPN may be used for SMDI links, networking and administration connections.

TIFN Overview

The TIFN consists of a 68K card and a T1 card. The 68K card provides processing for the T1 handling environment like relaying call processing events to the software environment, T1 link maintenance, and selecting the T1 span to provide the master clock reference. It also maps T1 timeslots to CO Voice Mail bus timeslots. The T1 card terminates 4 T1 spans.

Power Supplies

The Message Services Module is powered by the NT9X91AC power supplies with the following arrangements:

Each shelf is served by the A and B feeds and it remains under power unless both feeds are disconnected. The power output of both A & B supplies are brought together as common.

Each shelf is split in half with respect to power; the right half of the shelf is served by the A & B power supplies on the right wing, and the left half of the shelf is served by the left pair of supplies. This is for capacity purposes only; a single A or B does not have the capacity to serve the whole shelf.

SMDI Links

The NT1X89AA/BA MPC card in the DMS must be used for the SMDI link. An external modem (supplied by customer) is required for the SMDI Link with the following properties:

at least 2400 baud

leased line mode capability

auto answer capability

non-volatile RAM (NVRAM) to allow permanent storage of configuration settings.

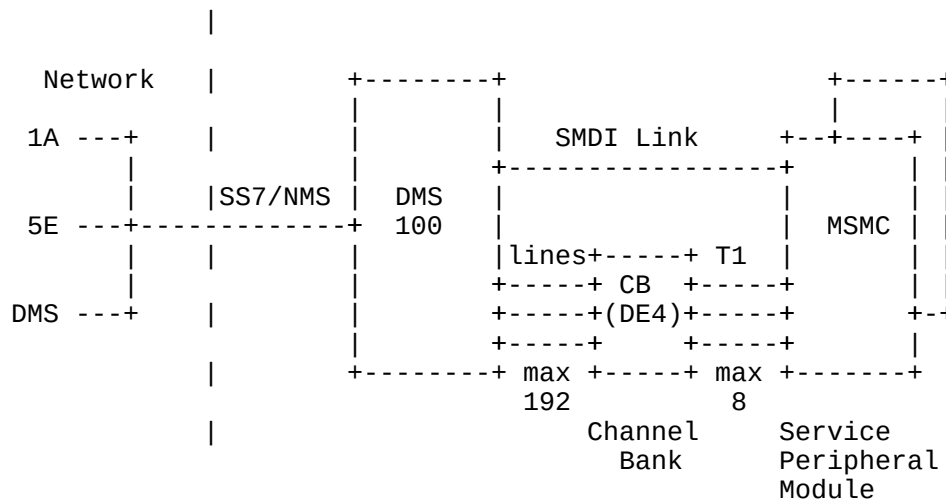
VENTEL 2400 Plus II is a recommended modem for the SMDI Link.

7.1.1.1 Central Office Market (CO)

The Message Services Module provides up to 192 ports in central office packaging with redundancy and reliability features:

- Voice Messaging
- Call Answering
- Auto-attendant
- Voice Menus
- Multi-Customer
- Multiple Administration Position
- Residential Call Answering with Dial Pulse Set Support

System Architecture and Connectivity



The Message Services Module Cabinet (MSMC) will support the following connections:

- * Single Connection, Network Service
- MSMC services a network of switches (possibly multi-vendors) through a single logical connection to one DMS
- Switches connected via Network Message Service or equivalent

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-Single UCD queue and SMDI link. Multiple queues/links can be used if desired for traffic control and/or capacity reasons.

* Multiple Switch Connectivity

-MSMC ports are divided into separate groups each serving a specified switch

-Separate trunking and SMDI links for each port group.

DMS-100 Limitation

Currently DMS-100 does not support the association of SMDI links with T1 trunks but only associates SMDI links with lines. As a consequence channel banks have to be used to interface the T1 trunks of the MSMC to DMS-100 lines.

The following two types of channel banks are supported for use with DMS VoiceMail : a) Northern Telecom DE4 ES
b) Newbridge 3624 Mainstreet.

7.2 Hardware Provisioning

7.2.1 Hardware Usage Restrictions

The Message Services Module is designed for the CPE and CPE Centrex market.

7.2.2 Hardware Dependencies

7.2.2.1 P and C Side Port Requirements

Not applicable

7.2.2.2 DMS BUS Port Requirements

Not applicable

7.2.2.3 Circuits Per Card

The NTGX06AB Transition Module CP provides 4 RS232-C serial ports. Ports 1,3 are asynchronous, and ports 2,4 can be synchronous or asynchronous.

The NTGX12AB VP12 circuit pack has 12 voice channels.

The NTGX01AB cabinet requires the three RS232 bulkheads to provide the full array of RS232 ports for networking. Also associated with this is the provisioning of the RS232 Transition Module Paddle Board NTGX06AB.

7.2.2.4 Discrimination Numbering

See "Software Provisioning" on page 21-96 for SPN, MSP and disk storage numbering.

7.2.2.5 CPE Connections (Centrex and non-Centrex)

The MSMC can be connected to a variety of switches. In the CPE Centrex environment SMDI links through a modem is required. Under normal traffic conditions a single SMDI link running at 2400 bps has sufficient capacity in both directions to support a fully configured 192 port MSMC system. For redundancy, the MSMC can have an additional SMDI link for a total of two (2) SMDI links. If additional SMDI links are desired the NTZB53AA Multiple SMDI Software package must be ordered to support more than one non-redundant or two redundant links.

Up to eight (8) T1 links shall be provisioned for voice transport. Each T1 link supports 24 voice channels. Each T1 node (in the TIFN) has four T1 spans. Provision T1 spans as follows:

NO. OF PORTS	NO. OF T1 NODES	NO. OF T1 LINKS(SPANS)
48	2	2
72	2	3
96	2	4
120	4	5
144	4	6
168	4	7
192	4	8

Figure 18. T1 span Provisioning

The following diagrams show the MSMC in three CPE configurations.

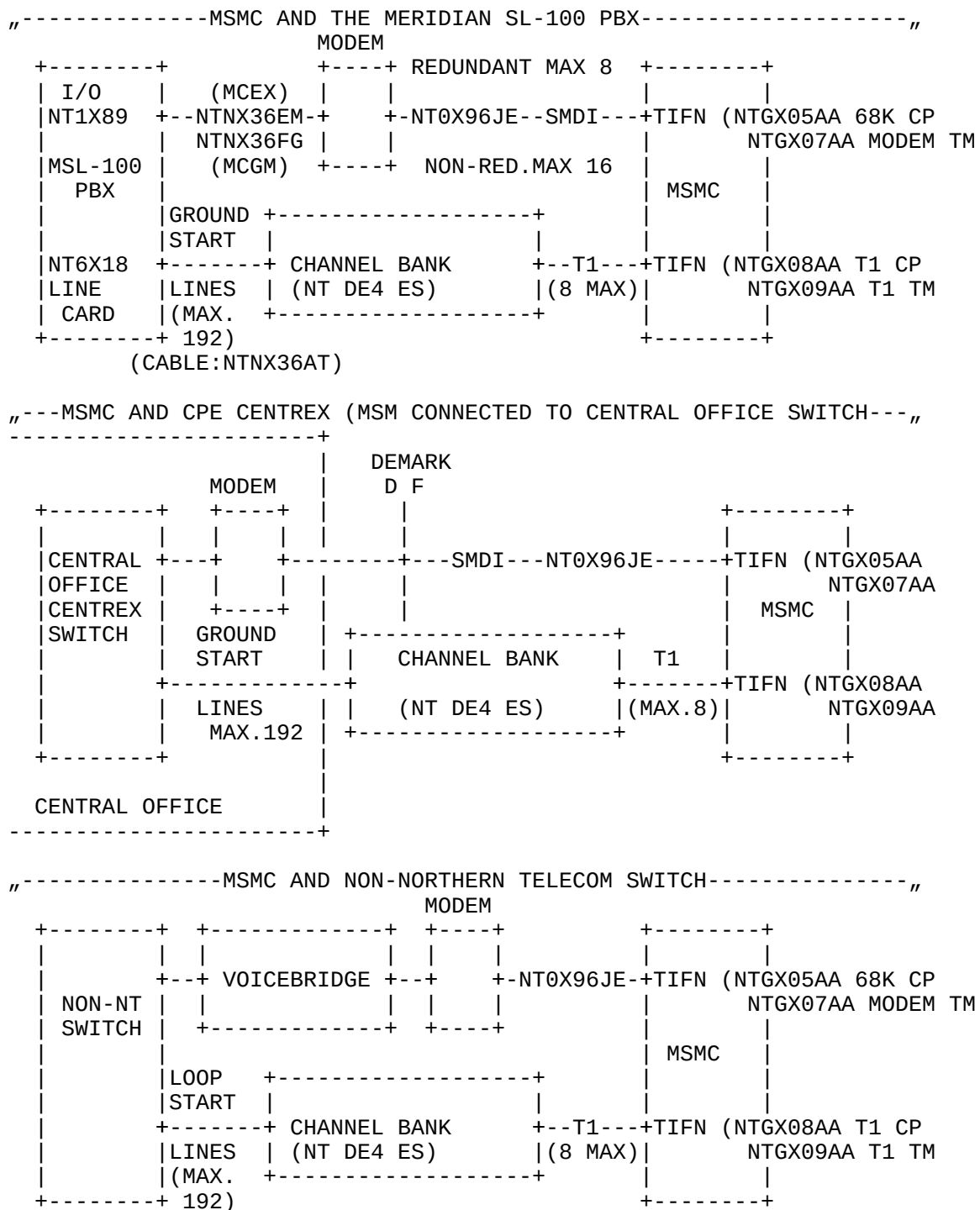


Figure 19. MSMC in three CPE configurations.

A customer premise that includes both an MSMC and one or a multiple of switches from different vendors can be connected using one or more VoiceBridge Series II PBX interface units. One SMDI port is required per VoiceBridge, and each SMDI link must be dedicated to each PBX. For outcalling to work with multiple PBX's, the switches must support Coordinated Dialing Plans. The MSMC to PBX interfaces are referred to in documentation as "Meridian CONNECTIONs". Due to the extra processing time of the VoiceBridge transactions for the AT&T and Rolm switches, the grade of service obtained will not normally be as good as in a non-CONNECTIONs Meridian Mail Environment. The VoiceBridge Units are used to enable the PBX to emulate a centrex switch using SMDI protocol to communicate with the MSMC.

REQUIRES VoiceBridge units

- " MERIDIAN 1
- " AT&T SYSTEM 75 Series PBX (R1V1 or greater software)
- " AT&T SYSTEM 85 Series PBX (R2V1 or greater software)
- " AT&T DEFINITY G1, G2 and G3
- " ROLM 8000CBX (8003 or greater software)
- " ROLM 9000CBX
- " ROLM 9750BCS
- " ROLM 9751 BCS (Model 10, 40, 50 and 70)

VOICE BRIDGE PRODUCT CODES:

FOR:

AT&T PBX'S :	A0380908
ROLM PBX'S :	A0383524

Figure 20. VOICE BRIDGE

7.2.2.6 Voice Mail Networking

Two types of standards are used for networking an MSMC to other voice mail systems. They are Meridian Mail Networking and AMIS Networking.

In an environment where two or more MSMCs are being networked, Meridian Mail Networking is used. Meridian Mail Networking uses separate data and voice paths. The data path is used to transmit passwords, message headers and message delivery acknowledgements via a 2400 baud modem to the switch. This data path is conferenced (via a NT1X81) with the voice path which is a member of a UCD Group.

Offices that require an MSMC to network with voice mail systems other than NT equipment require AMIS (Analog Messaging Interface

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Standard). AMIS protocol is an industry standard. AMIS open access design allows anyone who has access to AMIS to send and receive messages without the need for prearranged passwords, site definitions or specialized hardware such as modems. AMIS Open Networking refers to the ability to send AMIS voice messages to any AMIS site by entering the other site's System Access Number (usually a public network number) and by specifying the mailbox number of the recipient.

If networking is installed, the number of modems (Meridian Networking) required must be determined as well as the number of additional voice ports so that transmission and reception of network messages does not impair other services.

A maximum of 20 networking ports can be used on a MSMC. There are 4 RS232-C ports for every 24 port MSMC Voice Node (SPN). The RS232 ports are available through the NTGX06AB Transition Module mounted on the rear of the 68K Circuit Pack (NTGX05AA). The NTGX06AB offers both synchronous and asynchronous serial ports. Ports 2 and 4 can be configured as either synchronous or asynchronous and ports 1 and 3 are asynchronous only.

7.2.3 Provisioning Considerations

The MSMC consists of 3 different types of processing nodes that are connected by an internal packet bus. The MSMC is configured with two (2) Multi-server processors(MSP) plus one or more (up to 8) signal processing nodes(SPN), and a proportionate number of telephony interface nodes (TIFN). These nodes are located on shelves 26(Primary Electronics Shelf) and 39(Secondary Electronics Shelf).

Also contained in the MSMC cabinet are the storage modules consisting of one or two disk drives that are associated with each MSP and SPN.

The MSP consists of two cards: a 68K Processor Card, NTGX05AA, and a Bus Controller Card, NTGX10AA. Each card has a corresponding paddle board that mounts on the rear, NTGX06AA and NTGX11AA respectively. The 68K card provides the processing for common system data such as the user directory and message transfer. the bus controller provides system clocks and acts as the bus master.

39	9	9			S	S	T	T		S	S	9	9	Expansion Electronics Shelf
	X	X			P	P	IF	IF		P	P	X	X	
	9	9			N	N	N	N		N	N	9	9	
	1	1			8	7	4	3		6	5	1	1	
26	9	9	M	M	S	S	T	T		S	S	9	9	Primary Electronics Shelf
	X	X	S	S	P	P	IF	IF		P	P	X	X	
	9	9	P	P	N	N	N	N		N	N	9	9	
	1	1	1	2		4	3	2	1		2	1	1	1
13	9	9	Disk	Disk	Disk	Disk	Disk	Disk		Disk	Disk	9	9	Upper Disk Shelf
	X	X										X	X	
	9	9	Disk	Disk	Disk	Disk	Disk	Disk		Disk	Disk	9	9	
	1	1	5	6	7	8	9					1	1	
00	9	9	Disk	Disk	Disk	Disk	Disk	Disk		Disk	Disk	9	9	Lower Disk Shelf
	X	X										X	X	
	9	9	Disk	Disk	Disk	Disk	Disk	Tape		Disk	Disk	9	9	
	1	1	1	2	3	4						1	1	

Figure 21. Message Services Module Cabinet

The SPN has a 68K Processor Card (NTGX05AA), plus 1 or 2 VP12 cards (NTGX12AB) with 12 ports each, hence the 12 or 24 port SPN node. Each SPN has a storage module to hold user data. SPN's are paired so that if one fails, the other can still access its user messages.

The TIFN consists of a 68K processor card and a T1 card(NTGX08AA). The 68K card provides processing for the T1 environment. The T1 terminates four (4) T1 links. Incoming voice calls are transported from TIFN's to SPN's over two parallel voice buses.

A storage module consisting of one or two disk drives (NTGX14AB/BB) is associated with each SPN. The NTGX14AB is used when 75HRS are needed per SPN and the NTGX14BB is used when 150HRS are needed per SPN. Information is written to two disks at the same time for back-up or shadowing. Also residing in the storage module are two disk drives and a tape drive for the MSPs. The NTGX15BA on shelf 0 contains one 2.5 GB tape drive and a 2.4 GB disk drive which is shadowed by a 2.4 GB disk drive in a NTGX14AB on shelf 13. These disk drives store system programs and data which are loaded via the tape drive. The tape drive also provides backup and restore capabilities.

The following tables provide the provisioning guidelines to engineer an MSMC from 24 to 192 port systems:

SECOND ELECTRONICS SHELF (POS 39)				PORTS								NOTE
UNIT	SLOT	FRONT	REAR	2	4	7	9	1	1	1	1	
				4	8	2	6	0	4	8	2	
POWER	01	NT9X91AC							X	X		
POWER	04	NT9X91AC							X	X		
	07		NTGX04BA					X	X	X	X	
SPN8	13	NTGX12AB								X		
	14	NTGX12AB								X	X	
	15	NTGX05AA	NTGX06AB							X	X	
SPN7	17	NTGX12AB								X		
	18	NTGX12AB								X	X	
	19	NTGX05AA	NTGX06AB							X	X	
TIFN4	20	NTGX05AA	NTGX07AA					X	X	X	X	
	21											
	22	NTGX08AA	NTGX09AA					X	X	X	X	
TIFN3	23	NTGX08AA	NTGX09AA					X	X	X	X	
	24											
	25	NTGX05AA	NTGX07AA					X	X	X	X	
SPN6	27	NTGX12AB						X	X	X	X	
	28	NTGX12AB						X	X	X	X	
	29	NTGX05AA	NTGX06AB					X	X	X	X	
SPN5	30	NTGX05AA	NTGX06AB					X	X	X	X	
	31	NTGX12AB						X	X	X	X	
	32		NTGX04AA					X	X	X	X	
	32	NTGX12AB						X	X	X	X	
Power	33	NT9X91AC						X	X	X	X	
Power	36	NT9X91AC						X	X	X	X	

X - Provisionable

Figure 22. Secondary Electronics Shelf Physical Card Layout with Provisioning Algorithm

PRIMARY ELECTRONICS SHELF (POS 26)				PORTS								NOTE
UNIT	SLOT	FRONT	REAR	2	4	7	9	1	1	1	1	
				4	8	2	6	0	4	8	2	
POWER	01	NT9X91AC		X	X	X	X	X	X	X	X	
POWER	04	NT9X91AC		X	X	X	X	X	X	X	X	
MSP1	07		NTGX04AA	X	X	X	X					1
	07		NTGX04BA					X	X	X	X	
	08	NTGX05AA	NTGX06AA	X	X	X	X	X	X	X	X	
	09	NTGX10AA	NTGX11AA	X	X	X	X	X	X	X	X	
MSP2	10	NTGX10AA	NTGX11AA	X	X	X	X	X	X	X	X	
	12	NTGX05AA	NTGX06AA	X	X	X	X	X	X	X	X	
SPN4	14	NTGX12AB					X	X	X	X	X	
	15	NTGX12AB					X	X	X	X	X	
	16	NTGX05AA	NTGX06AB				X	X	X	X	X	
SPN3	17	NTGX12AB					X	X	X	X	X	
	18	NTGX12AB					X	X	X	X	X	
	19	NTGX05AA	NTGX06AB				X	X	X	X	X	
TIFN2	20	NTGX05AA	NTGX07AA	X	X	X	X	X	X	X	X	
	22	NTGX08AA	NTGX09AA	X	X	X	X	X	X	X	X	
TIFN1	23	NTGX08AA	NTGX09AA	X	X	X	X	X	X	X	X	
	25	NTGX05AA	NTGX07AA	X	X	X	X	X	X	X	X	
SPN2	27	NTGX12AB			X	X	X	X	X	X	X	
	28	NTGX12AB			X	X	X	X	X	X	X	
	29	NTGX05AA	NTGX06AB		X	X	X	X	X	X	X	
	30	NTGX05AA	NTGX06AB	X	X	X	X	X	X	X	X	
	31	NTGX12AB		X	X	X	X	X	X	X	X	
	32R		NTGX04AA	X	X	X	X	X	X	X	X	
	32F	NTGX12AB			X	X	X	X	X	X	X	
Power	33	NT9X91AC		X	X	X	X	X	X	X	X	
Power	36	NT9X91AC		X	X	X	X	X	X	X	X	

X - Provisionable

Figure 23. Primary Electronics Shelf Physical Card Layout with Provisioning Algorithm

SECONDARY DISK SHELF (POS 13)				PORTS								NOTE
UNIT	SLOT	FRONT	REAR	2	4	7	9	2	4	6	9	
				4	8	2	6	0	4	8	2	
POWER	01	NT9X91AC						X	X	X	X	
POWER	04	NT9X91AC						X	X	X	X	
DISK 5	07	NTGX14AB/14BB						X	X	X	X	1
	08											
	09											
	10											
	11		NT9X19BC	X	X	X	X	X	X	X	X	
DISK 6	12	NTGX14AB/14BB						X	X	X	X	1
	13											
	14											
	15											
	16		NT9X19BC	X	X	X	X	X	X	X	X	
DISK 7	17	NTGX14AB/14BB							X	X		1
	18											
	19											
	20											
	21		NT9X19BC	X	X	X	X	X	X	X	X	
DISK 8	22	NTGX14AB/14BB							X	X		1
	23											
	24											
	25											
	26		NT9X19BC	X	X	X	X	X	X	X	X	
DISK 9	27	NTGX14AB		X	X	X	X	X	X	X	X	
	28											
	29											
	30											
	31		NT9X19BC	X	X	X	X	X	X	X	X	
	32	NT9X19AA	NT9X19BB	X	X	X	X	X	X	X	X	
POWER	33	NT9X91AC		X	X	X	X	X	X	X	X	
POWER	36	NT9X91AC		X	X	X	X	X	X	X	X	

X - Provisionable

Figure 24. Upper Disk Shelf Physical Card Layout with Provisioning Algorithm

PRIMARY DISK SHELF (POS 00)				PORTS								NOTE
UNIT	SLOT	FRONT	REAR	2	4	7	9	1	1	1	1	
				4	8	2	6	0	4	8	2	
POWER	01	NT9X91AC		X	X	X	X	X	X	X	X	
POWER	04	NT9X91AC		X	X	X	X	X	X	X	X	
DISK 1	07	NTGX14AB/14BB		X	X	X	X	X	X	X	X	1
	08											
	09											
	10											
	11		NT9X19BC	X	X	X	X	X	X	X	X	
DISK 2	12	NTGX14AB/14BB		X	X	X	X	X	X	X	X	1
	13											
	14											
	15											
	16		NT9X19BC	X	X	X	X	X	X	X	X	
DISK 3	17	NTGX14AB/14BB				X	X	X	X	X	X	1
	18											
	19											
	20											
	21		NT9X19BC	X	X	X	X	X	X	X	X	
DISK 4	22	NTGX14AB/14BB				X	X	X	X	X	X	1
	23											
	24											
	25											
	26		NT9X19BC	X	X	X	X	X	X	X	X	
DISK/ TAPE	27	NTGX15BA		X	X	X	X	X	X	X	X	
	28											
	29											
	30											
	31		NT9X19BC	X	X	X	X	X	X	X	X	
	32		NT9X19BB	X	X	X	X	X	X	X	X	
POWER	33	NT9X91AC		X	X	X	X	X	X	X	X	
POWER	36	NT9X91AC		X	X	X	X	X	X	X	X	

X - Provisionable

Figure 25. Lower Disk Shelf Physical Card Layout with Provisioning Algorithm

7.2.3.1 MM REPORTER Provisioning

When AdminPlus Enable is provisioned on the MSMC and MM Reporter is used, the following minimum PC configuration is required for MM Reporter:

- * 80486DX2-66MHz CPU
- * 8MB of RAM for Windows 3.1; 12MB for Windows 95; 16MB for Windows NT.
- * 1GB Hard Disk
- * one 3.5" Floppy Disk Drive
- * Keyboard
- * VGA video card
- * Color Monitor
- * Mouse
- * one serial port with 16550 UART for connection to MSMC
- * Cables to connect the AdminPlus PC to the MSMC

Cabling of the MM Reporter PC to the MSMC can be achieved by a RS232 connection. Below is the configuration for the interface:

RS232:

NTGX06AB Transition Module(RS232) in MSMC
 NT0X96JD Cable (MSMC I/O panel to PC) Connects to
 either P1A or P1B on I/O
 A0376557 Null modem adapter
 A0385576 Reducer DB25/DB9 Female for DB9 male PC connector

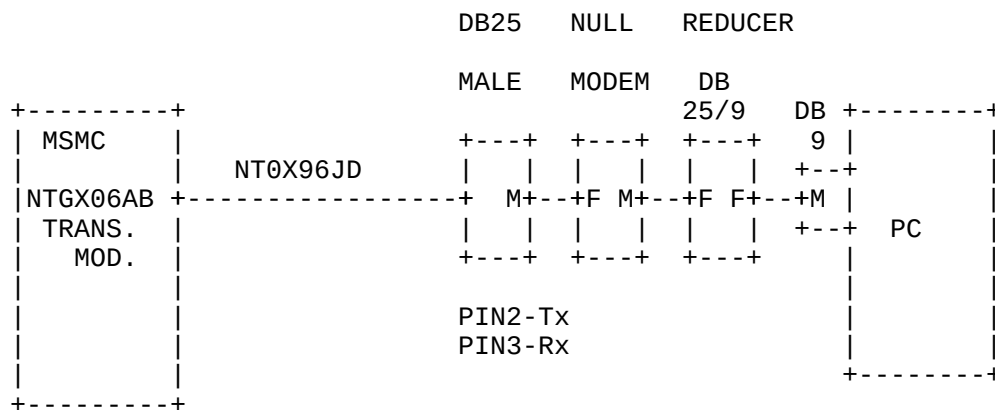


Figure 26. Configuration for the PC to MSMC Interface

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The following table shows the RS232-C ports that can be used for MM Reporter provided they are not used for Networking, ACCESS, or Multi- Admin Terminals.

SYSTEM SIZE	SPN+	port	I/O PANEL	
			BLKHD	CONN.
48 PORTS	1	1-4	26LEFT	P1A
	2	1-4	26LEFT	P2A
72-96 PORTS	3	1-4	26LEFT	P3
	4	1-4	26LEFT	P4
120-144 PORTS	5	1-4	39LEFT	P1A
	6	1-4	39LEFT	P2A
168-192 PORTS	7	1-4	39RIGHT	P1A
	8	1-4	39RIGHT	P2A

Figure 27. MM Reporter RS232-C ports

7.2.3.2 Upgrade Retrofit From NTGX01AA to NTGX01AB (MM8 to MM9)

The following hardware is required to convert an NTGX01AA to and NTGX01AB. This will allow for the introduction of the Networking features and the software upgrade from Meridian Mail 8 (MM8) to Meridian Mail 9 (MM9). Hardware quantities depend upon the port size of the MSMC provisioned (see "Provisioning Considerations" on page 21-80)

EXISTING	SHELF 26	REPLACED BY
NTGX0147(CL) I/O PANEL(LEFT)		NTGX0155(RS232) I/O PANEL (LEFT)
NTGX12AA VP12		NTGX12AB VP12
NTGX06AA CL TM (SPN 1,2,3,4)		NTGX06AB RS232 TM
ASSOCIATED INTERNAL CABLES		
NTGX0101(SPN1);		
NTGX0112(SPN2);		
NTGX0113(SPN3-4)		NTGX0119
		NTGX0120
		EXTERNAL CABLE FOR NTGX06AB:
		NT0X96JD
		NT0X96JE

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EXISTING -----	SHELF 39	REPLACED BY -----
NTGX0147(CL) I/O PANEL(LEFT)		NTGX0155(RS232) I/O PANEL (LEFT)
NTGX0148(CL) I/O PANEL(RIGHT)		NTGX0158(RS232) I/O PANEL (RIGHT)
NTGX12AA VP12		NTGX12AB VP12
NTGX06AA CL TM (SPN 1,2,3,4)		NTGX06AB RS232 TM
ASSOCIATED INTERNAL CABLES		
NTGX0101(SPN5);		
NTGX0112(SPN6);		
NTGX0113(SPN7-8)		NTGX0119
		NTGX0120
		EXTERNAL CABLE FOR NTGX06AB:
		NT0X96JD
		NT0X96JE

Any MSMC Release 8 should be checked for the presence of Three Position A-Bus Jumpers (NTGX16AA). Fourteen (14) of these jumpers need to be added if not present to eliminate cross talk during high activity on data lines.

7.2.3.3 MM9 and MM10 Conversion to MM11

It is possible to convert Gate 3 versions of Release 9 and 10 directly to Release 11. The hardware identified above in "Upgrade Retrofit From NTGX01AA to NTGX01AB (MM8 to MM9)" on page 21-87 is required for MM Release 11.

7.2.3.4 MSL100 and DMS100 Host Hardware Requirements

The MSL100 PBX requires the following switch hardware to support the MSMC:

NT6X18BA WLC TYPE B line cards: Provision 1 (one) per MSMC voice port configured for ground start signaling.

NT1X89BA/BB I/O CARD: Provision 1 (one) per SMDI link. Connection must be made on port 3 and the NT1X89BB must be dedicated to the MSMC.

Provide spares for the NT6X18BA and NT1X89BA/BB as needed.

7.2.4 Office Layout Information

Not applicable.

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7.2.5 Traffic Tables

The table shown indicates the heaviest traffic (in CCS) for which the system should be engineered. For a better grade of service additional channels should be allocated. With UCD (Uniform Call Distribution) queue used, the system does not block but rather delays caller in queue, listening to ringback, until a channel is available. The recommended grade of service is 'P.05' - 5% probability of delay in queue exceeding 6 seconds, i.e. one ring cycle. When no UCD is deployed and MLHG (Multi Line Hunt Group) is used instead, the system will block when all channels are busy, and must be engineered to a lower throughput; P.02 is recommended.

The traffic tables for various blocking and non-blocking grades of service indicates:

- the traffic that can be handled by a given number of nodes (CCS, and calls per hour assuming 0.4CCS per call)
- the number of users this represents (heavy use: 0.7 busy-hour CCS/user and light use: 0.2/0.3 busy-hour CCS/user)
- an estimate of the number of ports required for networking based on typical centrex use.

Note that the use of broadcast messages or large distribution lists can result in a surge of login traffic. Sending a broadcast message results in all message waiting lights coming on in a short period of time. Users will notice the visual MWI and many will attempt to log in to retrieve the message immediately. All ports may become busy, and callers will be blocked (no UCD) or delayed (UCD) while waiting for a free port. Note that external callers may be affected as well, since Call Answering competes with Login for voice ports. It is advisable that broadcast messages not be sent at peak hours.

Networking traffic is generated by AMIS Open Networking, which supports ad-hoc messaging to an open user community, and Private Networking, which supports messaging among a closed user community distributed over a closed set of sites (Centrex or PBX based). In both applications, all message transport is performed via voice call, with control information signalled via DTMF and message transfer via analog play/record on any voice channel. Networking traffic from AMIS message transfers resulting from compose operations can be expected to increase traffic by about 6% under typical use.

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Voice Ports	Busy hr traffic (CCS)	Calls/ Hour (30 sec)	Number of Users (.2ccs/user)	Number of Users (.7ccs/user)	Networking Ports
48	1258.1	4194	6290	1797	2
72	1982.7	6609	9913	2832	2
96	2718.6	9062	13593	3884	3
120	3460.9	11536	17304	4944	4
144	4207.8	14026	21039	6011	4
168	4957.9	16526	24789	7083	5
192	5710.5	19035	28552	8158	6

UCD: Non-blocking P.05 Delay > 1/6 Hold Time (One Ring Cycle)

Voice Ports	Busy hr traffic (CCS)	Calls/ Hour (30 sec)	Number of Users (.2ccs/user)	Number of Users (.7ccs/user)	Networking Ports
48	1149.8	3833	5749	1642	2
72	1847.2	6157	9236	2639	2
96	2560.7	8536	12803	3658	3
120	3284.1	10947	16420	4692	4
144	4014.4	13381	20072	5735	4
168	4749.9	15833	23749	6786	5
192	5489.5	18298	27447	7842	6

UCD: Non-blocking P.01 Delay > 1/6 Hold Time (One Ring Cycle)

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Voice Ports	Busy hr traffic (CCS)	Calls/ Hour (40 sec)	Number of Users (.3ccs/user)	Number of Users (.7ccs/user)	Networking Ports
48	1382.1	3455	4607	1974	3
72	2197.3	5418	7342	3139	5
96	3027.6	7569	10092	4325	6
120	3867.1	9668	12890	5524	8
144	4712.7	11782	15709	6732	9
168	5562.9	13907	18543	7947	10
192	6416.5	16041	21388	9166	12

MLHG: P.02 Blocking

Voice Ports	Busy hr traffic (CCS)	Calls/ Hour (40 sec)	Number of Users (.3ccs/user)	Number of Users (.7ccs/user)	Networking Ports
48	1299.9	3259	4333	1857	3
72	2086.4	5216	6955	2951	5
96	2891.0	7228	9637	4130	6
120	3706.7	9267	12356	5295	8
144	4530.0	11325	15100	6471	9
168	5562.9	13397	17863	7655	10
192	6192.0	15480	20640	8846	12

MLHG: P.01 Blocking

An average message length has been determined to be 40 seconds. At this level each networking port can transmit/receive about 51 messages per hour. Under normal conditions 2 networking ports is sufficient for all but the largest systems as can be seen in the following table.

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NUMBER OF VOICE PORTS	NETWORKING CHANNELS	NETWORKING CALLS PER HR. (40SEC. MESSAGES)
72	2	102
96	3	153
144	4	204
168	5	255
192	6	606

Figure 28. NETWORK CHANNELS ESTIMATE

With the following considerations networking can be expected to increase traffic by about 3% as compared with local traffic:

A higher use of COMPOSE-SEND will increase networking traffic. If 2 % of messages are the result of compose instead of 10%, the network port requirement is almost doubled.

A longer average message length may increase network port requirements. If the average message length is 50 seconds rather than 40, the expected network traffic increase by 13%.

If the average number of recipients per message is 5 rather than 4, the network traffic increases by 23%.

If 20% of recipients are remote instead of 3, network traffic goes up by 2%. The sensitivity to the number of sites increases if the percentage of remote recipients goes up since more messages will have to be transmitted to multiple sites.

Messages to other sites are queued until they can be sent. If network traffic is heavy in comparison to the number of available ports, these queues may become backlogged and messages will not be delivered as quickly. In general, doubling the number of ports will halve the message delivery time. Economy-class messages are held in the queue until off hours. If this feature is used extensively, fewer network ports will be needed and networking will have a reduced impact on voice port requirements.

If traffic is heavy between two sites, the modems can become tied up with traffic across this link and messages to other sites may be blocked unless other modems are available (proprietary networking).

If communication patterns are not symmetrical, for example, if twice as many messages are received than are sent, network port requirements must be adjusted accordingly.

7.2.5.1 System Capacity

MSMC maximum capacities:

Max. Voice Ports	Max. + of storage Hours	Max. + of Mailbox	Disk Mod. Ckt Pack (Shadowed)
48	150	5291	NTGX14AB
	300	10,582	NTGX14BB
72 or 96	300	10,582	NTGX14AB
	600	21,164	NTGX14BB
120 or 144	450	15,873	NTGX14AB
	900	31,746	NTGX14BB
168 or 192	600	21,164	NTGX14AB
	1200	42,328	NTGX14BB

NOTE: NTGX14AB 75HRS/NODE
NTGX14BB 150HRS/NODE

Figure 29. MSMC Maximum Capacities

7.3 Product/System Specification

7.3.1 Physical Characteristics

The MSMC NTGX01AB CABINET IS HOUSED IN A superNode C42 cabinet.
The dimensions of the cabinet are :

- * 72in. high(1.83m)
- * 42in. wide(1.07m)
- * 28in. deep(0.71m)

7.3.2 EMI/Earthquake Information

The MSMC complies with Part 15 and Part 68 of the FCC rules.

7.3.3 Sparing Information

Spares for MSMC in CO environment

PEC	Description	Spares
NTGX04AA	MMAIL BUS TERM TRAN MOD PB	1
NTGX04BA	MMAIL BUS EXT TRANS MOD PB	1
NTGX05AA	68K MAIN CIRCUIT PACK	1 or 2
NTGX06AA	68K TRANSITION MODULE PB	1 or 2
NTGX07AA	MODEM TRANSITION MODULE PB	1
NTGX08AA	T1 MAIN CIRCUIT PACK	1
NTGX09AA	T1 TRANSITION MODULE PB	1
NTGX10AA	BUS CONTROLLER MAIN CP	1
NTGX11AA	BUS CTLR TRANSITION MOD PB	1
NTGX12AB	VP12 WITH 57 MHZ DSPS CP	1 or 2
NTGX14AB	1200MB DISK MODULE ASSY	1 or 2
NTGX14BB	DUAL 1200MB DISK MOD ASSY	1 or 2
NTGX15BA	DISK TAPE MODULE ASSEMBLY	1
NT9X91AC	+5V/+12V Power Converter CP	2
NT0X96EH	SMDI Link cable	1

Note: Spares for the above Circuit Packs should be one (1) or two (2) for the common packs at the customer's discretion especially in market-places that have the 48-hour replacement service.

Spares for MSMC in non-traditional CO environment

The following shows the critical minimal sparing list for MSMC used in a non-traditional CO environment like PCS (Personal Computer Systems) to provide cost competitiveness. This list takes advantage of spares pooling and shows 3 (three) levels of sparing for systems with 1, 2 and 3 to 10 MSMCs.

PEC	Description	Spares for no. of MSMCs		
		+ + + + +		
		1	2	3 or more
NTGX05AA	68K MAIN CIRCUIT PACK	1	2	3
NTGX06AA	68K TRANSITION MODULE PB	1	1	1
NTGX08AA	T1 MAIN CIRCUIT PACK	1	1	1
NTGX10AA	BUS CONTROLLER MAIN CP	1	2	2
NTGX11AA	BUS CTLR TRANSITION MOD PB	1	1	1
NTGX14AB	1200MB DISK MODULE ASSY	1	2	2
NTGX14BB	DUAL 1200MB DISK MOD ASSY	1	2	2

7.3.4 Power Feed and Fusing Requirements

The following fuses and feeds are required:

The MSMC requires -48V DC through separate battery feeders A and B. A fully configured 192 port system, the power consumption is 50A at -48v. A system from 24-48 ports the power consumption is 20A at -48v.

The MSMC has the following fusing requirements per shelf:

SHELF	FUSING (AMP)
00-13 A,B FEED	20A EA.
26-39 A,B FEED	30A EA.
COOLING UNIT A,B	10A EA.

7.3.5 Current Drain Information

Current Drain for the circuit packs are:

PEC	DESCRIPTION	POWER CONSUMPTION (AMPS NOMINAL)
* NTGX04AA	Bus terminator TM	0.930
* NTGX05AA	68K	4.55
* NTGX06AA	68K TM at 12V CL	0.061
	68K TM at 5V CL	0.530
* NTGX06AB	68K TM RS232 AT 5V	0.600
* NTGX07AA	Modem TM	0.200
* NTGX08AA	T1	2.24
* NTGX09AA	T1 TM	0.699
* NTGX10AA	Bus Controller	2.00
* NTGX11AA	Bus controller TM	0.166
* NTGX12AB	VP12 card	5.96

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7.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

The MSMC requires at least Meridian Mail Release 9 software.

7.4.1 Required Software Packages and Interdependencies

7.4.1.1 MM9 Software Packages

The MM9 software packages available for the MSMC are :

- NTZB50AA Basic
- NTZB53AA Multi-SMDI
- NTZB52AA Enterprise Networking
- NTZB51AA Voice Forms
- NTZB54AA Multi-Customer
- NTZB58AA Fax On Demand
- NTZB56AA Access Enable
- NTZB57AA AdminPlus
- NTG628AA Family Mailboxes
- NTZB55AA Additional Languages
- NTZB59AA Release 8 to Release 9

7.4.1.2 MM10 Software Packages

The MM10 software packages available for the MSMC are :

- NTZB50AB MSMC Base SW
- NTZB53AB Multi-SMDI
- NTZB52AB Enterprise Networking
- NTZB51AB Voice Forms
- NTZB54AB Multi-Customer
- NTZB58AB Fax On Demand
- NTZB56AB Access Enable
- NTZB57AB AdminPlus
- NTZB55AB Additional Languages
- NTZB59AB Release 9 to Release 10

7.4.1.3 MM11 Software Packages

The MM11 software packages available for the MSMC are :

- NTZB50CA MSMC Base SW
- NTZB53CA Multi-SMDI
- NTZB61CA Meridian Proprietary & Enterprise Networking
- NTZB51CA Voice Forms
- NTZB54CA VMUIF, Family Mailboxes & Multi-Customer
- NTZB58CA Fax On Demand
- NTZB56CA Access Enable
- NTZB57CA AdminPlus Enable & Reporter

NTZB60CA AMIS Networking
NTZB67AA Rls 8 to 11 Upgrade
NTZB67BA Rls 9 to 11 Upgrade
NTZB67CA Rls 10 to 11 Upgrade

7.4.2 Software Usage Restrictions

Not applicable.

7.4.3 Memory Provisioning

Not applicable.

7.5 Real Time Impact

Not applicable.

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8.0 ECM566 - CALRS Loop Test Equipment: RTU-AMH & DRTU-AMH

8.1 Overview

The Centralized Automated Loop Reporting System (CALRS) is an operations support system that maintains the loop portion of a telephone network. CALRS does this by fully or partially automating the RSB's operating environment. It functions through a combination of:

UNIX-based microcomputer systems,
Northern Telecom test interface equipment, and
extensive software application code.

Testing capabilities are centralized for both Host and Remote switches. When equipped for trouble report management, trouble reports are stored in computer-accessible form to eliminate paper flow and to increase efficiency.

The Remote Test Unit (RTU) is a remote test head which is installed in a switching center to allow CALRS loop testing into that location.

The Digital Remote Test Unit (DRTU) can be installed in digital remote exchanges, Digital Line Carrier (DLC) remote terminal locations, and pair-gain devices to provide CALRS loop testing from those remote locations. The DRTU is operated as a test device which is a slave to a host RTU. The DRTU can also be directly accessed by CALRS in some digital switches (for systems equipped with Split Connect & Test version 7.2 or higher).

Communications between the CALRS 32-bit Test System and the RTU can be via:

- the Case/Rixon network
- an RS232 cable up to 250 ft. (75m),
- a dedicated data circuit (300, 1200 or 2400 bps),
- an X.25 Network link and pad,
- an Ethernet LAN/WAN 802.3 TCP/IP link and terminal server,
or
- a dial-up telephone number over the switched network.

The dial-up path can be assigned a backup role whenever the dedicated or networked circuit is utilized.

AMH Description

The AMH (Advanced Measurement Head) is a digital-signal-processing-based metallic loop test head which will replace the XFM (extra Fast Meter) used in CALRS test units. The AMH improves the testing accuracy and can accept remote software downloads from a 32 bit test system to

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add future features such as DRTU sounder with supervision, noise measurements, Meridian Business Set testing, and ISDN testing.

AMH DRTU

The AMH DRTU is a loop measurement unit which simplifies metallic line access and testing in digital remote carrier systems (DMS-1, DMS-10, OPM). It is supplied with brackets to mount in a 19" or 23" frame. Brackets for mounting in a 26" frame are provisionable. In a DMS cabinet, it can be placed directly above the batteries. The unit contains a single circuit board which exists today in previously standardized units such as the Local Test Cabinet or Remote Test Unit.

AMH RTU

The AMH is a loop measurement card which simplifies metallic line testing in any host switch. It is installed in the Remote Test Unit in place of the XFM card. It is shipped with new CPS firmware which is pre-installed in new RTUs, or field installed on upgraded XFM RTUs.

8.2 Hardware Provisioning

8.2.1 Hardware Usage Restrictions

Not applicable.

8.2.2 Hardware Dependencies

Not applicable.

8.2.2.1 P and C Side Port Requirements

Not applicable.

8.2.2.2 DMS BUS Port Requirements

Not applicable.

8.2.2.3 Circuits Per Card

Not applicable.

8.2.2.4 Discrimination Numbering

Not applicable.

8.2.3 Provisioning Considerations

8.2.3.1 Generic Requirements for Loop Testing Using AMH

The generic switch requirements for loop testing using AMH products are:

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Analog test trunk facilities to communicate line access information to the switch, or digital interface through the I/O port of a digital host or remote network element.

Test bus to allow a metallic path from the test equipment to the subscriber's line.

The ability to remotely manipulate the test bus through analog test trunk facilities and/or digital interface facilities as previously described.

8.2.3.2 DMS-100 Requirements for Loop Testing Using AMH

For RTU provisioning, the following requirements should be adhered to:

A minimum of one NT2X90 Test Trunk per Host DMS-100.

One NT2X90 Test Trunk is required per RTU or cluster of RTUs.

Each NT2X90 Test Trunk requires access to a host Metallic Test Access Horizontal assignment.

Two line cards are required at each central office Host location for RTU communications: one for dial-in from CALRS and one for callback to the CALRS operator.

If dedicated access is required, one 2-wire dedicated facility path is required between each RTU and CALRS.

To provide the DRTU in an integrated carrier or remote switch (i.e. OPM, RLM, etc.), consider the following items:

This requires two telephone lines: 1 for dial-in from RTU, and 1 for callback (for monitor and talk features).

MTA Data Assignments (for Digital switches) must be done (cross-connected from MTAVERT to TEST "IN" side of Signature Cards), and Remote Switch (cross-connected from TEST "IN"/TEST "OUT" of DRTU to MTAHORIZ).

Each DRTU located at a Remote requires Host NT3X09 or NT2X50 Vertical assignment for routing to a Signature Card.

Each DRTU located at a Remote requires Remote NT3X09 or NT2X50 Horizontal assignment or Test Bus access to DRTU testing connections.

One line card is required at each central office Host

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location for an AUL line at the DF. This is required to connect each DRTU when using dial-up access.

To provide the DRTU in a CR/RT configuration, the following provisioning items should be considered:

DRTUs have only a callback line. In this case, two Line Terminal assignments are required: one to serve the callback line and one to serve the Test Access circuit. The LTs should be assigned to work in the cabinet or hut in which the DRTU is to be installed.

One line card is required at the Remote for callback to the CALRS operator.

The Signature Shelf provides two functions in an integrated carrier system. The first function is a 56.2 Kohm "signature" (similar to that provided by the CT in a CT/RT system). The signature is used to alert the RTU that a line working from a remote DMS site is being accessed. The second function provided by the signature shelf is one in which the signature shelf seizes a touch tone ring down line (AUL option in DMS Host) which sets up a communications circuit to the telephone line assigned as a DRTU dial-up at the remote location.

Signature Shelf usage indicates the following requirements:

Dial-up lines must be installed with the AUL option DMS software.

One line card is required for the AUL dial-up line.

Note: If using CALRS Admin version 7 or higher, signature cards are not required.

Signature cards may be mounted on either a signature shelf or an applique shelf.

8.2.4 Office Layout Information

Not applicable.

8.2.5 Traffic Tables

Not applicable.

8.3 Product/System Specification

8.3.1 Physical Characteristics

The physical characteristics of the Remote Test Unit (RTU) are as follows:

Width.	43.18 cm (17 in.)
Depth.	30.48 cm (12 in.)
Height	50.8 cm (20 in.)
Ventilation above and below.	10.16 cm (4 in.)
Weight	23 kg (50 lbs.)
Can be mounted in a standard 19 in. or 23 in. frame, or optional 26 in. frame.	

The physical characteristics of the Digital Remote Test Unit (DRTU) are as follows:

Width.	43.18 cm (17 in.)
Depth.	35.56 cm (14 in.)
Height	4.45 cm (1.75 in.)
Weight	3.63 kg (8 lbs.)
Can be mounted in a standard 19 in. or 23 in. frame, or optional 26 in. frame.	

8.3.2 EMI/Earthquake Information

Not applicable.

8.3.3 Sparing Information

DRTU-AMH

Sparing for the DRTU-AMH is done by providing a complete DRTU-AMH and a case to contain it. Quantity and location of spares is determined by the customer.

Ordering Code	Description
-----	-----
C0ASB004	DRTU AMH Spares Case
NTAN60AA	DRTU AMH

RTU-AMH

For the RTU-AMH (4 or 16 trunk), a spares kit consists of the following:

Ordering Code	Description
-----	-----

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	C0ASB001	RTU Spares Case
	NT0J0828	IFC Board
	NT0J0824	Tip/Ring Conditioner
	NT0J0825	Tones Board
	NTAN00AB	AMH Board
	NTAN70AA	Loop Test Processor
*	NT0J04ED	DRTU Interface Board
	NT0J04EC	Remote Access 2
*	NT0J05AP	Cbl Fault Loc MUX/CP (2 CPs)
	NT0J0811	Power Supply
	NT0J0517	Lower Pan Assembly
*	NT0J0829	4 Channel MUX
	and/or	
*	NT0J0827	16 Channel MUX

- * Items with an asterisk are optional for the spares kit, according to whether those items are used in the RTUs supported by the spares kit.

8.3.4 Power Feed and Fusing Requirements

The power feed and fusing requirements for the Remote Test Unit (RTU-AMH) are as follows:

2 A for alarm battery
5 A for C0 battery
-48 V DC power

The power feed and fusing requirements for the Digital Remote Test Unit (DRTU-AMH) are as follows:

2 A for C0 battery
-48 V DC power

8.3.5 Current Drain Information

Not applicable.

8.4 Software Provisioning

For NTX software packages to PCL/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

8.4.1 Required Software Packages and Interdependencies

Not applicable.

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8.4.2 Software Usage Restrictions

The CPS firmware load associated with the AMH RTU is different than that used in the XFM RTU. Therefore, field technicians MUST NOT swap an XFM card for an AMH card (or vice versa) unless the corresponding CPS card is also changed.

It is not necessary for the RTU/LTC host and DRTU to be equipped with an AMH circuit board for regular testing. An XFM RTU can control the testing of an AMH DRTU. However, an AMH RTU is required if new software needs to be downloaded remotely to an AMH DRTU.

8.4.3 Memory Provisioning

Not applicable.

8.5 Real Time Impact

Not applicable.

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9.0 ECM598 - DMS Large Tandem (210 DTC7 Large Tandem)

9.1 Overview

The DMS Large Tandem is not a new product. The DMS-200 and DMS-250 are existing products. The DMS-200 resides in a toll office which provides connections to other tandem switches and carrier switching centres. They do not support subscriber lines terminating on them. On the other hand, the DMS100/200 is an application that combines the end-office functions of the DMS-100 system and the tandem functions of a DMS-200 systems. DMS-250 is a tandem switch using only trunk facilities to carry traffic over long distances. They are typically used by the interexchange carriers (IECs). The Large Tandem configuration of DMS-200 (NOT the DMS-100/200) and DMS-250 systems are those which support more than 140 DTC7s and/or more than 40,000 ISUP trunks.

The DMS Large Tandem differs from the basic products mainly in the larger numbers of DTCs and ISUP trunks and the higher levels of call traffic and the billing record generation supported. The DMS Large Tandem is provisionable as a Service Switching Point (SSP) only, NOT as an INODE. INODE means an integrated node which combines the functionality of an STP with an SSP. The DMS Large Tandem uses the same operations, administrations, and maintenance systems as the basic DMS-200 and DMS-250 for the user perspective.

Common Channel Signaling No.7 (CCS7)

CCS7 signaling is a generic term for a telecommunications system using two separate paths for information transfer: one for voice/data and one for signaling information. The CCS7 protocol represented by four parts:

- Message Transfer Part (MTP)
- Signaling Connection Control Part (SCCP)
- Integrated Services Digital Network User Part (ISUP)
- Transaction Capabilities Application Part (TCAP)

The MTP ensures reliable transfer of signaling units in correct sequence without loss or duplication, and the ISUP provides signaling for setting up, monitoring, and taking down CCS7 calls on ISUP trunks using MTP. The ISUP is called a user part because it transports signaling messages associated with the connection between two users in a network.

There are three levels to the MTP.

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- Physical level is the level one, and it is performed by the NT9X77 or the NT9X78 PBs.
- Link Level is the level two, and it is performed by the NT9X76 pack.
- Network level is the level three, and it performs logical address routing. This level is done by the NTEX22 card.

Message routing prior to External Routers

Within the SSP, the Digital Trunk Controller #7s (DTC7s) route ISUP messages to the appropriate LIU7. This routing function is controlled by several routing tables kept centrally in the Computing Module (CM) and locally in the DTC7s. The router in the DTC7 performs a lookup in the CCS7 database to choose a physical signaling link. The ISUP message is then sent to the correct LIU7. The LIU7 re-verifies the integrity of the signaling link and the route chosen by the DTC7 and passes the message to the CCS7 link.

Message routing with External routing using LIU7 Routers

The volume of messaging required to keep DTC7s informed of CCS7 routing changes can be extremely high and can become a real-time issue. External Routing enhances the manner in which this MTP routing function is performed within the SSP. In order to reduce the quantity of messaging required to keep the dynamic routing information up to date in the DTC7s, the MTP function is disabled in the DTC7s and moved to an External Router. This removes the need to maintain the CCS7 database in the DTC7. Given an ISUP message, The DTC7 now simply chooses one of the available External Routers based on the data in the External Router database. The External Router then performs the MTP routing function that was previously located in the DTC7s. The External Router looks up the appropriate information in the CCS7 database to determine which signaling link to use and then sends the message to the LIU7 associated with that link.

Hardware description for External Routers

External Routers must be at least eight Meg LIU7s. They are physically the same as the LIU7s used for signaling links. Physical links are not permitted for an LIU7 configured as an External Router. Even if a link is attached, it will not be used.

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9.2 Hardware Provisioning

9.2.1 Hardware Usage Restrictions

The DMS Large Tandem is provisionable as a Service Switching Point (SSP) only, NOT as an INODE.

The DMS Supernode SE (SNSE) does not support large tandem configurations.

LIU7s configured as External Routers are dedicated to that function only and CANNOT be used for Signalling links.

The CSP06 ENET load will not be supported with the NT9X13FA and earlier ENET processor cards.

9.2.2 Hardware Dependencies

External Routers are only supported on SSP and only upto a maximum of eight can be configured for any installation.

The NT9X13KA (16 Mbyte) ENET processor card will be introduced in in CSP06 and this is required to support the larger local ENET load.

9.2.2.1 P and C Side Port Requirements

Not applicable

9.2.2.2 DMS BUS Port Requirements

Not applicable

9.2.2.3 Circuits Per Card

Not applicable

9.2.2.4 Discrimination Numbering

Not applicable

9.2.3 Provisioning Considerations

Refer to -- Heading id 'D200598' unknown -- and -- Heading id 'D250598' unknown -- for how to to engineer DMS Large Tandems.

9.2.4 Office Layout Information

Not Applicable

9.2.5 Traffic Tables

Refer to the following SEBs:

SEB 92-02-001 Provisioning Rules for LPP, SNSE and FLIS LIS.

SEB 92-01-001 Link Interface Unit (LIU7) Memory Calculations.

9.3 Product/System Specification

9.3.1 Physical Characteristics

Not Applicable

9.3.2 EMI/Earthquake Information

Not Applicable

9.3.3 Sparing Information

Not Applicable

9.3.4 Power Feed and Fusing Requirements

Not Applicable

9.3.5 Current Drain Information

Not Applicable

9.4 Software Provisioning

The table below lists the software units supported in the DMS Large Tandem up to and including CSP06.

Office Type	Product Computing Module-Load (PCL)	Development Release Units (DRUs)
DMS-200	LECB004, CDNB004	CSP04
	LECB005, CDNB005	CSP05
	LECB006, CDNB006	CSP06
DMS-250	MCI06	CSP04
	MCI07, MCI08	CSP05
	MCI09, MCI10	CSP06

	SSR06, IEC05	CSP04	
	+-----+	+-----+	
	SSR07	CSP05	
	+-----+	+-----+	
	SSR08	CSP06	
	+-----+	+-----+	
	UCS05	CSP04	
	+-----+	+-----+	
	UCS06	CSP04	
	+-----+	+-----+	
	UCS07	CSP05	
	+-----+	+-----+	

9.4.1 Required Software Packages and Interdependencies

Not applicable.

9.4.2 Software Usage Restrictions

System Application Engineers MUST ensure that DMS-200 S/W load for each CSP release, for the Large Tandem (which meets one or both of the following criteria: more than 140 DTC7s or more than 40,000 ISUP trunks) MUST first be tested in that CSP release or above in at least one DMS-250 BNR lab at the maximum configuration level before being supplied to the customer sites.

9.4.3 Memory Provisioning

The table below describes the memory limitations for the Series 50, 60 and 70 processors.

+-----+	+-----+	+-----+
Platform	CSP04	CSP05
+-----+	+-----+	+-----+
Series 50	248-Mbyte	248-Mbyte
+-----+	+-----+	+-----+
Series 60	400-Mbyte	608-Mbyte
+-----+	+-----+	+-----+
Series 70	400-Mbyte	736-Mbyte
+-----+	+-----+	+-----+

9.5 Real Time Impact

Refer to the System Engineering Bulletin for your application.

Refer to table in -- Figure id 'A1A1598' unknown -- for DMS-200.

Refer to table in -- Figure id 'B1B1598' unknown -- for DMS-250.

10.0 ECM624 - CompuCALL

10.1 Overview

The block diagram on Figure 30 on page 21-112 illustrates in outline a typical hardware configuration required for operating the CompuCALL feature.

CompuCALL is a Central Office (CO) service using an Open System Interconnection (OSI) based application level interface between the CO DMS-100 switch and external equipment such as a computer located at a service providers premises. CompuCALL is considered to be a software feature because no new hardware is introduced for CompuCALL.

CompuCALL software comprises applications residing in the DMS and in the service providers host computer, both of which exchange messages relating to call processed in the DMS. The Switch Computer Applications Interface (SCAI) messaging protocol is used.

A CompuCALL application requires one or more data links from the IOC (Input Output Controller) to the Service Providers Premises. The number of links installed in a particular DMS switch providing CompuCALL service depends upon the following factors:

- Number of service providers premises served.
- Expected data traffic per Session per Service Provider

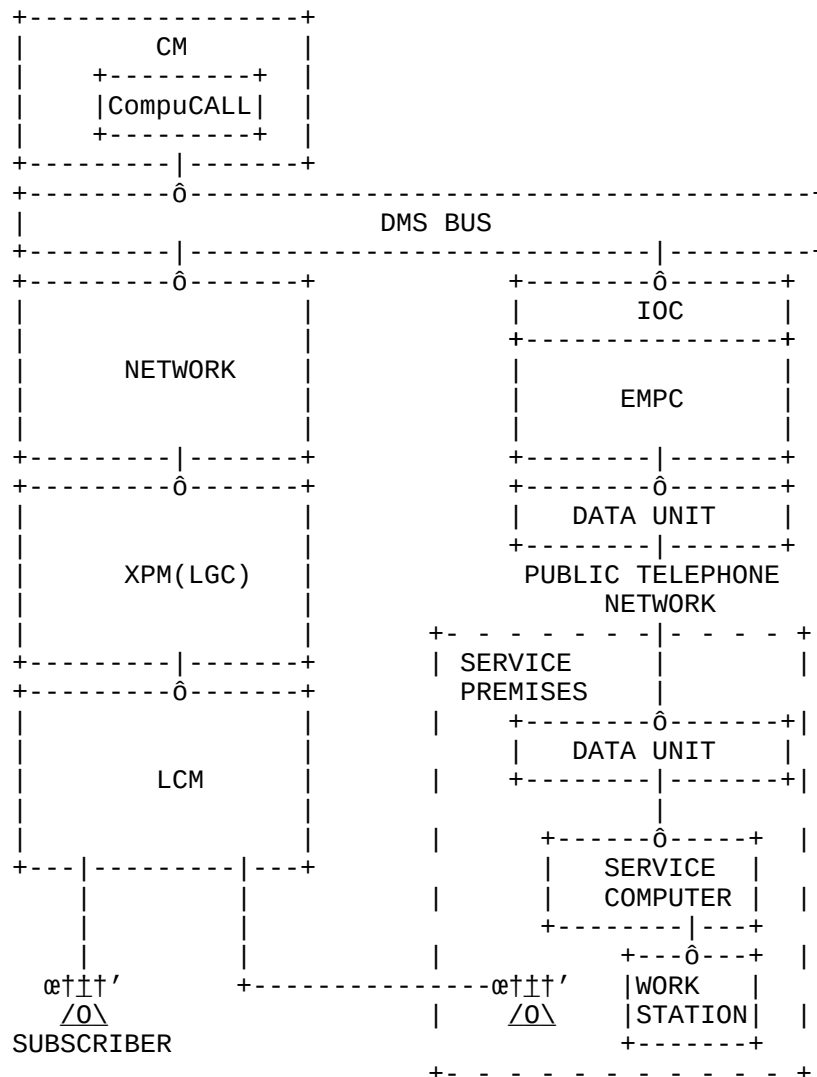


Figure 30. CompuCALL System - Block Diagram

The traffic expected per application is to some extent dependent upon the DMS feature interfacing the service provider through CompuCALL. Currently the following features are capable of using the CompuCALL interface.

- Meridian Automatic Call Distribution with Extended Call Management. The combination of MACD with CompuCALL gives the feature entitled MACD CompuCALL.

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10.1.1.1 CompuCALL on Meridian Cabinet Product Line(MERIDIAN

SCAI)

There no differences between the Meridian Cabinet application (Meridian SCAI) and the standard DMS100 offering. The Software is the same. The only difference is in the cabling application restrictions. (Ref. "Hardware Usage Restrictions")

10.2 Hardware Provisioning

10.2.1 Hardware Usage Restrictions

10.2.1.1 EMPC Port Usage Recommendation

Although the EMPC can serve two data link ports, only one port should be used in CompuCALL applications.

10.2.1.2 Meridian Cabinet Cabling Restrictions(X.25/V.35)

When providing for MERIDIAN SCAI on Meridian Cabinets X.25 is the interface available for engineering the link from the DIO in the MCEX cabinet to a modem card in the MCGM cabinet. Bulkhead and wiring restrictions between the two cabinets (MCEX/MCGM) exclude the use of V.35 in this configuration.

The NT1X89 EMPC CP will be located in the MCEX DIO, a cabling interface will connect the EMPC to a rack mounted modem in the MCGM cabinet. A tip and ring cable will link the modem in the MCGM to MDF cross connect point for customer modem/device.(Ref. CANX11)

If a V.35 interface is required the EMPC will need to interface a standalone modem. The modem will need to be powered from an AC power outlet via an isolation power inverter.

10.2.2 Hardware Dependencies

None identified.

10.2.2.1 P and C Side Port Requirements

10.2.2.2 DMS BUS Port Requirements

10.2.2.3 Circuits Per Card

10.2.2.4 Discrimination Numbering

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10.2.3.2 CompuCALL Links

A compucall link is a logical Switched Virtual Circuit (SVC) which carries messages between a DMS 100 application, e.g., MADDC, and a service provider's host computer.

Up to and including BCS 34, a session is carried by a maximum of one SVC and a maximum of one session is carried by one SVC. Refer to "CompuCALL Sessions" on page 21-114 for the definition of a session.

From and including BCS 35, a session may be carried by more than one SVC. This capability may be used to improve CompuCALL reliability.

SVCs are set up on X.25 physical links. Currently, CompuCALL links are restricted to one (1) SVC per X.25 physical link.

10.2.3.3 MACD CompuCALL/SMDI (Simplified Message Desk Interface)

The AUXCP scheduler class was originally introduced for the incoming message processing function of SMDI. This scheduler class is therefore shared with SMDI if this feature is present in the switch. The sum of guaranteed CP real time allocated to both MACD CompuCALL messaging and SMDI shall result in a setting of no greater than 25% for the office parameter AUXP_CP_SHARE.

10.2.3.4 Information Needed for Provisioning

1. Number of Service Providers

a. Number of Service Providers <SVCE PROVIDERS> =_____

2. Redirection Option

a. Is MADDC CompuCALL redirection option
required (Yes or No) <SCAIREDIR> =_____

3. Service Provider Information

For each Service Provider, answer the following questions:

number of simultaneous CompuCALL Sessions
required <MAX SESSIONS> =_____

For each Session, answer the following questions, based on HDBH traffic:

a. Inbound MACD COMPUCALL CA (Call Attempts)/Hour
(HDBH) w/o redirection option

< MACD CCALL IN W/O REDIRECT CA/HOUR> =_____

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- b. Inbound MACD COMPUCALL CA/Hour (HDBH)
W/ redirection option
zero (0) redirects/call

< MACD CCALL IN W/ REDIRECT (0) CA/HOUR> =_____

- c. Inbound MACD COMPUCALL CA/Hour (HDBH) W/ redirection
option one (1) redirect/call

<MACD CCALL IN W/ REDIRECT (1) CA/HOUR> =_____

- d. Outbound MACD COMPUCALL CA/Hour
< MACD CCALL OUT CA/HOUR>

=_____

- e. X.25 Link Bandwidth

<DATA SPEED> (Check one) =:

1) Bandwidth <9600 bits/s> _____

2) Bandwidth <19200 bits/s> _____

3) Bandwidth <56000 bits/s> _____

- f. Service Provider Premises Data Modem Requirements

Answer yes or no:

Are Service Provider premises data modems to be
supplied, <SUPPLY CP MODEMS> _____

4. CO Modem Provisioning Requirements

Answer yes or no:

Are CO located data modems to be
supplied, <SUPPLY CO MODEMS> _____

10.2.3.5 Provisioning Calculations

Perform the calculations below for each Service Provider:

1. Required Number of X.25 Links

Refer to answers to questions in "Information Needed for Provisioning" on page 21-115 "Service Provider Information". To determine the number of X.25 links, for each Service Provider, calculate expected message traffic for each Session required by the Service Provider, as follows:

<TOTAL MESSAGES/SEC> =
(MACD CCALL IN W/O REDIRECT CA/HOUR/3600) x 4
+ (MACD CCALL IN W/ REDIRECT (0) CA/HOUR/3600) x 5
+ (MACD CCALL IN W/ REDIRECT (1) CA/HOUR/3600) x 10

+ (MACD CCALL OUT CA/HOUR/3600) x 3 =_____

<AVERAGE MESSAGE LENGTH> (bytes) =
 { (MACD CCALL IN W/O REDIRECT CA/HOUR/3600) x 4" x 82
 + (MACD CCALL IN W/ REDIRECT (0) CA/HOUR/3600) x 5" x 66
 + (MACD CCALL IN W/ REDIRECT (1) CA/HOUR/3600) x 10" x 53
 + (MACD CCALL OUT CA/HOUR/3600) x 3" x 46}
 divided by TOTAL MESSAGES/SEC (round up) =_____

<X.25 LINK CAPACITY> =
 lookup Figure 32 , for AVERAGE MESSAGE
 SIZE, and DATA SPEED (messages per second) =_____

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+									
AVERAGE MESSAGE SIZE IN BYTES									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+									
95 80 65 60 55 50 45									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+									
SPEED MESSAGES PER SECOND									
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+									
1	9600	11	13	16	17	18	19	20	
2	19200	20	20	22	22	23	25	25	
3	56000	20	19	20	21	22	23	23	
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+									

Figure 32. X.25 Link Capacity (MACD CompuCALL)

<NO OF X.25 LINKS> (needed for session) =
 If BCS 35 or Greater, then
 (TOTAL MESSAGES/SEC)/(X.25 LINK CAPACITY)
 (round up)
 else 1 =_____

<SUB-TOT X.25 LINKS>
 (needed for Service Provider) =
 Sum NO OF X.25 LINKS =_____

Note..If BCS is not BCS 35 or greater, check that the selected
 X.25 link bandwidth is adequate for the expected
 traffic, as follows

<BANDWIDTH> =
 If (TOTAL MESSAGES/SEC)/(X.25 LINK CAPACITY) > 1
 Then TOO NARROW
 Else OK

If BANDWIDTH is TOO NARROW then DATA SPEED must be increased to
 accommodate the estimated traffic for the Session. If DATA SPEED
 cannot be increased Session traffic must be reduced.

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2. Enhanced Multi Protocol Controller Card Provisioning

For each Service Provider calculate the number of EMPC cards required as follows:

<NUMBER OF EMPC> = SUB-TOT X.25 LINKS =_____

3. Link Protection

From BCS 35 onwards, CompuCALL will have the capability of permitting one Session to be carried on more than one SVC. This enables the provisioning of additional SVCs, to provide protection against link failure. Protection should be engineered to provide protection per CompuCALL Session.

4. Number of 9.6 kbs Modems Required

Calculate the number of 9.6 kbs modems required for each service provider as follows:

<MODEMS 9.6 KBS> = if DATA SPEED = 9600
then if SUPPLY CP MODEMS = yes
then SUB-TOT X.25 LINKS
else 0
+ if DATA SPEED = 9600
and if SUPPLY CO MODEMS = yes,
then SUB-TOT X.25 LINKS
else 0 =_____

5. Number of 19.2 kbs Modems Required

<MODEMS 19.2 KBS> = if DATA SPEED = 19200
then if SUPPLY CP MODEMS = yes
then SUB-TOT X.25 LINKS
else 0
+ if DATA SPEED = 19200
and if SUPPLY CO MODEMS = yes,
then SUB-TOT X.25 LINKS
else 0 =_____

6. Number of 56 kbs Modems Required

<MODEMS 56 KBS> = if DATA SPEED = 56000
then if SUPPLY CP MODEMS = yes
then SUB-TOT X.25 LINKS
else 0
+ if DATA SPEED = 56000
and if SUPPLY CO MODEMS = yes,
then SUB-TOT X.25 LINKS
else 0 =_____

7. Total EMPC Required

<TOT EMPC'S> = Sum of the NUMBER OF EMPC'S

calculated for each Service Provider
(refer to "Provisioning Calculations" on page 21-116) =_____

8. Total Number of 9.6 kbs Modems Required

<TOT MODEMS 9.6 KBS> = Total the number of
MODEMS 9.6 KBS calculated for
each Service Provider =_____

9. Total Number of 19.2 kbs Modems Required

<TOT MODEMS 19.2 KBS> = Total the number of
MODEMS 19.2 KBS calculated for
each Service Provider =_____

10. Total Number of 56 kbs Modems Required

<TOT MODEMS 56 KBS> = Total the number of
MODEMS 56 KBS calculated for
each Service Provider =_____

10.2.4 Office Layout Information

Refer to the Engineering Manual

10.2.5 Traffic Tables

Not applicable.

10.3 Product/System Specification

The data protocol (layer 1, physical) used on the interface between the CompuCALL data link EMPC and the Data Unit or Synchronous Modem, refer to Figure 30 on page 21-112 may be any of the following:

- RS232-C
- V.35

10.3.1 Physical Characteristics

Refer to the Engineering Manual.

10.3.2 EMI/Earthquake Information

Refer to the Engineering Manual.

10.3.3 Sparing Information

Standard sparing algorithms apply.

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10.3.4 Power Feed and Fusing Requirements

10.3.5 Current Drain Information

10.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

Software provisioning requirements for the MACD CompuCALL application are given below.

10.4.1 Required Software Packages and Interdependencies

| 10.4.1.1 COMPUCALL BASE ACD00002

| CompuCALL Base ACD00002 is always required.

| Besides the DMS SuperNode Platform, the following are other ordering codes that are required for this Function to be operational.

- | • MDC00001 Meridian Digital Centrex Minimum
- | • MDC00003 Meridian Digital Centrex Standard
- | • MDC00007 Meridian Business Set Minimum

| ACD00002 CompuCALL Base provides support for the two following Functions. For CompuCALL to be of benefit, one or both of them must also be in operation.

- | • ACD00007 - for use in the ACD environment
- | • ACD00008 - for use in the Meridian Digital Centrex environment

| 10.4.1.2 COMPUCALL FOR ACD - ACD00007

| This optional Function offers simultaneous delivery of voice and data information to ACD agents as well as capabilities for call conferencing, transferring, and interworking with interactive voice response (IVR) systems.

| In addition to the order codes required by ACD00002, the following are other ordering codes that are required for this Function to be operational.

- | • ACD00001 Meridian Automatic Call Distribution Base
- | • ACD00002 CompuCALL Base

| 10.4.1.3 CENTREX COORDINATED VOICE AND DATA - ACD00008

| This optional Function supports CompuCALL in the Meridian Digital Centrex (MDC) environment. With ACD00008 voice and data information can be simultaneously presented to a single appearance Centrex station.

| In addition to the order codes required by ACD00002, the following are other ordering codes that are required for this Function to be operational.

- | • ACD00002 CompuCALL Base

| Note that ACD00001 (ACD Base) is not required with this particular Function.

| 10.4.1.4 DMSE ORDER CODE TO BCS NTX MAPPING

Functional Group	Function	NTX Code	NTX Package Name
ACD00002		NTX59AC	CompuCALL Base
	ACD00007	NTXJ60AB	CompuCALL Coordinated Voice and Data Coordinated
		NTXJ62AA	Third-Party Call Control
		NTXJ63AA	Voice Processing Integration
		NTXS22AA	Third-Party Agent Control
	ACD00008	NTXR89AA	Centrex Coordinated Voice and Data

| **Figure 33. DMSE ORDER CODE TO BCS NTX MAPPING**

10.4.2 Software Usage Restrictions

None identified.

10.4.3 Memory Provisioning

The memory requirements for CompuCALL includes separate requirements for the SCAI base and for each of the applications. For CC memory requirements of MADC with CompuCALL use MEMCALC.

10.5 Real Time Impact

MADC CompuCALL real time impact may be considerable. Estimate MADC CompuCALL impact on real time using the Real::Time, version 6.4 or later.

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11.0 ECM682 - Building Block Engineering - Automated

11.1 Overview

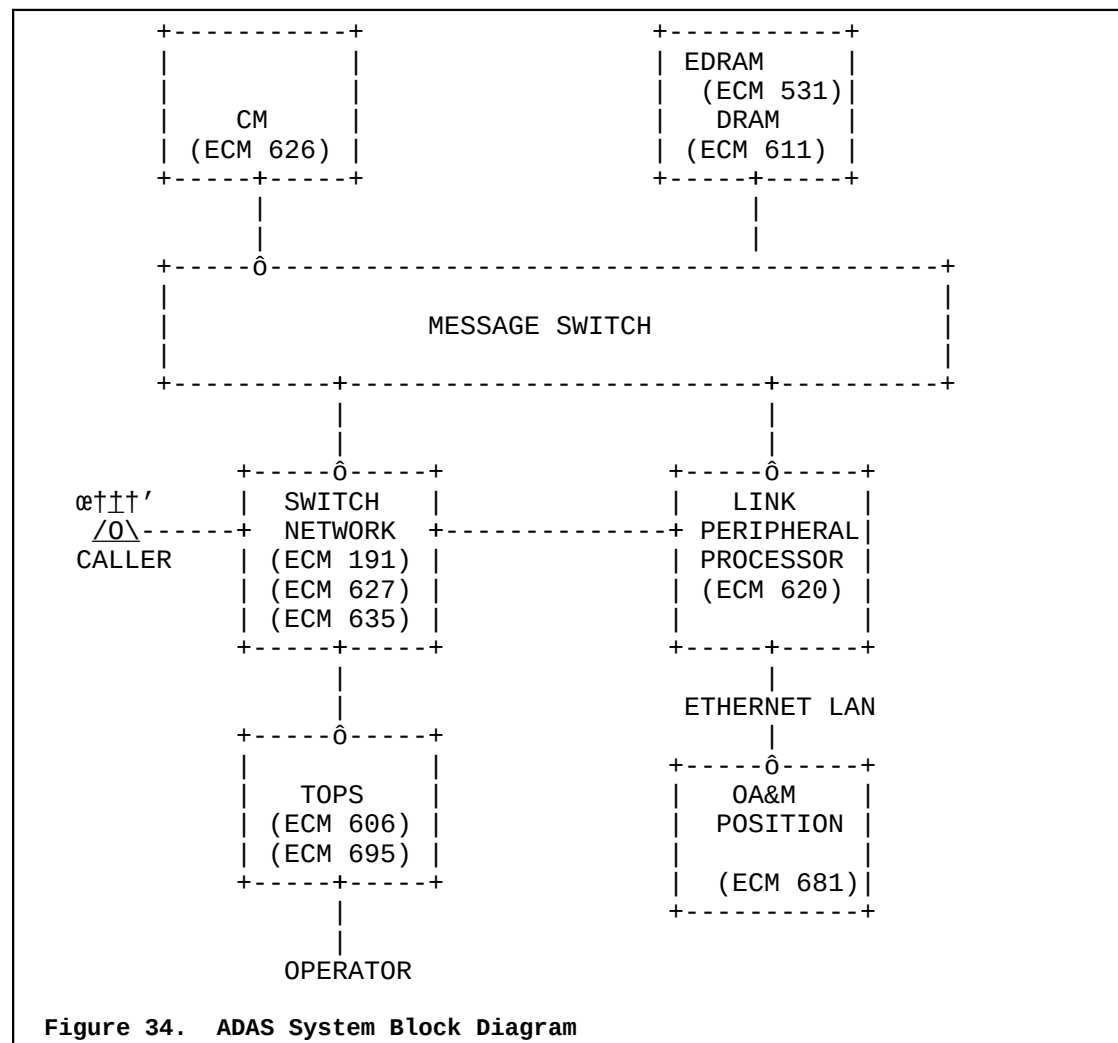
11.1.1 Purpose

The primary aim of ADAS is to reduce AWT (Average Work Time) of Directory Assistance Operators. The reduction of operator AWT is accomplished by automation of the first segment of a Directory Assistance DA call. The first segment is the part of the call in which the location and listing name of the desired directory number is determined. The remainder of the call, that is the DA database search and communication of the result to the caller is done by the operator and an ARU (Automatic Response Unit) as it is in a conventional DA call.

ADAS is a software application which operates with a SuperNode DMS 1 0/200 TOPS DA configuration and a DMS 200 TOPS DA configuration using the voice services resources provided by the LPP (Link Interface Module). Refer to ECM 620.

11.1.2 Description

Figure 34 on page 21-124 presents a block diagram of the vehicle on which ADAS operates. Each of the blocks represents a functional entity.



Briefly, call control for Operator Assistance calls is provided by TOPS software resident in the DMS 100/200/TOPS CM. DA calls are identified by TOPS and either a greeting announcement is provided by the ADAS system or by a DRA (Digital Recorded Announcement) system if the optional TOPS DA/Toll Branding Feature is used. The TOPS DA/Toll Branding feature permits different announcements to be played. Each announcement is recorded to suit the operating company selected by the subscriber. DA/Toll Branding feature announcements are generated by the DRA (Digital Recorded Announcement) system. The DRA is now MD and replaced by the EDRAM. When the ADAS or TOPS DA/Toll Branding announcement is complete, communication is established between the Caller and voice processing resources in the Link Peripheral Processor (LPP) via the switch network. Under CM control, the ADAS application software, resident in the LPP, controls the voice processing resources to provide

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the ADAS service. A description of the ADAS service is given in the "Service Description" Subsection, below.

On completion of the initial segment of the DA call, the ADAS application requests a connection, via the switch network, to provide voice communication between the Caller, and the ADAS services. When the location and name collection segment of the call is complete, ADAS plays a hold announcement to the caller and requests a caller to operator connection.

The hold announcement instructs the caller to hold the line while connection to an operator is established. The request for operator connection is made after the completion of the hold announcement. Once the connection between the operator and the ADAS service has been made, ADAS plays back to the operator the caller's responses which were recorded in the initial segment of the call. At the completion of the playback, the ADAS service is released from the call.

The Operator conducts a DA database search via a data link connection with the DA service node. When the required listing data is identified the operator releases the call to an ARU at the DA service node.

| The DRAM/EDRAM with the TOPS DA/Toll Branding feature is optionally used with ADAS to provide an initial greeting, custom recorded for the selected DA service provider, at the commencement of the ADAS serviced call. Refer to ECM 611 for DRA provisioning information, ECM 611 has been cancelled. Refer to ECM 531 for EDRA provisioning information.

The Simplex Workstation building block is required by ADAS. One Simplex Workstation is always required. ADAS supports only one Simplex Workstation. The Workstation provides a means of monitoring the operation of the components of ADAS for the purpose of optimizing the efficiency of the system. The Workstation may also be used to perform operations normally performed on the MAP. An Ethernet LAN provides the means of communication between the Workstation and the LPP. Refer to ECM 681 for OA&M Workstation provisioning information.

11.1.3 ADAS Service Description

ADAS is an application of the VPP (Voice Processing Platform) which is contained within the LPP. ADAS uses VPP voice processing resources to automate the initial segment of DA calls.

A telephone operator, typically, responds in the following way when a DA call arrives at his or her position:

- The operator answers the call with an opening announcement, e.g., "ABC telephone..."

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- The operator asks the caller for locality information, e.g., "What city please?"
- The caller responds with the locality information and the operator keys this into the TOPS using the keyboard.
- The operator asks the subscriber for the name of listing, e.g., "What name?".
- The caller responds by giving the name of the subscriber who's number he or she needs.

The ADAS feature automates this sequence. It responds with a greeting which is generated by ADAS and which is tailored to a specific operating company or, optionally, to a selection from a number of possible greetings each tailored for a different operating company. The optional feature is called Directory Assistance/Toll Call Branding. After this initial greeting the caller receives a prompt and for the required DN locality. The caller's response is recorded and the caller is prompted again, this time for the directory listing name. ADAS records the caller's response. ADAS then 'asks' the caller to wait for an operator. ADAS uses VPP resources to trim pre and post utterance silence from the caller's responses. This is done to reduce the time taken to playback the listing response.

11.1.4 ADAS Compatibility

Some of the ADAS software developments are modifications to existing TOPS products. ADAS operates compatibly with:

- TOPS MP with CCI DA service node
- TOPS MP with IBM DA service node
- TOPS MPX (IBM DA service node)

ADAS is designed to operate compatibly with the following systems:

DMS 100/200/TOPS (SuperNode) and DMS 200/TOPS switches

- Configured as an HOC (Host Operator Centralization)
- Configured as an ROC (Remote Operator Centralization). For ROC operation, ADAS is directly integrated with the ROC, i.e., VPP/ADAS hardware is co-located with the ROC. In this configuration, the ADAS ROC may operate with an HOC that is not equipped with ADAS hardware but which is equipped with TOPS software compatible for operation with ADAS ROC's. For illustration, refer to Figure 34 on page 21-124.
- Configured as an SA (Stand Alone) operator center

ADAS operates with the following TOPS configurations:

- TOPS MP with TMS (TOPS Message Switch) using CCI DA or IBM DA service.
- TOPS MP without TMS using CCI DA service.
- TOPS MPX with TMS using IBM DA service.

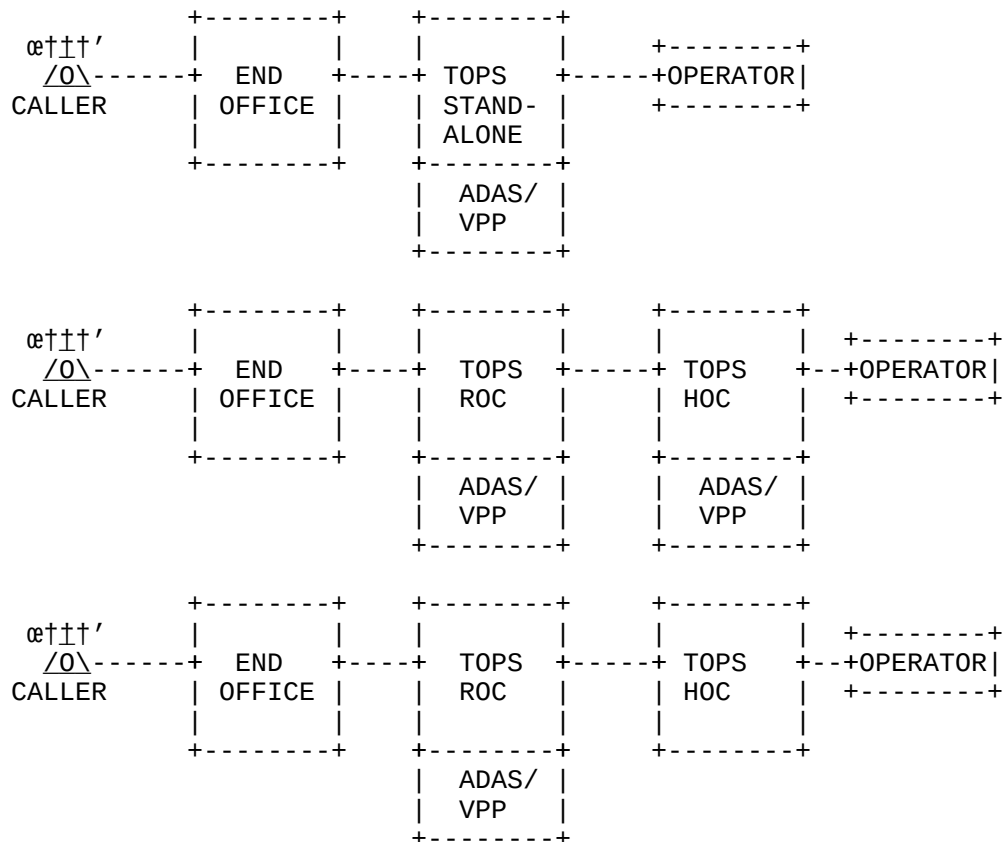


Figure 35. ADAS/DMS 200/TOPS Configurations

11.2 Hardware Provisioning

11.2.1 Hardware Usage Restrictions

For ADAS, the LIS(s) which mount the ADAS VPUs and APUs shall be used for ADAS exclusively.

In BCS 35 the number of NIUs that may be provisioned per switch is restricted to six (6). This restriction applies to the total of NIUs for all applications using NIUs.

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ADAS LISs may share an LPP with the LISs containing equipment required for other features with the exception of the LISs used to house the equipment required for the Packet Handler (XLIU) feature.

11.2.2 Hardware Dependencies

The product platform on which ADAS is based uses the LPP (Link Peripheral Processor) which is provisionable only on DMS SuperNode switches.

11.2.2.1 P and C Side Port Requirements

The ADAS NIUs, C-side, require ports at the Switch Network. Each ADAS NIU requires 2 duplicated DS-30 ports at the switch network. In each ADAS LIS, the two units NIU0 and NIU1 interface with Switch Network Planes 0 and 1 respectively. This arrangement provides a total of 128 voice channels, per NIU, for communication between each ADAS LIS and the Switch Network.

11.2.2.2 DMS BUS Port Requirements

11.2.2.3 Circuits Per Card

11.2.2.4 Discrimination Numbering

11.2.3 Provisioning Considerations

11.2.3.1 General

Figure 36 on page 21-129 illustrates typical hardware configurations for ADAS.

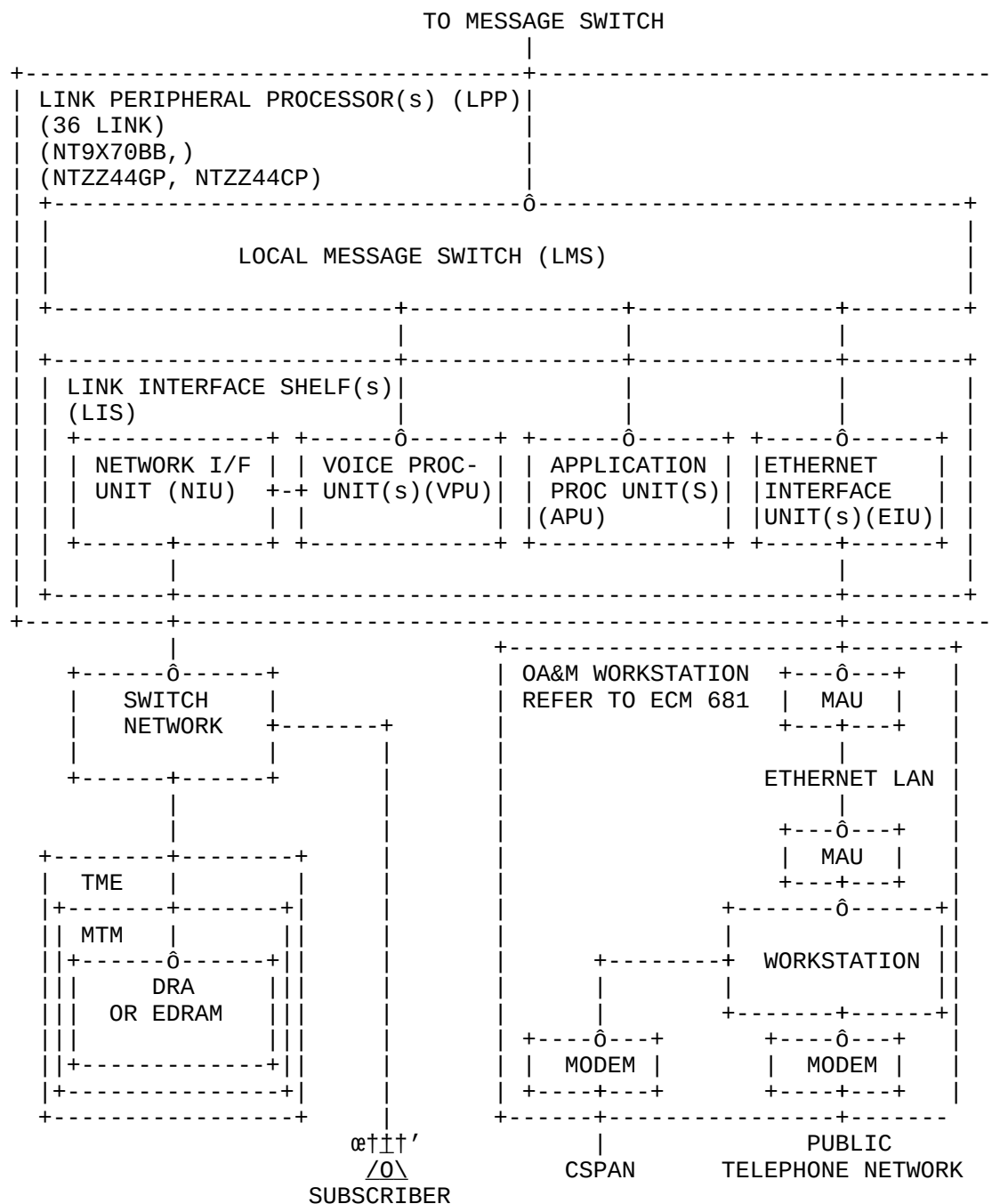


Figure 36. ADAS - Hardware Configuration

11.2.3.2 Network Considerations

ADAS may be configured to operate with a DMS 100/200 SuperNode or DMS 200.SuperNode. With respect to the telephone network, ADAS may be equipped in switches configured as follows:

- HOC (Host Operator Center)
- ROC (Remote Operator Center) with ADAS equipped HOC
- ROC with non-ADAS HOC

To operate as an ADAS ROC, the ROC switch must be equipped with ADAS hardware and software.

11.2.3.3 LPP Provisioning-General

The quantities of equipment required for provisioning ADAS is based on the number of voice resource servers i.e. Voice Processing Units (VPUs), needed for the expected DA traffic.

The VPU voice resource servers are each capable of serving 20 callers simultaneously.

The number of LPP's required to house ADAS equipment depends upon the required capacity of the system.

The Voice Processing Platform (VPP) on which the ADAS is based requires processing resources of two APUs. These units are referred to as the VPP-APUs. They are needed for the following functions:

- Ethernet Interface
- OA&M management and ADAS APU process management.

An LPP (LIM) is always equipped with three LIS shelves. When an LPP is used for the ADAS application, a minimum of one LIS shelf in this LPP is dedicated to ADAS use. LIS shelves not used by the ADAS application may be used by other features, with the exception of the Packet Handler feature.

Single LPP System

If the equipment required for an ADAS application can be housed in a single LPP, accommodation must be made for the VPP-APUs, refer to "LPP Provisioning-General"

The maximum number of ADAS servers that an ADAS system with a single LPP is 340, i.e. $340/20 = 17$ VPU's.

Multi-LPP System (1+N LPPs)

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The first LPP in a multi-LPP system houses the two (2) base system VPP-APUs. The maximum number of ADAS servers that this first LPP can accommodate is 340, i.e. $340/20 = 17$ VPU's.

The remaining LPPs (1+N) can accommodate up to 360 servers, i.e. $360/20 = 18$ VPUs. Two (2) APUs must always be provided in each of the 1+N LPPs. These APUs perform ADAS OA&M management functions for the containing LPP. They are referred to as LPP-APUs. The LPP-APUs are also capable performing ADAS application call processing functions. Each LPP-APU can handle 40 calls simultaneously. These LPP APUs should be included in the count of application APUs required for the considered ADAS system.

11.2.3.4 LIS Provisioning-General

When configured for ADAS operation, the ADAS LIS has the following provisioning limits:

- Minimum Provision (for ADAS) = 1 LIS (3 LIS are always provided with LPP)
- Maximum (for ADAS)/LPP = 3
- Maximum/DMS Switch = 6 (BCS35 to BCS36) or 9 with CSP02

Because the capacity of DS-30 links interfacing each LIS with the Switch Network is limited to a total of 128 voice channels, the maximum number of VPUs that may be provisioned in an LIS is $128/(\text{Max channels per VPU})$ (rounded down) = $128/20$ (rounded down) = 6 (120 channels).

A LIS houses between 20 and 120 ADAS call servers in increments of 20, i.e. up to 6 VPU's, except for those LIS which are used to accommodate the VPP-ASUs.

In a single LIS system, the LIS has a maximum capacity of 80 ADAS servers, i.e., 4 VPUs.

The base VPP requires at least one Ethernet Interface Unit (EIU). This unit is contained in an LIS in the first ADAS LPP.

In a system having a single LPP and two (2) LIS, the first LIS has a capacity of 100 ADAS call servers, i.e., 5 VPUs. The second LIS has a capacity of 120 call servers, i.e., 6 VPUs. The first LIS also contains the two (2) required VPP APUs and the required VPP-EIU.

11.2.3.5 VPU Provisioning-General

A VPU is capable of handling 20 ADAS calls simultaneously.

Application APU's operate in conjunction with VPU's, and APU's are capable of handling at least 40 ADAS calls simultaneously, the ratio of

Application APU's to VPU's required for a properly balanced system is 1 Application APU to 2 VPUs.

Voice processing resources of VPU's are allocated to an APU service on a per call basis. The coupling between APU and VPU resources is not fixed but is dynamically allocated within the same LPP.

11.2.3.6 NIU Provisioning-General

For ADAS applications, each LIS requires a Network Interface Unit NIU. An NIU is made up of two ASUs which are located in the center four front slot positions in the LIS.

The maximum number of NIUs that may be provisioned per switch, prior to CSP02 software load, is six (6). This restriction is imposed by the integrated maintenance software. With CSP02, the maximum number of NIU provisionable in a DMS switch is increased to nine (9). The number of LIS available for ADAS applications may be affected by the presence of other features which also consume LIS resources.

11.2.3.7 ADAS Initial Greeting

The initial greeting a subscriber receives when making a DA call to a system served by ADAS may be provided either by the ADAS VPU, which is the general ADAS greeting or by an announcement generated by the optional DA/Toll Branding feature which is generally used to identify the DA service provider selected by the subscriber. The Digitally Recorded Announcement system is used by the DA/Toll Branding feature to provide the initial announcement if the DA Toll Branding feature is used.

11.2.3.8 DRAM Provisioning - General

Digitally Recorded Announcements are required if the optional Directory Assistance/Toll Branding feature is used. DRAs are provided either by DRAMs (Digitally Recorded Announcement Modules) or EDRAMS (Enhanced Digitally Recorded Announcement Modules). Both DRAM and EDRAMS are mounted in MTM (Maintenance Trunk Module) shelves which are contained within Trunk Module Equipment (TME) frames or cabinets. The number of DRAs required depends upon the expected ABSBH DA/ADAS call traffic. The MTM and TME may be shared with compatible CPCs used by other features. Refer to ECM 611 for DRAM provisioning and to ECM 531 for EDRAM provisioning.

Announcements used for DA/Toll Branding feature are custom recorded. Sufficient DRA memory must be provisioned to accommodate the announcements required. The DA/Toll announcements may either be broadcast in the switch network or may be assigned to multiple trunk circuits to provide the number of announcement 'servers' required to service the expected call traffic.

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11.2.3.9 OA&M Workstation Provisioning

ADAS supports a single EIU configuration with a single Simplex OA&M Workstation. The Simplex Workstation fulfills the minimum workstation requirements for ADAS. It uses a single Workstation having a single LAN connection interfacing to the switch through a single EIU. Because ADAS supports the use of only one Workstation, the LAN Hub option of the Simplex Workstation building block is not required, and should not be ordered.

Refer to ECM 681 for general OA&M Workstation engineering requirements.

11.2.3.10 Power Failure Protection

For failure protection purposes, the best compromise arrangement for limiting the effect of a power supply failure is to intermix APU's and VPU's within LIS's in the ratio of 1 APU's to 2 VPU per LIS. For VPP-APUS failure protection the VPP-APUS should be configured on opposite LIS half shelves in a single LIS system and on different LIS shelves in a multi-LIS system.

11.2.3.11 Standard CP Configurations

The slot configuration of the CPCs within LIS for the ADAS application are standardized according to the rules given in the referenced Engineering Manual Sections covering 36 Link LPPs. In these rules, the APUS listed have three functional categories: VPP-APU, LPP-APU and APP-APU.

The APP-APU (ADAS Application APU) handles OA&M overheads and at least 40 ADAS calls simultaneously.

The VPP-APU (VPP OA&M APU) Contains the Central Data Collector for the LPP frame as well as the APU process Management function for the ADAS system. Each ADAS system requires 2 VPP APUS configured in one of the LPP frames. For convenience, the first frame containing ADAS application APUS contains the 2 VPP-APUS.

The LPP-APU (LPP OA&M APU) contains the ADAS application as well as the Central Data Collector for the containing LPP frame. Only the 1+N (N=1 or 2) LPP requires LPP-APUS. Two (2) LPP-APUS are required in all 1+N LPPs. The LPP-APU is capable of handling 40 ADAS calls simultaneously. The LPP-APUS are required in each of the second and subsequent ADAS LPPs. These APUS must be present regardless of the quantity of VPUS in the same cabinet. The LPP-APU is included in the count of ADAS Application APUS when determining the number of APUS required using the APU to VPU ratio of 1:2. Each LPP frame containing APP-APUS requires 2 LPP-ASUS except for the LPP frame containing the 2 VPP-APUS.

The above categorizations are used to indicate the corresponding APU function. The function is determined by table datafill. The software load is the same in each type of APU; the required function is selected by datafill. The slot positions for each type of APU function are se-

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lected for optimum failure protection characteristics of the ADAS as a whole. The APU slot positions are assigned according to the standard configuration rules given in the LPP Engineering Manual Sections referenced in Section 6, to ensure optimum failure protection and traffic handling.

11.2.3.12 ADAS RTS - APU Application Software Loading

The application software in the ADAS APU is run under the SuperNode UNIX (SNIX) operating system. This makes APU software loading different from other DMS peripherals. ADAS uses a 2 stage loading process. The first stage loads the base SNIX using PMLOAD like other peripherals. The operating system software remains loaded until the APU is powered down or is physically removed. In the second stage, i.e. the transition from the ISTb state to the INSV state, the ADAS application is loaded. This loading is performed each time an APU is returned to service from the MAP.

In the RTS process, ADAS application software is loaded into the APUs from the Software Load Module (SLM) or Disk Drive Units (DDU) via the HSDF file server during the RTS.

HSDF file servers are software entities which are defined in table SNIXVOLS. The data in SNIXVOLS also defines the Volumes and Filenames accessible to each HSDF server. Another table, SNIXAPPL, defines, for each ASU, the HSDF server assigned for application software file downloading. The HSDF server to APU assignment is specified using the identities of the files to be downloaded, i.e., the file system names defined in the SNIXVOLS table.

On occasions when the multiple APUs need to be loaded, as it is in when RTS ALL or a CM Reload restart is performed, the duration of the secondary load process may be relatively long. The time taken to load the ADAS application depends on the number of APUs in the ADAS system, the size of the ADAS/APU application software file, the throughput of the loading device or devices, SLM or IOC Disk Drives, and other factors external to ADAS, such as processor occupancy in the CM.

Using datafill in the SNIXAPPL table configure SLM/IOC Disk Drive to load APUs according to the following guidelines:

1. Generally, for systems having 4 (four) or less APUs, load the APUs from SLMs only. Allocate APUs evenly across SLMs.
2. For systems with more than 4 APUs, allocate APUs across all available SW loading devices, SLMs and DDUs with loads distributed commensurate with loading device throughput capability.
3. Because the throughput of SLMs is greater than that of DDUs, favor the allocation of APUs to SLMs rather than to DDUs.

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Examples:

For operation in the simplex mode, i.e. one HSDF server per SLM or DDU.

APUs	SLM0	SLM1	DDU0	DDU1
----	----	----	----	----
4	2	2	0	0
5	2	2	1	0
6	2	2	1	1
7	3	2	1	1
8	3	3	1	1
9	3	3	2	1
1	4	3	2	1
1	4	4	2	1
1	4	4	2	2
1	5	4	2	2
14	5	5	2	2
15	5	5	3	2
16	6	5	3	2
17	6	6	3	2
18	6	6	3	3
19	7	6	3	3
2	7	7	3	3
2	7	7	4	3
2	8	7	4	3
2	8	8	4	3
24	8	8	4	4

Note: The above configurations are controlled by datafill in the SNIXAPPL table. The performance of software loading devices is affected by factors external to the ADAS system and may affect the optimum configuration for ADAS. The above should be used as a guide only.

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For operation in the duplex mode:

APUs	SLM0	SLM1	DDU0	DDU1
---	---	---	---	---
4	3	0	1	0
5	3	0	2	0
6	4	0	2	0
7	5	0	2	0
8	5	0	3	0
9	6	0	3	0
1	6	0	4	0
1	7	0	4	0
1	7	0	5	0
1	8	0	5	0
14	9	0	5	0
15	9	0	6	0
16	10	0	6	0
17	10	0	7	0
18	11	0	7	0
19	12	0	7	0
2	12	0	8	0
2	13	0	8	0
2	14	0	8	0
2	15	0	8	0
24	16	0	8	0

In the above table, for convenience, SLM1 and DDU1 appear to be unused. In practice they are used as alternatives to their mates, SLM0 and DDU0 respectively.

11.2.3.13 Provisioning Questions

-) Is Directory Assistance/Toll Branding option selected?

Yes/No _____

-) If answer to 1) is 'Yes' then what is required announcement recording time capacity?

<REQ REC CAPACITY> = _____sec

-) What percent of DA calls is to be handled by ADAS?

<ADAS%> _____%

(default = 100%)

- 4) What is the expected DA Call Traffic (HDBH)

<DA TRAFFIC> = _____Calls/Sec

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- 5) What is the expected operator queue time (HDBH).

Note Operator queue delay can vary considerably during the day. The delay affects DA call holding time and therefore has a significant effect on DA call traffic. To ensure correct ADAS equipment provisioning, the operator queue delay time figure given for provisioning calculation should be the delay experienced at HDBH (High Day Busy Hour). This figure may be significantly longer than the default of 5 sec.

<OP QUEUE> = _____sec

(default = 5 sec)

- 6) If space in LPP is not used by other features, how many LIS are empty?

<EMPTY LIS> = _____

- 7) Provide LAN IP Addresses for devices to be accessed via the Ethernet LAN:

APUs _____

|

|

EIU _____

OA&M Workstation _____

The IP addresses are obtained from the equipment customer, assuming that the Ethernet LAN is owned and operated by the customer. The LAN IP addresses must be assigned to enable communication between devices connected to the LAN.

11.2.3.14 Provisioning Calculations

The following calculations assume that the ADAS maximum capacity is limited to a configuration comprising a maximum of six (6) LIS.

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The number of LIS required, when calculating the number of LIS to be ordered, depends upon the number of LIS existing in the office in which ADAS is to be installed, if any. The number of LIS required, therefore, is determined by calculating the number of LIS needed to house all the ADAS ASUs, and then subtracting the number of empty LIS in existing LIM cabinets.

The number of empty LIS in which ADAS hardware can be accommodated, affects the way in which ADAS ASUs are configured.

For details of ADAS hardware configuration refer to the Engineering Manual Section covering the LIM type that is to be used for ADAS. Section 6 of NTP provides a list of referenced Engineering Manual Sections.

Systems with no Empty LIS

For systems having no empty LIS available for ADAS, at least one new LIM is needed. This LIM can accommodate up to three ADAS LIS. There are three configuration layouts. For systems needing more than three LIS, a second LIM cabinet is required. The configuration layouts for both the first and second ADAS LIS are listed below.

- 1 LIS ADAS System
 - Hardware Layout ADAS - First LIM with one ADAS LIS
- 2 LIS ADAS System
 - Hardware Layout ADAS - First LIM with two ADAS LIS
- 3 LIS ADAS System
 - Hardware Layout ADAS - First LIM with three ADAS LIS
- 4 LIS ADAS System
 - Hardware Layout ADAS - First LIM with three ADAS LIS and
Hardware Layout ADAS - 1+N (N=1) LIM with one ADAS LIS
- 5 LIS ADAS System
 - Hardware Layout ADAS - First LIM with three ADAS LIS and
Hardware Layout ADAS - 1+N (N=1) LIM with two ADAS LIS
- 6 LIS ADAS System
 - Hardware Layout ADAS - First LIM with three ADAS LIS

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and
Hardware Layout ADAS - 1+N (N=1) LIM with three ADAS
LIS

Systems with One Empty LIS

For systems having one empty LIS to accommodate ADAS hardware, the following configurations may be used:

- 1 LIS ADAS System
 - Hardware Layout ADAS - First LIM with one ADAS LIS
- 2 LIS ADAS System
 - Hardware Layout ADAS - First LIM with one ADAS LIS
and
Hardware Layout ADAS - 1+N (N=1) LIM with one ADAS LIS
- 3 LIS ADAS System
 - Hardware Layout ADAS - First LIM with one ADAS LIS
and
Hardware Layout ADAS - 1+N (N=1) LIM with two ADAS LIS
- 4 LIS ADAS System
 - Hardware Layout ADAS - First LIM with one ADAS LIS
and
Hardware Layout ADAS - 1+N (N=1) LIM with three ADAS LIS
- 5 LIS ADAS System
 - Hardware Layout ADAS - First LIM with one ADAS LIS
and
Hardware Layout ADAS - 1+N (N=1) LIM with three ADAS LIS
and
Hardware Layout ADAS - 1+N LIM (N=2) with one ADAS LIS
- 6 LIS ADAS System
 - Hardware Layout ADAS - First LIM with one ADAS LIS
and
Hardware Layout ADAS - 1+N (N=1) LIM with three ADAS LIS
and
Hardware Layout ADAS - 1+N (N=2) LIM with two ADAS LIS

Systems with Two Empty LIS

For systems having two empty LIS to accommodate ADAS hardware, the following configurations may be used:

- 1 LIS ADAS System
 - Hardware Layout ADAS - First LIM with one ADAS LIS

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- 2 LIS ADAS System
 - Hardware Layout ADAS - First LIM with two ADAS LIS
- 3 LIS ADAS System
 - Hardware Layout ADAS - First LIM with two ADAS LIS
and
Hardware Layout ADAS - 1+N (N=1) LIM with one ADAS LIS
- 4 LIS ADAS System
 - Hardware Layout ADAS - First LIM with two ADAS LIS
and
Hardware Layout ADAS - 1+N (N=1) LIM with two ADAS LIS
- 5 LIS ADAS System
 - Hardware Layout ADAS - First LIM with two ADAS LIS
and
Hardware Layout ADAS - 1+N (N=1) LIM with three ADAS LIS
- 6 LIS ADAS System
 - Hardware Layout ADAS - First LIM with two ADAS LIS
and
Hardware Layout ADAS - 1+N (N=1) LIM with three ADAS LIS
and
Hardware Layout ADAS - 1+N LIM (N=2) with one ADAS LIS

ADAS Traffic

) Calculate ADAS traffic as follows:

<ADAS HOLD TIME> =

(15 + <OP QUEUE>) = _____sec.

<ADAS TRAFFIC> =

(<ADAS HOLD TIME> x <DA TRAFFIC> x

<ADAS%>)/(100 x 100) = _____CCS

ADAS Servers Required

) <ADAS SERVERS> =

Lookup Traffic Table (Blocking probability 0.01)

for <ADAS TRAFFIC> = _____ SERVERS

Refer to NT297-1001-450 for traffic table.

VPUs Required

) Calculate the number of VPUs required as follows:

<VPUs> = VPUs required =

<ADAS SERVERS>/20 (rounded up) = _____

EIUs Required

5) Provision 1 EIU per ADAS system

<EIUs> = 1

LISs Required

6) Calculate the number of LISs required as follows:

<LISU> = Number of LIS used =

IF <EMPTY LIS> = 0:

THEN,

IF <VPUs> <= 4 then 1

ELSE, IF<VPUs> > 4 and <=11 then 2

ELSE, IF<VPUs> > 11 and <=17 then 3

ELSE IF<VPUs> > 17 and <= 23 then 4

ELSE, IF<VPUs> > 23 and <= 29 then 5

ELSE, IF<VPUs> > 29 and <= 35 then 6

ELSE, IF <EMPTY LIS> = 1:

THEN,

IF<VPUs> <= 4, then 1

ELSE, IF<VPUs> > 4 and <=10 then 2

ELSE, IF<VPUs> > 10 and <=16 then 3

ELSE, IF<VPUs> > 16 and <=22 then 4

ELSE, IF<VPUs> > 22 and <=28 then 5

ELSE, IF<VPUs> > 28 and <=34 then 6

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ELSE, IF<EMPTY LIS> = 2,

THEN,

IF<VPUs> <=4, then 1

ELSE, IF<VPUs> > 4 and <= 11 then 2

ELSE IF<VPUs> > 11 and <= 17 then 3

ELSE, IF<VPUs> > 17 and <= 23 then 4

ELSE, IF<VPUs> > 23 and <= 29 then 5

ELSE, IF<VPUs> > 29 AND <= 35 THEN 6

=

<LISS> = number of LIS required =

IF<LISU> <= <EMPTY LIS>, then 0

ELSE, U> - <EMPTY LIS> =

NIUs Required

6) Calculate the number of NIUs required as follows:

<NIUs> = <LISS>+<EMPTY LIS> =

LPPs Required

7) Calculate number of LPPs as follows:

<LPPs> = IF (<LISS> - <EMPTY LIS>) >= 1

THEN (<LISS> - (<LISS> - <EMPTY LIS>))/3 Rounded up

ELSE 0 =

APUs Required

8) Calculate the number of APUs required as follows:

For ADAS Systems having <EMPTY LIS> = 0

<APUs> = IF <VPUs> >= 1 AND <= 17,

THEN, 2 + (<VPU>/2) (rounded up)

ELSE, IF <VPUs> > 17 <=21 = 13

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ELSE, IF <VPUs> > 21 <= 35,

THEN $11 + ((\text{VPUs} - 17)/2)$ (rounded up)

ELSE, IF <VPUS> > 35,

THEN, CAPACITY EXCEEDED = _____

For ADAS systems having <EMPTY LIS> = 1

<APUs> = IF<VPUs> >= 1 AND <=4,

THEN $2 + (\text{VPUs}/2)$ (rounded up)

ELSE, IF<VPUs> > 4 AND <= 8, THEN 6

ELSE, IF<VPUs> > 8 AND <= 22,

THEN $2 + (\text{VPUs} - 4)/2$ (rounded up)

ELSE, IF<VPUs> > 22 AND <= 26, THEN 15

ELSE, IF<VPUs> > 26 AND <= 34,

THEN $13 + ((\text{VPUs} - 22)/2)$ (rounded up)

ELSE, IF<VPUs> > 34,

THEN, CAPACITY EXCEEDED = _____

For ADAS systems having <EMPTY LIS> = 2

<APUs> = IF<VPUs> >= 1 AND <=11,

THEN $2 + (\text{VPUs}/2)$ (rounded up)

ELSE, IF<VPUs> > 11 AND <= 15, THEN 10

ELSE, IF<VPUs> > 15 AND <= 29,

THEN $8 + ((\text{VPUs} - 11)/2)$ (rounded up)

ELSE, IF<VPUs> > 29 AND <= 33, THEN 19

ELSE, IF<VPUs> > 33 AND <= 35,

THEN $17 + ((\text{VPUs} - 29)/2)$ (rounded up)

ELSE, IF<VPUs> > 35,

THEN, CAPACITY EXCEEDED = _____

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DRA/EDRAMS Required

- 9) Using the answer <REQ REC CAPACITY> given in "DRAM Provisioning - General" on page 21-132 2), refer to ECM 611 to calculate DRA/EDRAM requirements.

Filler Face Plates Required

- 0) Calculate the number of Filler Faceplates as Follows:

$$<FILLER PLATES> = <LISS> \times 10 - (<APUs> + <VPUs>) = \underline{\hspace{2cm}}$$

OA&M Workstations Required

- 1) Provide one Simplex OA&M Workstation per ADAS system. Refer to ECM 681 for OA&M Workstation engineering requirements.

11.2.4 Office Layout Information

11.2.5 Traffic Tables

Refer to NTP279-1001-450 DMS-100 Family Provisioning for traffic tables required for calculating the number of voice resource servers needed for expected DA call traffic.

11.2.6 Network Impact

When compared with non-ADAS DA call, the use of ADAS increases subscriber hold time. This causes an increase in traffic over End Office to ADAS TOPS Office trunks. Refer to the ADAS/DMS 200/TOPS Office Configurations illustration in Figure 35 on page 21-127. Where ADAS is added to an existing office, End Office to ADAS TOPS Office trunk provisioning should be reviewed and additional trunks provisioned to accommodate the expected increase in DA call traffic.

The use of ADAS decreases holding time on TOPS Remote Operator Center (ROC) with ADAS to TOPS Host Operator Centralization (HOC) trunks, for DA calls, where the HOC Operators handle the ROC DA calls. In this situation ADAS in the ROC automates the handling of DA calls thereby reducing the traffic on the ROC to HOC trunks.

The increase in EO to ROC or ADAS/TOPS Stand Alone trunk hold time for a DA call caused by ADAS is made up as follows:

- Difference in hold time between existing TOPS/Toll Branding announcement if any and the optional ADAS associated TOPS/Toll Branding Announcement, or ADAS greeting announcement, typically 4 sec. per call

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- The ADAS 'Hold for operator' announcement, typically 3 sec per call
- THE ADAS Caller response playback to operator, typically 3 sec. per call

From the above, the increase in hold time owing to ADAS is typically 10 sec. per call

The decrease in ROC to HOC trunk holding time owing to ADAS automation in the ROC with the operator force in the ROC not staffed is made up as follows:

- Operator Work Time (AWT) reduction owing to ADAS, typically 3 sec. per call.

Refer to NTP 297-1001-450 DMS-100 Family Provisioning for trunk provisioning information.

11.2.7 Installation Customer Pre-Requisites

11.2.7.1 TOPS Operator Centralization Trunk

Prior to ADAS installation, the customer should ensure that TOPS Host to Remote or OC voice trunks are defined as one-way trunks as opposed to two-way trunks. The definition is set in table TRKGRP with the remote side defined as incoming DP Immediate and the Host side defined as outgoing NP Immediate. This datafill should be reviewed in advance of installation.

11.2.7.2 Message Switch Load

When loading the MS for an ADAS switch, the customer MUST ensure that the MS (Message Switch) is loaded with the MEC or MIC MS load. This does not imply that the switch needs ENET, it only ensures that the full ADAS functionality will be available. If a load other than the MEC or MIC load is put into the MS, the MS will need to be reloaded with the MEC or MIC load, then a warm restart done to activate the change.

11.2.7.3 IP Address Assignment Customer Pre-requisite

An Internet Protocol (IP) address is needed for communication between the CM, EIU, workstation and each APU through the Ethernet LAN. The customer should provide these.

In a closed, private LAN, the addresses can be assigned by the system administrator. For open or public Ethernet networks, the IP addresses are obtained from the Network Information Center in the Defense Data Network in Chantilly Virginia. This center may be reached at 1-800-365-3642 or by mail at the following address with a typical response time of two weeks.

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DDN Network information Center
142000 Park meadow Drive, Suite 200
Chantilly, Va. 22021

11.2.7.4 DA Automation Billing

The Telco is responsible for service billing implementation of automated DA call traffic. TOPS billing, EO billing, and answer supervision signaling should be considered for operator service traffic types: OS trunks (IT trunks), ATC trunks (IEC, IOC and Cellular traffic), and Inter-Toll trunks (LAMA/CAMA). Before ADAS is installed and put in service, Telco management should consider whether to trigger billing at the start of call automation (ADAS) or delay it until the operator is cut into service. The Telco should also define the policy for abandoned calls and specify whether billing is to be performed on the TOPS switch or at the end-office. The Telco should also specify how IOC and Cellular traffic is to be billed.

Answer supervision signaling provides billing triggers for EO and 4E tandem offices. The standard is to return answer supervision upon call arrival at the TOPS switch. A patch is available to delay answer supervision until operator cut-in. It is an activation patch with settings for immediate or delayed response to incoming IT and RONI trunks for call acknowledgment. This will work for most EO's with exception of ATT 4E tandem switches which do not open the voice path until answer supervision is returned. The patch applies to all ADAS trunks. In TOPS03, the answer supervision can be applied on per trunk group basis.

Directory Assistance AMA recording is defined with 194 (Local) or 195 (terminating) record types each appended with a module code 055. Within module code 55, field 284 defines "means of information input" with a value 3 for "verbal to voice recognition system". The traditional value is 1 for "verbal to operator". Abandoned calls can be verified by checking AMA 055 for settings in the 284 field and the operator usage field to determine call success or failure.

11.2.7.5 Installation Test Requirements

Several TOPS system resource requirements for product verification are telco provided. The tests include a test queue, test trunk, operator position and an operator profile assignment. These resources need to be available prior to equipment installation start. The test queue and trunks are required prior to installation start. Once the audio file is uploaded, the test trunks will be used to insure a call can be completed to the operator using ADAS services. An operator position should be assigned to the test queue and an operator ID assigned to the test queue also, for the purpose of test call processing. A helpful suggestion is to assign an SA

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or IC to the test queue/operator to allow additional supervision of the test call interaction.

The ADAS product will be installed per the NT Installation Manual 20- 2 20. This provides the datafill to allow uploading of the audio file to the VPU and call profile scenario to the APUs. This datafill is mostly default data to provide a consistent test bed for the Field Technician. If there is a requirement to change any of this data to reflect more site specific data, then the Telco should be prepared to make those changes.

11.2.7.6 TOPS CM Disk

The following disks must meet the requirements below in order to install ADAS onto the switch. A Telco Representative must coordinate disk management on the switch for these requirements to be met. Only after the SLM and IOC disks have been configured for the space requirements of ADAS, can the installation method be started.

Audio Loads - The audio loads require a minimum of five (5) Megabytes. Although the audio load does not occupy all 5Meg, this amount of disk space will allow for installation of new loads. A SLM disk volume should be dedicated to Audio Loads only and must be able to manage 511 file names as opposed to the default of 127.

ISN Loads - The ISN (Intelligent Services Node) loads require is 1 4 Megabytes. These loads include the APU, VPU, LIM, NIU, and EIU load files. This amount of space will allow room for upgrading without removing the previous load.

Note: The SLM disks must have a name with 8 characters or less. The name is broken down into device and volume. This will also be the disk where the service data file resides.

APU application loads - Two IOC disks need to be provisioned for the APU application load file which require 20 Megabytes each. This amount of space will allow for upgrading without removing the previous load. The APU load is made up of AAC36nn and ULC36nn.

Note: On the IOC disks, a file will always be open once it has been datafilled in table SNIXVOLS.

11.3 Product/System Specification

11.3.1 Physical Characteristics

11.3.2 EMI/Earthquake Information

Not applicable.

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11.3.3 Sparing Information

Standard sparing algorithms are used.

11.3.4 Power Feed and Fusing Requirements

11.3.5 Current Drain Information

11.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

11.4.1 Required Software Packages and Interdependencies

11.4.1.1 Software Delivered By BCS

- NTG320AA - ADAS APU which has the following prerequisite packages:
 - NTXQ23AA - TOPS ADAS
 - NTXA62AA - TOPS DA AUDIO RESPONSE CALL HANDLING
 - NTXH77AA - CHANNELIZED ACCESS ON LPP/LIS
(MEC or MIC load).
 - NTG310AA - EIU PERIPHERAL LOAD FOR SUPERNODE OPC
 - NTXF20AA - LMS ON LPP
- NTXS31AA - ENHANCED SERVICE RESOURCE MANAGEMENT
 - NTXS11AA - FILE TRANSFER PROTOCOL (DARPA)
- NTXS30AA - UAE/UNIX
- NTXS29AA - APU MAINTENANCE
 - NTXF19AA - TCP/IP PROTOCOLS
 - NTXF05AA - EIU
 - NTXN18AA - LIU Base
- NTXS32AA - APU SOS UNIX BASE
- NTG322AA - VPU
- NTG321AA - OA&M POSITION
- NTXE71AA - TOPS DIRECTORY ASSISTANCE/TOLL BRANDING (OPTIONAL)

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The mapping of ADAS package identities to software feature activity numbers is as follows:

- NTXQ23AA - TOPS ADAS
 - AF3011 - - AABS VSN XP RESTRUCTURE
 - AF3204 - - ADAS MTS Message Composer/Interpreter
 - AF3205 - - ADAS VSN XP
 - AF3206 - - ADAS TOPS XP
 - AF3012 - - ADAS VSN SIMULATOR
 - AN0327 - - ADAS APU S/W Installation
- NTXS29AA - APU MAINTENANCE
 - AF2689 - - Maintenance for SNode
 - AL2010 - - APU Maintenance
- NTXS30AA - UAE, UNIX CONVERSANT S/W
 - AF3379 - - SNode/UNIX File System Access to IOC Disk
 - AF2980 - - OM Transmission
 - AN0069 - - S/W Installation for UNIX Components
 - AF3391 - - Log Transfer - UNIX-SOS
- NTXS31AA - ENHANCED SERVICE RESOURCE MANAGEMENT
 - AF3049 - - APU Resource Management
 - AN0047 - - Enhanced Services Resource Management
 - AF3006 - - VPU Service Circuit Resource Management
 - AF3532 - - VPU MAP and Table Control
 - AN0178 - - ADAS MMI Data Transfer
- NTXS32AA - APU SOS UNIX BASE
 - AF2684 - - UNIX Kernal Change for SNIX
 - AL1579 - - UNIX Kernal Initialization
 - AF3290 - - Logs & Alarms Transfer
 - AL1982 - - Messaging Access for UNIX
 - AL2016 - - Enhanced VM Scheduler
 - AL2479 - - FPX VM Modifications

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- AL1047 - - LA Support for non-SOS operating systems in SuperNode
- AL1580 - - Support for Non-SOS Systems in SuperNode - Phase 2
- AL1581 - - UNIX Kernel Changes for Small Machine Environment
- NTG320AA - ADAS APPLICATION PROCESSING UNIT (APU) S/W
 - AF3048 - - ADAS Communication Interface
 - AF3050 - - ADAS CPE Internals
 - AF3291 - - APU Process Management
 - AF3381 - - ADAS APU Call processing Application
 - AF3382 - - ADAS Data Manager
 - AF3384 - - ADAS Voice/CM Libraries
- NTG321AA - OA&M POSITION
 - AN0056 - - ADAS Service Data MMI
 - AN0182 - - VDS to VREC Conversion Tool
- NTXG322AA - VOICE PROCESSING UNIT (VPU) S/W
 - AF3005 - - VPU Local Maintenance
 - AF3007 - - VPU Service Circuit Processing
 - AF3031 - - VPU RAP and CBI Low Level I/O
 - AF3033 - - VPU RAP and CBI Diagnostic Support
 - AF3035 - - VPU Local Resource Management
 - AF3394 - - RAP DTMF
 - AN0016 - - RAP Play and Record Processing
 - AN0046 - - RAP Application and Diagnostics

11.4.1.2 PCL Delivered Software

Software ordering codes for ADAS software contained in the PCL TOPS0003

(STD & IBM) P0720806

- OSDA0002 Auto DACC w/AB P0720818
- OSDA0003 Auto Intercept CC P0720819

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- OSDA0004 ADAS Base P0720820
- OSDA0005 Cellular ADACC
- OSDA0006 ADAS+Interface
- OSDA0008 LPP/APU Support

| For TOPS0002 order ADAS0003 or ADAS0004

The following software is provided when ADAS Non-CM software NCL ADAS0003 is ordered:

- ALPP0001 ADAS LPP Supp P0749296
- AVPU0001 ADAS VPU Supp P0749295
- AWSS0001 ADAS WS (DAT) P0749297
 - AWSS0002 Remote Access (DAT), is an optional addition to AWSS0001 and should be provisioned if remote access is required.
 - AWSS0003 Workstation UNIX OS, must be ordered when Workstation HW is initially provisioned. Otherwise this software is an optional addition to AWSS0001.

| For TOPS0003 order ADAS0003 or ADAS0004 or ADAS0005

| For TOPS0004 order ADAS0004 or ADAS0005 or ADAS0006

| For TOPS0005 order ADAS0005 or ADAS0006 or ADAS0007

| For TOPS0006 order ADAS0006 or ADAS0007 or ADAS0008

| For TOPS0007 order ADAS0007 or ADAS0008

| For TOPS0008 order ADAS0008

| For questions on compatibility of the ADAS software, consult the
| Non-CM Compatibility Matrix (NON_CM_MTRX) Engineering Manual sec-
| tion.

11.4.2 Software Usage Restrictions

11.4.3 Memory Provisioning

11.5 Real Time Impact

The ADAS feature has a relatively high real time impact. Refer to System Engineering Alert SEA 93-08-001.

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12.0 ECM690 - EAS - Enhanced Alarm System

12.1 Overview

The Enhanced Alarm System will provide immediate alarm indication (within 2 seconds) of catastrophic loss of power to the DMS-100 PDCs regardless of whether the software remains operative. The alarm indication will include the AUDIBLE (Critical Bell) and VISUAL (Critical Power Plant Lamp). (Provisions made are for the loss of feeders from the Power Plant only, not the loss of the power board).

Remote contact closures for the dead system alarm normally open and normally closed and the DMS power fail will provide connectivity for remote alarm scanners. The three (3) contacts are wired out with a total of four (4) wires, a wire for each contact and a common wire. No signal, voltage, or ground is supplied from the DMS via these contacts.

An internally detected low voltage alarm indication will be given every fifteen minutes indicating the power supply batteries are discharging, as long as the conditions exist and the DMS-100 remains operational. The present alarm indications for loss of power to either the MTM shelves or ABS will be maintained.

A fuse or breaker panel may be required to be provided at the power board for the TME frames housing the primary and secondary alarm MTMs and ABS power feeds if appropriate fuse positions are not already available at the power board.

The PDC, ISM, and TME must be powered from the same power plant.

The primary and secondary MTM shelves cannot be powered from the same fuse or breaker.

Currently the feed for the FSP (NT0X42) originates at busbar A, and provides an Alarm Battery Supply (ABS) for the alarm circuits and lamps in the other frames.

The EAS kit requires a feed from both the A feed and the B feed fused at 5 amps from the PDC FSP (fuse position 13).

12.2 Hardware Provisioning

12.2.1 Hardware Usage Restrictions

EAS can be applied to existing offices with Version 2 office alarm systems.

Remotes utilizing an NT0X40 FSP (RME Frame) can be provided with the separate ABS feed portion of the EAS System. These can be any

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of the following remote products: RSC, RSCI, RLCM, RLCC, RSC-S Model B.

While this new alarm scheme enhances the DMS-100 alarm system in remotes by powering the ABS alarms from the power board, this is not EAS in it's full functionality.

12.2.2 Hardware Dependencies

The following changes will be introduced to support EAS in existing offices. The Primary and Secondary Alarm MTM shelves will no longer derive power from the A or B feed of the PDC. They will be powered from the same power board (Power Plant) as that serving the DMS-100 via the TME's FSP. The power will come from a fuse or circuit breaker at the power board directly to the TME's FSP. This re-powering will in actuality re-power the entire TME Frame.

(Note: The ISME and CISM require 6 fuses, 3A feed and 3 B feed.)

The System Engineer will need to determine if there are enough fuse or breaker positions available on the customer's power board before upgrading an existing office with EAS.

The System Engineer will also need to determine if, on a PDC, there are two (2) fuse positions (1 A feed & 1 B feed) available for the NT0X42XC EAS Kit. Fuse Position 13 on both the A & B feed, shelves 54 and 50 respectively, is the preferred position. For RMEs acting as a PDC, Fuse Position 13 on both the A & B feed, shelves 67 and 63 respectively, is the preferred position.

One (1) NT0X42XC EAS Kit is required for each PDC/RME in the office to be upgraded to EAS. The NT0X42XC Kit includes two fuses. Customer Eng should not specify additional fuses per 1071/110 spec or they will be double provisioned. If the PDC contains the NT0X40UB FSP, the upgrade kit is not required

If fuse positions are not available, arrangements must be made to provide the fuse positions to support EAS.

A question should be added to NTACCESS asking if EAS will be required in that particular office for upgrades and extensions. All initials should receive the EAS option.

12.2.2.1 P and C Side Port Requirements

Not Applicable

12.2.2.2 DMS BUS Port Requirements

Not Applicable

12.2.2.3 Circuits Per Card

Not Applicable

12.2.2.4 Discrimination Numbering

Not Applicable

12.2.3 Provisioning Considerations

12.2.3.1 Host Offices

The following additional equipment will be required when upgrading an existing host office with EAS:

QTY	PEC	DESCRIPTION	FRM	SHF	SLOT
1	PC0X42XC	EAS Product Change Kit			
3	NT3X82AH	OAU Dead System Alarm CP replaces and backward compatible with NT3X82-- Quantity of 2 + cold spare Primary MTM Shelf (pos 51) Secondary MTM Shf (pos 65)	TME-00 TME-01	51 65	05 05
		or			
3	NT3X82AJ	OAU Dead System Alarm CP replaces and backward compatible with NT3X82-- Quantity of 2 + cold spare Primary MTM Shelf (pos 51) Secondary MTM Shf (pos 65)	TME-00 TME-01	51 65	05 05
1	NT0X46XA	EAS Change Kit Consists of one (1) NT3X89AB AXU Shelf and also two (2) P0747556 EAS Labels	TME-00	65	
1	NT0X42XC	EAS Kit per PDC/RME The A-feed and the B-feed cables are included with the NT0X42XC EAS Kit. It also includes two fuses. Customer Eng should not specify additional fuses per 1071 spec or they will be double provisioned.	PDC	45R	

(NOTE: This EAS Kit is not required if the PDC contains a NT0X40UB FSP.)

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1	pair of power cables (6 or 8 AWG -48V & -48VR) from a 20 amp fuse at the power plant to the TME 00 FSP.	TME-00	45
1	pair of power cables (6 or 8 AWG -48V & -48VR) from a 20 amp fuse at the power plant to the TME 01 FSP.	TME-01	45
1	power cable (6 or 8 AWG -48V) from a 30 amp fuse at the power plant to the PDC e/w the NT0X42XC kit	PDC	45

12.2.3.2 Remote Offices

The following equipment will be required when upgrading a remote office to support EAS:

QTY	PEC	DESCRIPTION	FRM	SHF	SLOT
1	PC0X42XC	EAS Product Change Kit			
1	NT0X42XC	EAS Kit per RME e/w PDC	RME	45R	
1		power cable (6 or 8 AWG -48V) from a 30 amp fuse at the power plant to the RME e/w the NT0X42XC kit	RME	50	

12.2.4 Office Layout Information

CONFIGURATION LAYOUT and ADDITIONAL EAS CABLING

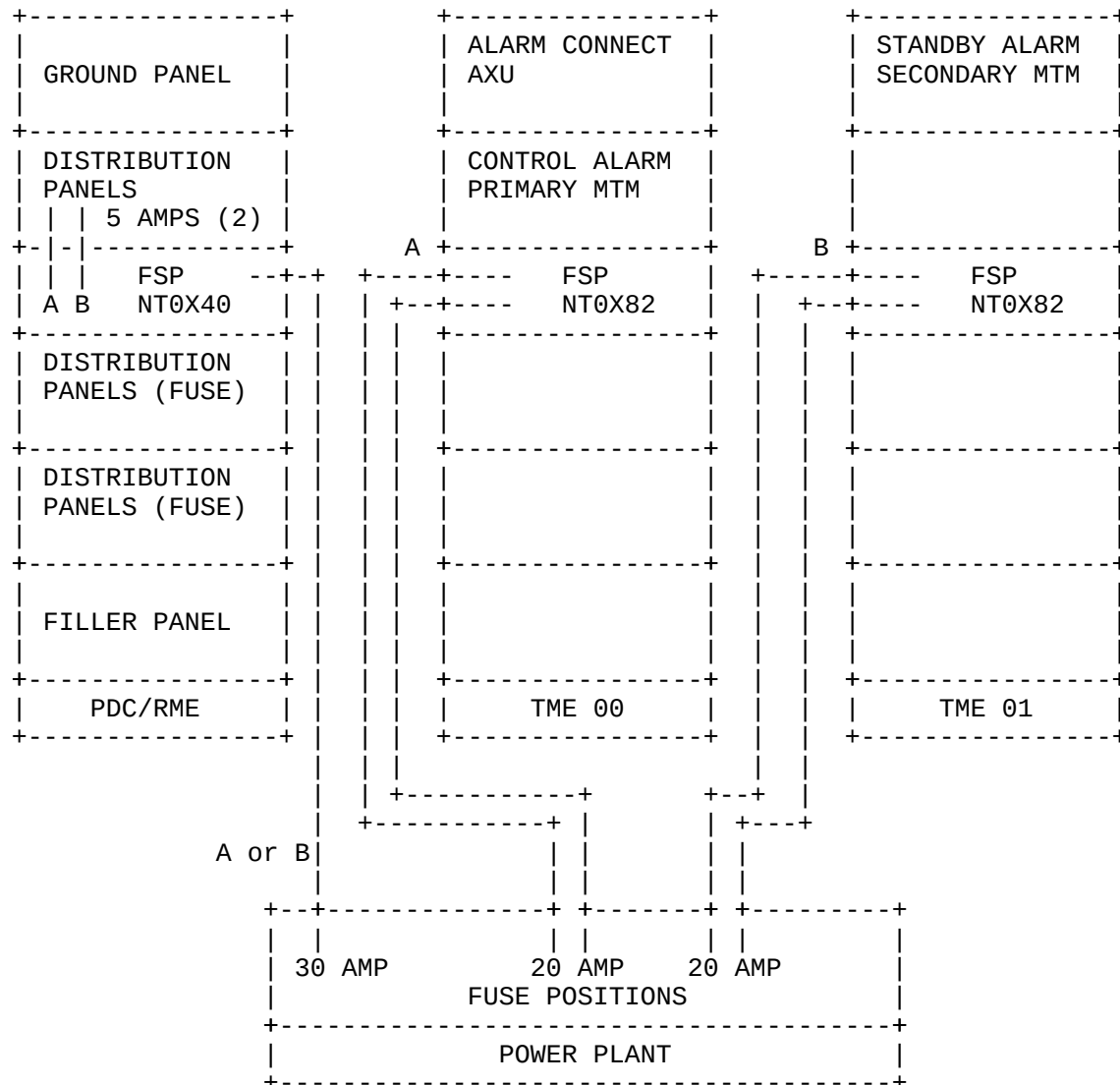


Figure 37. PDC, TME 00 and TME 01 EAS Power Cabling

12.2.5 Traffic Tables

Not Applicable

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12.3 Product/System Specification

12.3.1 Physical Characteristics

The packaging of the OAU and the MTM will remain the same except for the replacement of the existing NT3X82-- with the new NT3X82AH or NT3X82AJ cards. The NT3X89AA AXU will be replaced with the NT3X89AB Alarm Cross Connect Shelf on upgrades by utilizing the NT0X46XA Enhanced Alarm Service Change Kit. New offices will ship with NT3X89CA Alarm Cross Connect Shelf, a cost reduced version of the NT3X89AB which includes support for the EAS functionality.

EAS will have independent power feeds to the OAU, MTM, and ABS from the power plant serving the DMS-100 equipment. Audible and visual alarm indication within 2 seconds of a loss of power to any or all PDCs. Dedicated contacts for the use of external alarm scanners for Loss of Power to the DMS (Critical Power Plant) Alarm indication and Dead System Alarm indication. EAS also has Internal detection of loss of power and low voltage detection.

12.3.2 EMI/Earthquake Information

Not Applicable

12.3.3 Sparing Information

Provide one (1) of each for spares:

NTFX05AA Power Failure Detection Board

NT3X82AH Distinctive Audible Alarm CP

NT3X82AJ Common Audible Alarm CP

12.3.4 Power Feed and Fusing Requirements

The TME0 and TME1 frames will be powered directly from the power board when EAS is used, requiring one (1) 20 amp breaker or fuse position for each TME frame. A single power feed is required from the power board to the TME FSP to support EAS capabilities. The TME feed will require one (1) 20 amp breaker or fuse position.

The PDC/RME frames will require (2) fuse positions (one on the A-Feed and one on the B-Feed fuse panels) for each NT0X42XC kit fused at 5 amps each. The NT0X42XC Kit includes two fuses. Customer Eng should not specify additional fuses per 1071/110 spec or they will be double provisioned.

12.3.5 Current Drain Information

Not Applicable

12.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

12.4.1 Required Software Packages and Interdependencies

No changes to the software are required.

12.4.2 Software Usage Restrictions

Not Applicable

12.4.3 Memory Provisioning

Not Applicable

12.5 Real Time Impact

Not Applicable

Chapter 22

SOFTWARE

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1.0 ECM510 - BCS Insertion Gating Hardware

1.1 Overview

This ECM identifies the hardware modification needed to load BCS software into the DMS-100. The hardware modifications identified are categorized as 'insertion gating', i.e. they are essential for the achievement of successful BCS software insertion into DMS 100 target configurations.

Two types of gating hardware are covered in this ECM:

- BCS Gating Hardware
- Feature Insertion Gating Hardware

Definitions of these and associated terms are given in "Definition of Terms" on page 22-2 .

BCS Gating Hardware and Feature Insertion Gating hardware are identified because they require to be shipped and installed before loading of BCS software is attempted in the target DMS. If loading of BCS software is attempted before the BCS Software or Feature Insertion Hardware has been installed, a load abort will occur.

For commercial reasons, BCS Gating Hardware is differentiated from Feature Insertion Gating Hardware. Note that BCS gating hardware is required in all systems receiving the corresponding BCS software. Feature Insertion Gating Hardware, on the other hand, is required in addition to the BCS Gating Hardware for the following:

- Systems in which the corresponding feature is required and the corresponding feature software is contained in the BCS load.
- Systems receiving USL (Universal Software Load)
- Systems receiving BCS Software obtained through a buy-out.

BCS Gating Hardware and Feature Insertion Gating Hardware are identified in tables covering BCS-26 through BCS-35.

ANY OFFICE THAT IS UPGRADING A BCS MUST MEET THE MINIMUM HARDWARE REQUIREMENTS FOR THAT OFFICE. HARDWARE MINIMUMS ARE BASED ON ADDITIONS TO THE PREVIOUS BCS HARDWARE REQUIREMENTS.

All other upgrade hardware is feature hardware. The feature related hardware information and details on BCS Feature Gating Hardware should be obtained from Advanced Provisioning Information (API) or Engineering Change Memorandum (ECM) documents providing provisioning information on the feature. This feature related hardware should be ordered in the appropriate specs.

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Specific software packages in the BCS or USL software load are dependent on having specific insertion gating hardware for successful loading. This dependant software and corresponding hardware is identified in this ECM.

1.1.1 Definition of Terms

The terms defined in this section are defined for the purposes of system engineering and are not intended for any other purposes.

Hardware gating terms used in this document are defined below.

- Base Hardware - is the hardware that is deemed to be the minimum hardware configuration required to load and run, correctly, the BCS base software. Base hardware may comprise hardware contained in any part of the DMS.
- BCS Gating Hardware - is, for a specific BCS, the hardware, modification to the Base Hardware of the immediately previous BCS, that is deemed to be necessary to load and run the specific BCS base software. Refer to Figure 1 on page 22-3 for an illustration.

Base software is BCS software excluding feature software which may be ordered as an option additional to the base BCS software.

Figure 2 on page 22-4 illustrates non-consecutive, that is, multiple increment, BCS upgrade situations.

- Strategic BCS Gating Hardware - is a sub-set of BCS Gating Hardware. It is hardware which is required for strategic marketing purposes in addition to the hardware considered essential, technically, for the loading and correct operation of the associated BCS base software.
- Feature Gating Hardware - is the hardware, additional to the BCS Base Hardware, which is needed to enable a specified feature to function correctly. The software for a feature is an optional addition to the base BCS software described under the BCS Gating Hardware definition given above.
 - Feature Insertion Gating Hardware - is a sub-set of Feature Gating Hardware. It is hardware required to be installed in the target DMS before loading the corresponding BCS software which includes the the software for the feature considered.
 - Strategic Feature Gating Hardware - is a sub-set of Feature Gating Hardware. It is hardware which is required for strategic marketing purposes in addition to the hardware considered essential, technically, for the loading and correct operation of the associated feature software.

- USL (Universal Software Load) Gating Hardware - is the hardware which must be installed in the target DMS before the corresponding USL may be successfully loaded into the target system. This USL Gating Hardware includes BCS Base Hardware and Feature Insertion Gating Hardware. Refer to Figure 3 on page 22-5 for an illustration of USL Gating Hardware Composition.

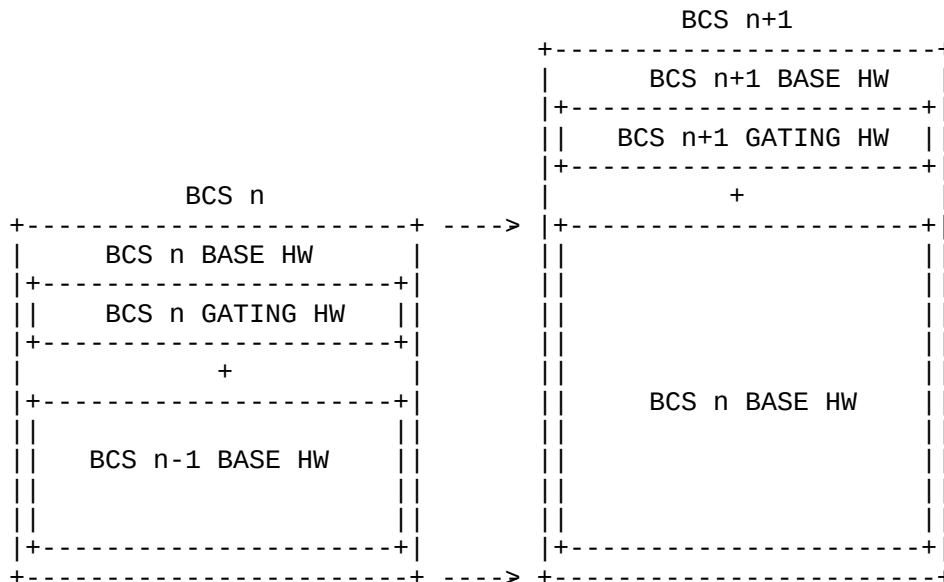


Figure 1. BCS Gating Hardware

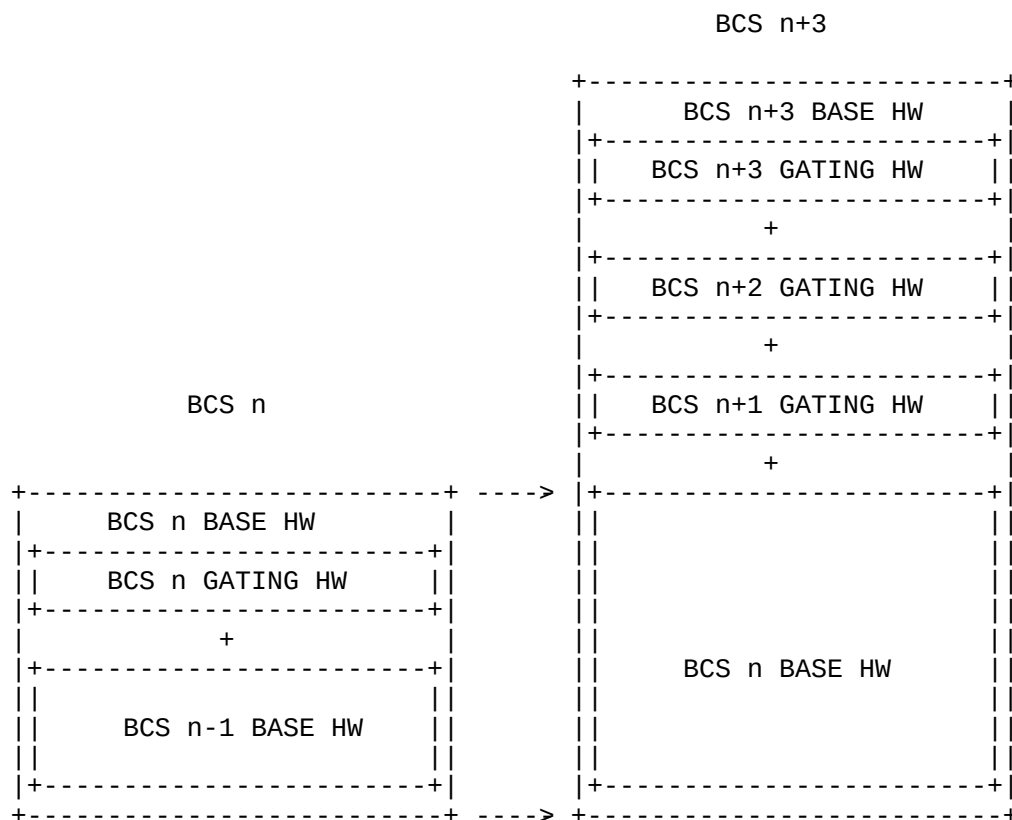


Figure 2. BCS Gating Hardware - Multiple Increment Upgrade

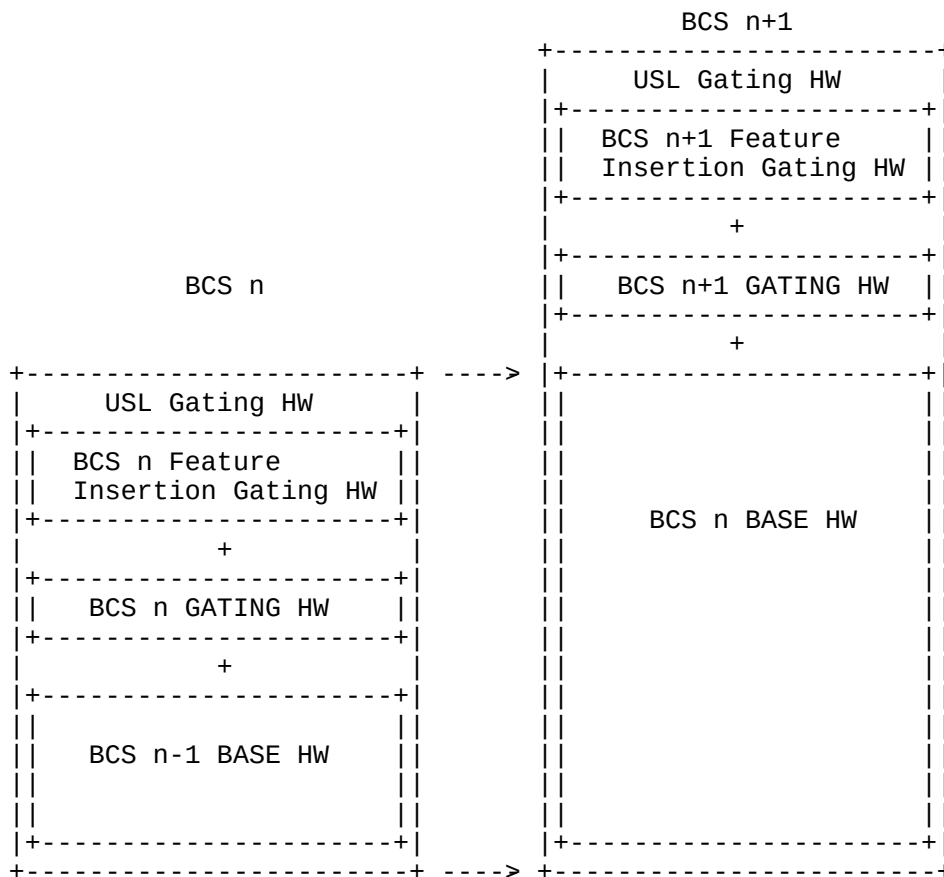


Figure 3. USL Gating Hardware

1.1.1.2 BCS Gating Hardware

BCS Gating Hardware includes BCS Insertion Gating Hardware and Strategic Gating Hardware.

Feature Gating Hardware is not included in the scope of this ECM. Information regarding Feature Gating Hardware may be obtained from the ECM corresponding to the feature considered. Note that if feature software loading is attempted where the corresponding feature Gating Hardware is not present, the load process is not impacted and there is no load abort. Feature gating hardware, therefore, may be installed after load insertion.

1.1.1.3 Feature Insertion Gating Hardware

Feature Insertion Gating Hardware, however, is included in the scope of this ECM. This is because of the critical nature of insertion gating hardware and because Feature Insertion Gating Hardware has the same shipping and installation procedure as BCS

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gating hardware. Feature Insertion Gating Hardware is required to be installed in the target system before the corresponding BCS software is loaded. If BCS software loading is attempted before the insertion gating hardware is installed, a load abort will occur. To avoid such loading aborts, the ordering and shipping process requires that the BCS Gating Hardware and Feature Insertion Gating Hardware are identified. BCS Hardware (specific to the BCS considered) and Feature Insertion Gating Hardware are separately specified and shipped to the target site where they are installed prior to load insertion.

1.1.4 USL Gating Hardware

USL Gating Hardware is required to be installed in the target system before the corresponding USL software load is inserted. If loading of the USL software is attempted before the USL Insertion Gating Hardware is installed, a loading abort will occur. To avoid such loading aborts, the ordering and shipping process requires that the USL Insertion Gating Hardware is identified. USL Gating Hardware is separately identified and shipped to the target site where it is installed prior to load insertion.

1.2 Hardware Provisioning

1.2.1 Hardware Usage Restrictions

Not applicable.

1.2.2 Hardware Dependencies

Not applicable.

1.2.2.1 P and C Side Port Requirements

1.2.2.2 DMS BUS Port Requirements

1.2.2.3 Circuits Per Card

1.2.2.4 Discrimination Numbering

1.2.3 Provisioning Considerations

1.2.3.1 BCS Gating and Feature Insertion Gating Procedures

BCS Gating and Feature Insertion Gating Hardware is processed by BCS scheduling.

- Manufacturing ships the BCS Gating and Feature Insertion Gating material separately to site.

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- Hardware is installed prior to corresponding load application in the comprising hardware unit, e.g. CC (Central Control), XPM (Peripheral Module), MS (Message Switch).

1.2.3.2 General - USL Gating Hardware

USLs have a comprehensive feature content. A USL may contain features which are redundant for some target offices. The feature software is redundant in these cases if the target office does not operate the considered feature and, therefore, if there are special hardware requirements for the feature, the feature hardware will not be present. For some features the special hardware required is Feature Insertion Gating Hardware, e.g. additional memory. If an attempt is made to load a USL in a target office not equipped with this Feature Insertion Gating Hardware, a load abort will occur. To avoid this, Feature Insertion Gating Hardware must be installed in offices receiving USL. Feature Insertion Gating Hardware must be installed prior to USL insertion.

To facilitate the determination of whether or not an office has all of the hardware necessary for USL insertion, the features requiring Feature Insertion Gating Hardware are identified by software package identity codes in the tables presented later in this ECM.

1.2.3.3 General - SLM II

SLM II hardware is categorized as Feature Insertion Gating. Refer to "Definition of Terms" on page 22-2. Because it is Feature Insertion Gating, BCS Gating material, shipping and installation procedures must be followed.

SLM II may be required for the following reasons:

1. For USL (Universal Software Load) applications. Refer to 'BCS33 Gating Hardware' in "Provisioning Considerations" on page 22-6.
2. Size of office image is greater than the capacity of SLM I. i.e., 6 Mb. (calculated by MEMCALC) (Feature Insertion Gating, refer to "Definition of Terms" on page 22-2).
3. Customer orders SLM II for other reasons, e.g. BRISC hardware requirement, planned capacity upgrade, etc. (Feature Insertion Gating).

For SLM II installation details refer to Installation Manual IM 9 5.

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1.2.3.4 General - BRISC

BRISC hardware (NT9X10AA and NT9X26DA) is categorized as Feature Insertion Gating and, regardless of BCS level, must be installed prior to CC load application, according to the procedures described for BCS Gating and Feature Insertion Gating Hardware, above.

The NT9X86AB Dual Port Message Controller (DPMC) Circuit Pack is required before a BRISC upgrade can be done in SNSE. Any existing NT9X86AA circuit packs must be removed and replaced with NT9X86AB.

The NT9X26DB Remote Test Interface (RTIF) Paddleboard is required for the Series 60 BRISC processor, and the NT9X26EA RTIF Paddleboard is required for the Series 70 BRISC processor.

The NT9X14EA Memory Circuit Packs are required to fully utilize the capability of the BRISC processors.

For BRISC installation details refer to Installation Manual IM 9 5.

1.2.3.5 BCS26 & 27 Gating Hardware

Only Feature Insertion Gating Hardware is identified for BCS 26 and 27.

In the table, terms used are defined as:

Terms in Table	Associated PEC
Ext. SP Mem	NT6X46AC or NT6X46BB - SEE NOTE
Ext. MP Mem	2nd NT6X47AB per shelf - SEE NOTE

NOTE: The NT6X46AC circuit pack (cp) will be used to update existing modules. This cp (NT6X46AC) will be ordered via a Product Change (PC) kit. The PC kit will change the PEC of the base modules and make several other circuit pack slots provisionable. (The slots are being made provisionable to eliminate the need for additional PC kits and base module PECs when the circuit packs change PECs due to upcoming features.) The NT6X46BB will be used on new modules. These new modules will contain provisionable slots for changing cp's.

For U.S. applications only, the second NT6X47AB (MP Memory CP) pair can be provisioned on updated modules. The second NT6X47AB CP pair will be ordered as a line item on modules where the existing module already contained one (1) NT6X47AB CP pair. The one (1) NT6X47AC is provisionable on new modules and has the memory capacity equivalent of two (2) NT6X47AB. Existing modules should be updated via a change kit which replaces the NT6X47ABs with the NT6X47ACs.

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1.2.3.6 BCS28 & 29 Gating Hardware

Only Feature Insertion Gating Hardware is identified for BCS 28 and 29.

In the table, terms used are defined as:

Terms in Table	Associated PEC
Ext. SP Mem	NT6X46AC or NT6X46BB - SEE NOTE
Ext. MP Mem	2nd NT6X47AB per shelf or NT6X47AC - SEE NOTE
New Msg	NT6X69AA & 79AA or NT6X69AB or NT6X69AC - SEE NOTE
XPM Processor CP	NT6X45BA - SEE NOTE
Ext. LCM Processor CP	NT6X51AB - SEE NOTE

NOTE: The NT6X46AC circuit pack (cp) will be used to update existing modules. This cp (NT6X46AC) will be ordered via a Product Change (PC) kit. The PC kit will change the PEC of the base modules and make several other circuit pack slots provisionable. (The slots are being made provisionable to eliminate the need for additional PC kits and base module PECs when the circuit packs change PECs due to upcoming features.) The NT6X46BB will be used on new modules. These new modules will contain provisionable slots for changing cp's.

For U.S. applications only, the second NT6X47AB (MP Memory CP) pair can be provisioned on updated modules. The second NT6X47AB CP pair will be ordered as a line item on modules where the existing module already contained one (1) NT6X47AB CP pair. The one (1) NT6X47AC is provisionable on new modules and has the memory capacity equivalent of two (2) NT6X47AB. Existing modules should be updated via a change kit which replaces the NT6X47ABs with the NT6X47ACs.

The NT6X69AA and NT6X79AA or NT6X69AB cp can be used to update existing modules. These cp will be ordered via PC Kit. The PC kit will change the PEC of the base modules and make the card slots provisionable. The NT6X69AC is to be used for all New Messaging updates and replaces all the previous New Msg circuit packs.

For Canadian applications, the provisionable NT6X45BA circuit pack will be required for BCS-28 for XPM Super Charging.

For Canadian applications, the NT6X51AB circuit pack will be required for BCS-28 for XPM Super Charging. NT6X51AB is an "Always Provided" circuit pack on the LCM Common CP fill. It is part of NT6X04AB LCM Common CP (i.e. pertaining to LCM, RSC, RLCM) and NT8X04AB LCM Common CP (i.e. pertaining to OPM). In Canada, Change Application Dept. 1955 BRW will field upgrade existing LCM modules as required (i.e. Systems Application Engineering will NOT

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retrofit NT6X51AA to NT6X51AB via product change kit). However, after Change Application field upgrades an office, System Application Engineering will update the office records accordingly.

1.2.3.7 BCS30 & 31 Gating Hardware

Only Feature Insertion Gating Hardware is identified for BCS 30 and 3 .

In the BCS 30 - 31 table, terms used are defined as:

Terms in Table	Associated PEC	
Ext. SP Mem	NT6X46AC or NT6X46BB	- SEE NOTE
Ext. MP Mem	2nd NT6X47AB or one (1) NT6X47AC per shelf	- SEE NOTE
4M MS Proc	NT9X13DC	
6M Memory	NT9X14BB	

NOTE: The NT6X46AC circuit pack (cp) will be used to update existing modules. This cp (NT6X46AC) will be ordered via a Product Change (PC) kit. The PC kit will change the PEC of the base modules and make several other circuit pack slots provisionable. (The slots are being made provisionable to eliminate the need for additional PC kits and base module PECs when the circuit packs change PECs due to upcoming features.) The NT6X46BA will be used on new modules. These new modules will contain provisionable slots for changing cp's.

For U.S. applications only, the second NT6X47AB (MP Memory CP) pair can be provisioned on updated modules. The second NT6X47AB CP pair will be ordered as a line item on modules where the existing module already contained one (1) NT6X47AB CP pair. The one (1) NT6X47AC is provisionable on new modules and has the memory capacity equivalent of two (2) NT6X47AB. Existing modules should be updated via a change kit which replaces the NT6X47ABs with the NT6X47ACs.

For Canadian applications only, one (1) NT6X47AC pair will be provisioned on new modules and will replace NT6X47AB on existing modules. The second NT6X47AB is not to be provisioned for Canadian jobs. NT9X13DC, MS CPU Processor CP (4Meg), and NT9X14BB, 6MB Memory, must be provisioned on the Message Switch (MS) when ENET hardware and/or software (NTXE01AA) is ordered. Refer to ECM-493 and ECM-626.

1.2.3.8 BCS32 Gating Hardware

Only Feature Insertion Gating Hardware is identified for BCS 32.

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Effective BCS-32, all IACs in an office must be replaced with LGCI/LTCI or LGC/LTC modules with ISDN capabilities prior to accepting a BCS-32 or above load.

1.2.3.9 BCS33 Gating Hardware

Only Feature Insertion Gating Hardware is identified for BCS 33.

Effective with BCS33, the old messaging/small memory configuration will no longer be supported on new BCS loads for any XPM except DTC6, MSB6, and MSB7.

Switches using Universal Software Load require SLM II hardware, i.e. NT9X44AB. Refer to ECM-626, DMS Core, for provisionng details.

The following terms used in the table below are defined as follows:

Terms in Table -----	Associated PEC -----
Ext. MP Mem	2nd NT6X47AB or one NT6X47AC per shelf
New Msg	NT6X69AB, NT6X69AC, or NT6X69AA & NT6X79AA & minimum NT6X45AC
Ext. SP Mem	NT6X46AC, NT6X46BA, or NT6X46BB
4M MS Proc	NT9X13DC
6M Memory	NT9X14BB
SLM II	NT9X44AB

The second NT6X47AB (MP Memory CP) can be provided when upgrading existing DTC modules. A NT6X02EQ change kit will be used on existing DTCs to replace the NT6X47AB CPs with NT6X47AC CPs.

The NT6X47AC CP will be provisioned on new DTC modules and RLCM/OPM modules with ESA.

The NT6X69AC (Msg Protocol & Tone CP) will be provisioned on new DTC and SMR modules. DTC and SMR modules with old messaging, NT6X43AA, will be upgraded with the NT6X69AC, via a Product Change (PC) Kit, to meet new messaging requirements. DTC modules being upgraded to new messaging must upgrade the Signal Processor Memory CP with the NT6X46AC or NT6X46BB via PC Kits. New modules will be provisioned with the NT6X46BB CP. Existing DTC modules may have been provisioned with the NT6X46BA.

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NT6X69AA & NT6X79AA or NT6X69AB, Msg Protocol & Tone CP, and NT6X45AC Processor CP satisfies the new messaging requirement on existing DTC modules.

NT9X13DC, MS CPU Processor CP (4Meg), and NT9X14BB, 6MB Memory, must be provisioned on the Message Switch (MS) when ENET hardware and/or software (NTXE01AA) is being ordered. Refer to ECM-493 and ECM-626. The NT9X13DC and NT9X14BB must also be provisioned when FLIS hardware and/or software (NTXQ51AA) is ordered in BCS33 and beyond. Refer to ECM612.

Refer to the appropriate API/ECM document for further provisioning rules.

Refer to ECM-441, XPM Power Provisioning, to ensure that the correct NT2X70, Power Converter CP, is provisioned in upgraded XPMs.

1.2.3.10 BCS34 Gating Hardware

Only Feature Insertion Gating Hardware is identified for BCS 34.

The following terms used in the table below are defined as follows:

Terms in Table -----	Associated PEC -----
Unified Proc	NTMX77AA
XPM+ Term PB	NTMX71AA
EISP	NTBX01AB
4M MS Proc	NT9X13DC
6M Memory	NT9X14BB

The NTMX77AA (Unified Processor), NTMX71AA (XPM Plus Terminator Paddleboard), and NTBX01AB (Enhanced ISP) must be provisioned on all RCCI modules going to BCS34.

NT9X13DC, MS CPU Processor CP (4Meg), and NT9X14BB, 6MB Memory, must be provisioned on the Message Switch (MS) for applications using the NIU hardware and or software (NTXP47AA) in BCS34, i.e. the Packet Handler.

1.2.3.11 BCS35 Gating Hardware

The following BCS Insertion Gating Hardware is identified for BCS 35:

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- Minimum 16M memory is required in the Message Switch prior to BCS 35 load insertion if USL load MIC is used and/or if SCP II and Billing Server is being added.
- In STP switches Combined Clock CPs, NT9X53AC, and External Clock I/F CPs, NT9X54AC, are required in in the MS of STP switches prior to BCS SW load insertion.
- When using "Universal" loads (USL) on the SuperNode SE, the Compute Module must be provisioned with NT9X14EA 96MByte memory cards prior to USL insertion. The NT9X14EA is in these instances regarded as BCS Insertion Gating. Provisioning of the NT9X14EA is conditional on having NT9X13MB processors in the SNSE Compute Module. Refer to ECM-623 for SNSE provisioning rules.

The following table provides a summary of MS loads, their size and their contents.

MS LOAD -----	MEMORY -----	PRODUCT -----	PACKAGE -----
MSC35	7M	J-NET	NTXP10
MEC35	10M	E-NET DMS-PH * FLIS ASN VM ADAS	NTXE01 or NTXP47 or NTXQ51 or NTXR87 or NTXQ23
MIC35	16M	DMS-SCP	NTXN21
MNC35	16M	SNSE	NTXP44

* Requires minimum 7M in Canada

The following MS memory sizes may be configured. MS memory sizes are referenced as requirements in the tables which follow.

TOTAL MEMORY -----	PROCESSOR -----	MEMORY -----
7 Meg	9X13DA (1 meg) + 9X14BB (6 meg)	
7 Meg	9X13DB (1 meg) + 9X14BB (6 meg)	
1 Meg	9X13DC (4 meg) + 9X14BB (6 meg)	
25 Meg *	9X13DB (1 meg) + 9X14DB (24 meg)	
28 Meg	9X13DC (4 meg) + 9X14DB (24 meg)	
16 Meg **	9X13DD (16 meg)	

* (only used in DMS 250)

** V0 in BCS 35)

1.2.3.12 BCS36 Gating Hardware

No change from BCS35

The following tables list the hardware gating and MINIMUM packfill level required for BCS 32-35 on a per module basis:

MODULE BCS	LGC	LTC	DTC
26	NO CHANGE	NO CHANGE	NO CHANGE
MIN PACKFL	NT6X02AH	NT6X02AG	NT6X02AA
27	Ext. SP Mem.	Ext. SP Mem.	Ext. SP Mem. (if New Msg) & Ext. MP Mem. (Canadian Only)
MIN PACKFL	NT6X02LA NT6X02AT(upg)	NT6X02MA NT6X02AU(upg)	NT6X02AA NT6X02AS (if New Msg exists)
28	Canada: NT6X45BA US: NO CHANGE from BCS 27	Canada: NT6X45BA US: NO CHANGE from BCS 27	Canada: NT6X45BA US: NO CHANGE from BCS 27
MIN PACKFL	NT6X02LA NT6X02AT	NT6X02MA(new) NT6X02AU	NT6X02AA NT6X02AS (if New Msg exists)
29	NO CHANGE from BCS 28	NO CHANGE from BCS 28	NO CHANGE from BCS 28
MIN PACKFL	NT6X02LA NT6X02AT	NT6X02MA(new) NT6X02AU	NT6X02AA NT6X02AS (if New Msg exists)

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30	NO CHANGE from BCS 29	Ext. MP Mem.	NO CHANGE from BCS 29
----- MIN PACKFL	----- NT6X02LA NT6X02AT	----- NT6X02MC(new) NT6X02MA NT6X02AU	----- NT6X02AA NT6X02AS (if New Msg exists)
31	Ext. MP Mem.	NO CHANGE from BCS 30	NO CHANGE from BCS 30
----- MIN PACKFL	----- NT6X02LC(new) NT6X02LA NT6X02AT	----- NT6X02MC(new) NT6X02MA NT6X02AU	----- NT6X02AA NT6X02AS (if New Msg exists)
32	NO CHANGE from BCS 31	NO CHANGE from BCS 31	NO CHANGE from BCS 31
----- MIN PACKFL	----- NT6X02LC(new) NT6X02LA NT6X02AT	----- NT6X02MC(new) NT6X02MA NT6X02AU	----- NT6X02AA NT6X02AS (if New Msg exists)
33	NO CHANGE from BCS 32	NO CHANGE from BCS 32	Ext. MP Mem New Msg Ext. SP Mem
----- MIN PACKFL	----- NT6X02LC(new) NT6X02LA NT6X02AT	----- NT6X02MC(new) NT6X02MA NT6X02AU	----- NT6X02IC(new) NT6X02IA NT6X02AS
34	NO CHANGE from BCS 33	NO CHANGE from BCS 33	NO CHANGE from BCS 33
----- MIN PACKFL	----- NT6X02LC(new) NT6X02LA NT6X02AT	----- NT6X02MC(new) NT6X02MA NT6X02AU	----- NT6X02IC(new) NT6X02IA NT6X02AS
00	0	0	0

Continued.....

35	NO CHANGE from BCS 34	NO CHANGE from BCS 34	NO CHANGE from BCS 34
MIN PACKFL	NT6X02LC(new) NT6X02LA NT6X02AT	NT6X02MC(new) NT6X02MA NT6X02AU	NT6X02IC(new) NT6X02IA NT6X02AS
36	NO CHANGE from BCS 35	NO CHANGE from BCS 35	NO CHANGE from BCS 35
MIN PACKFL	NT6X02LC(new) NT6X02LA NT6X02AT	NT6X02MC(new) NT6X02MA NT6X02AU	NT6X02IC(new) NT6X02IA NT6X02AS
00	0	0	0

Figure 4. BCS Requirements Table for LGC/LTC/DTC

MODULE BCS	DTC used for CCS7	DTC used for CCS6	MSB6
26	NO CHANGE	N/A	N/A
MIN PACKFL	NT6X02AQ		
27	Ext. SP Mem. Ext. MP Mem.	N/A	N/A
MIN PACKFL	NT6X02IA NT6X02AS		
28	Canada: NT6X45BA US: NO CHANGE from BCS 27	N/A	N/A
MIN PACKFL	NT6X02IA NT6X02AS		
29	NO CHANGE from BCS 28	N/A	N/A
MIN PACKFL	NT6X02IA NT6X02AS		

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30	NO CHANGE from BCS 29	NO CHANGE from BCS 29	NO CHANGE from BCS 29
----- MIN PACKFL	----- NT6X02IA NT6X02AS	----- NT6X02IA NT6X02AS	----- NT6X07AC
31	NO CHANGE from BCS 30	NO CHANGE from BCS 30	NO CHANGE from BCS 30
----- MIN PACKFL	----- NT6X02IA NT6X02AS	----- NT6X02IA NT6X02AS	----- NT6X07AC
32	NO CHANGE from BCS 31	NO CHANGE from BCS 31	NO CHANGE from BCS 31
----- MIN PACKFL	----- NT6X02IA NT6X02AS	----- NT6X02IA NT6X02AS	----- NT6X07AC
33	NO CHANGE from BCS 32	NO CHANGE from BCS 32	NO CHANGE from BCS 32
----- MIN PACKFL	----- NT6X02IC(new) NT6X02IA NT6X02AS	----- NT6X02IC(new) NT6X02IA NT6X02AS	----- NT6X07AC
34	NO CHANGE from BCS 33	NO CHANGE from BCS 33	NO CHANGE from BCS 33
----- MIN PACKFL	----- NT6X02IC(new) NT6X02IA NT6X02AS	----- NT6X02IC(new) NT6X02IA NT6X02AS	----- NT6X07AC
00	0	0	0

Continued.....

35	NO CHANGE from BCS 34	NO CHANGE from BCS 34	NO CHANGE from BCS 34
----- MIN PACKFL	NT6X02IC(new) NT6X02IA NT6X02AS	NT6X02IC(new) NT6X02IA NT6X02AS	NT6X07AC
36	NO CHANGE from BCS 35	NO CHANGE from BCS 35	NO CHANGE from BCS 35
----- MIN PACKFL	NT6X02IC(new) NT6X02IA NT6X02AS	NT6X02IC(new) NT6X02IA NT6X02AS	NT6X07AC

Figure 5. BCS Requirements Table for LGC/LTC/DTC/MSB6

MODULE BCS	SMR	SMS	SMU
26	NO CHANGE	NO CHANGE	NO CHANGE
MIN PACKFL	NT6X02CA	NT6X02DA	NT6X02EA
27	NO CHANGE from BCS 26	NO CHANGE from BCS 26	Ext. SP Mem.
MIN PACKFL	NT6X02CA	NT6X02DA	NT6X02EB NT6X02AW(upg)
28	NO CHANGE from BCS 27	Ext. SP Mem. New Msg	Canada: NT6X45BA US: NO CHANGE from BCS 27
MIN PACKFL	NT6X02CA	NT6X02DD NT6X02DC(upg)	NT6X02EB NT6X02AW(upg)
29	NO CHANGE from BCS 28	NO CHANGE from BCS 28	NO CHANGE from BCS 28
MIN PACKFL	NT6X02CA	NT6X02DD NT6X02DC(upg)	NT6X02EB NT6X02AW(upg)
30	NO CHANGE from BCS 29	NO CHANGE from BCS 29	NO CHANGE from BCS 29
MIN PACKFL	NT6X02CA	NT6X02DD NT6X02DC(upg)	NT6X02EB NT6X02AW(upg)

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31	Ext. SP Mem. Ext. MP Mem.	Ext. MP Mem.	Ext. MP Mem.
MIN PACKFL	NT6X02CC NT6X02CQ(upg)	NT6X02DD NT6X02DC(upg)	NT6X02EB NT6X02AW(upg) NT6X02EG(new)
32	NO CHANGE from BCS 31	NO CHANGE from BCS 31	NO CHANGE from BCS 31
MIN PACKFL	NT6X02CP(new) NT6X02CC NT6X02CQ(upg)	NT6X02DH(new) NT6X02DD NT6X02DC(upg)	NT6X02EG(new) NT6X02EB NT6X02AW
33	New Msg	NO CHANGE from BCS 32	NO CHANGE from BCS 32
MIN PACKFL	NT6X02CT(upg)	NT6X02DH(new) NT6X02DD NT6X02DC	NT6X02EG(new) NT6X02EB NT6X02AW
34	NO CHANGE from BCS 33	NO CHANGE from BCS 33	NO CHANGE from BCS 33
MIN PACKFL	NT6X02CT(upg)	NT6X02DH(new) NT6X02DD NT6X02DC	NT6X02EG(new) NT6X02EB NT6X02AW
35	NO CHANGE from BCS 34	NO CHANGE from BCS 34	NO CHANGE from BCS 34
MIN PACKFL	NT6X02CT(upg)	NT6X02DH(new) NT6X02DD NT6X02DC	NT6X02EG(new) NT6X02EB NT6X02AW
00	0	0	0

Continued.....

36	NO CHANGE from BCS 35	NO CHANGE from BCS 35	NO CHANGE from BCS 35
MIN PACKFL	NT6X02CT(upg)	NT6X02DH(new) NT6X02DD NT6X02DC	NT6X02EG(new) NT6X02EB NT6X02AW

Figure 6. BCS Requirements Table for SMR/SMS/SMU

MODULE BCS	RSC	Dual RSC	MSB7
26	NO CHANGE	Ext. SP Mem. Ext. MP Mem.	NO CHANGE
MIN PACKFL	NT6X12AB	NT6X12CA NT6X12AD(upg)	NT6X32AA
27	Ext. SP Mem. Ext. MP Mem.	NO CHANGE from BCS 26	Ext. SP Mem.
MIN PACKFL	NT6X12CA NT6X12AD(upg)	NT6X12CA NT6X12AD(upg)	NT6X32CA NT6X32AB(upg)
28	Canada: NT6X45BA US: NO CHANGE from BCS 27	Canada: NT6X45BA US: NO CHANGE from BCS 27	Canada: NT6X45BA NO CHANGE from BCS 27
MIN PACKFL	NT6X12CA NT6X12AD(upg)	NT6X12CA NT6X12AD(upg)	NT6X32CA NT6X32AB(upg)
29	NO CHANGE from BCS 28	NO CHANGE from BCS 28	NO CHANGE from BCS 28
MIN PACKFL	NT6X12CA NT6X12AD(upg)	NT6X12CA NT6X12AD(upg)	NT6X32CA NT6X32AB(upg)
30	NO CHANGE from BCS 29	NO CHANGE from BCS 29	NO CHANGE from BCS 29
MIN PACKFL	NT6X12CA NT6X12AD(upg)	NT6X12CA NT6X12AD(upg)	NT6X32CA NT6X32AB(upg)

Continued....

31	NO CHANGE from BCS 30	NO CHANGE from BCS 30	NO CHANGE from BCS 30
----- MIN PACKFL	----- NT6X12CA NT6X12AD(upg)	----- NT6X12CA NT6X12AD(upg)	----- NT6X32CA NT6X32AB(upg)
32	NO CHANGE from BCS 31	NO CHANGE from BCS 31	NO CHANGE from BCS 31
----- MIN PACKFL	----- NT6X12AG(new) NT6X12CA NT6X12AD	----- NT6X12AG(new) NT6X12CA NT6X12AD	----- NT6X32CA NT6X32AB
33	NO CHANGE from BCS 32	NO CHANGE from BCS 32	NO CHANGE from BCS 32
----- MIN PACKFL	----- NT6X12AG(new) NT6X12CA NT6X12AD	----- NT6X12AG(new) NT6X12CA NT6X12AD	----- NT6X32CA NT6X32AB
34	NO CHANGE from BCS 33	NO CHANGE from BCS 33	NO CHANGE from BCS 33
----- MIN PACKFL	----- NT6X12AG(new) NT6X12CA NT6X12AD	----- NT6X12AG(new) NT6X12CA NT6X12AD	----- NT6X32CA NT6X32AB
35	NO CHANGE from BCS 34	NO CHANGE from BCS 34	NO CHANGE from BCS 34
----- MIN PACKFL	----- NT6X12AG(new) NT6X12CA NT6X12AD	----- NT6X12AG(new) NT6X12CA NT6X12AD	----- NT6X32CA NT6X32AB
00	0	0	0

Continued.....

36	NO CHANGE from BCS 35	NO CHANGE from BCS 35	NO CHANGE from BCS 35
MIN PACKFL	NT6X12AG(new) NT6X12CA NT6X12AD	NT6X12AG(new) NT6X12CA NT6X12AD	NT6X32CA NT6X32AB

Figure 7. BCS Requirements Table for RSC/Dual RSC/MS7E

MODULE BCS	LCM	RLCM (w/ESA)	OPM (w/ESA)
26	NO CHANGE	NO CHANGE	NO CHANGE
MIN PACKFL	NT6X03RA NT6X03RB NT6X04AA(LCM)	NT6X11AA	NT6X11AA
27	NO CHANGE from BCS 26	NO CHANGE from BCS 26	NO CHANGE from BCS 26
MIN PACKFL	NT6X03RA NT6X03RB NT6X04AA(LCM)	NT6X11AA	NT6X11AA
28	Canada: NT6X51AB US: NO CHANGE from BCS 27	Canada: NT6X51AB US: NO CHANGE from BCS 27	Canada: NT6X51AB US: NO CHANGE from BCS 27
MIN PACKFL	NT6X03RA NT6X03RB NT6X04AA(LCM)	NT6X11AA	NT6X11AA
29	NO CHANGE from BCS 28	NO CHANGE from BCS 28	NO CHANGE from BCS 28
MIN PACKFL	NT6X03RA NT6X03RB NT6X04AA(LCM)	NT6X11AA	NT6X11AA

Continued.....

30	NO CHANGE from BCS 29	NO CHANGE from BCS 29	NO CHANGE from BCS 29
----- MIN PACKFL	NT6X03RA NT6X03RB NT6X04AA(LCM)	NT6X11AA	NT6X11AA
31	NO CHANGE from BCS 30	NO CHANGE from BCS 30	NO CHANGE from BCS 30
----- MIN PACKFL	NT6X03RA NT6X03RB NT6X04AA(LCM)	NT6X11AA	NT6X11AA
32	NO CHANGE from BCS 31	NO CHANGE from BCS 31	NO CHANGE from BCS 31
----- MIN PACKFL	NT6X03RA NT6X03RB NT6X04AA(LCM)	NT6X11AA	NT6X11AA
33	NO CHANGE from BCS 32	Ext. MP Mem (NT6X47AC)	Ext. MP Mem (NT6X47AC)
----- MIN PACKFL	NT6X03RA NT6X03RB NT6X04AA(LCM)	NT6X11AA	NT6X11AA
34	NO CHANGE from BCS 33	NO CHANGE from BCS 33	NO CHANGE from BCS 33
----- MIN PACKFL	NT6X03RA NT6X03RB NT6X04AA(LCM)	NT6X11AA	NT6X11AA
00	0	0	0

Continued.....

35	NO CHANGE from BCS 34	NO CHANGE from BCS 34	NO CHANGE from BCS 34
----- MIN PACKFL	----- NT6X03RA NT6X03RB NT6X04AA(LCM)	----- NT6X11AA	----- NT6X11AA
36	NO CHANGE from BCS 35	NO CHANGE from BCS 35	NO CHANGE from BCS 35
----- MIN PACKFL	----- NT6X03RA NT6X03RB NT6X04AA(LCM)	----- NT6X11AA	----- NT6X11AA
00	0	0	0

Figure 8. BCS Requirements Table for LCM/RLCM/OPM

MODULE BCS	COMPUTING MODULE	MESSAGE SWITCH	SYSTEM LOAD MODULE
26	NT9X13BC NT9X14DB ** NT9X12AB/AC	NT9X13DB NT9X14BB	NT9X12AB/AC
MIN PACKFL	NT9X06AC	NT9X04AE	NT9X07AB
27	NO CHANGE from BCS 26	NO CHANGE from BCS 26	NO CHANGE from BCS 26
MIN PACKFL	NT9X06AC	NT9X04AE	NT9X07AB
28	NO CHANGE from BCS 27	NO CHANGE from BCS 27	NO CHANGE from BCS 27
MIN PACKFL	NT9X06AC	NT9X04AE	NT9X07AB
29	NO CHANGE from BCS 28	NO CHANGE from BCS 28	NO CHANGE from BCS 28
MIN PACKFL	NT9X06AC	NT9X04AE	NT9X07AB
30	NO CHANGE from BCS 29	NO CHANGE from BCS 29	NO CHANGE from BCS 29
MIN PACKFL	NT9X06AC	NT9X04AE	NT9X07AB
31	NO CHANGE from BCS 30	4M MS Proc 6M Memory &&	NO CHANGE from BCS 30
MIN PACKFL	NT9X06AC	NT9X04AE	NT9X07AB

Continued....

32	NO CHANGE from BCS 31	NO CHANGE from BCS 31	NO CHANGE from BCS 31
----- MIN PACKFL	----- NT9X06AC	----- NT9X04AE	----- NT9X07AB
33	NO CHANGE from BCS 32	4M MS Proc 6M Memory \$\$	For regular SW loads, NO CHANGE from BCS 32. For Universal SW Loads, SLM II MUST BE PROVIDED.
----- MIN PACKFL	----- NT9X06AC	----- NT9X04AE	----- NT9X07AB
34	NO CHANGE from BCS 33	4M MS Proc 6M Memory ##	NO CHANGE from BCS 33
----- MIN PACKFL	----- NT9X06AC	----- NT9X04AE	----- NT9X07AB
35	NO CHANGE from BCS 34	4M MS Proc 6M Memory ++ NT9X53AC %% 16M Memory @@	NO CHANGE from BCS 34
----- MIN PACKFL	----- NT9X06AC	----- NT9X04AE NT9X04AG %%	----- NT9X07AB
36	NO CHANGE FROM BCS 35	NO CHANGE FROM BCS 35	NO CHANGE FROM BCS 35
----- MIN PACKFL	----- NT9X06AC	----- NT9X04AE NT9X04AG %%	----- NT9X07AB

Figure 9. BCS Requirements Table for SuperNode

** Existing NT9X14BB 6 MByte CPs do not have to be retrofit to NT9X14DB 24 Mbyte. Requirements for the NT9X14DB CP for BCS26

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& 27 refers to new installations and replacements of existing NT9X14DA. Memory growth is provisioned in increments of 24 MBytes (i.e. NT9X14DB). The NT9X12AC replaces the NT9X12AB.

&& Required when adding ENET H/W and/or S/W.(Package NTXE01AA in MS load MEC)

\$\$ Required when adding FLIS H/W and/or S/W (Package NTXQ51AA in MS load MEC)

Required when adding the NIU H/W and/or Packet Handler S/W package(NTXP47) in MS load MEC.

For the Canadian Market, the requirement for a minimum of 10M Byte of MS for Packet Handler in BCS 34 is reduced to a minimum of 7M Byte in BCS 35. The S/W package NTPX47AA is contained in the MS load MEC.

For the US Market the requirement for a minimum of 10M Byte of MS memory is also required in BCS 35.

@@ A minimum of 16M of MS memory is required when adding SCP II and Billing Server.

%% Combined Clock CPs, NT9X53AC, and External Clock I/F CPs, NT9X54AC, are required in the SuperNode MS of STP switches prior to BCS SW load insertion. The minimum MS packfill required to support NT9X53AC and NT9X54AC is NT9X04AG.

++ A minimum of 10 Mbyte of MS memory is required when adding NIU HW and/or S/W (Package NTXQ23AA in MS load MEC) for ADAS.

MODULE BCS	CM	MS	SLM
	00	0	0
35	NO CHANGE from BCS 34 (96M Memory)**	NO CHANGE from BCS 34 (16M Memory)@@	NO CHANGE from BCS 34
MIN PACKFL	NA	NA	NA NT9X44AC##
36	NO CHANGE from BCS 35 (96M Memory)**	NO CHANGE from BCS 35 (16M Memory)@@	NO CHANGE from BCS 35
MIN PACKFL	NA	NA	NA NT9X44AC##

Figure 10. BCS Requirements Table for SuperNode SE

** When using "Universal" loads (USL) on the SuperNode SE, the Compute Module must be provisioned with NT9X14EA 96MByte memory cards prior to USL insertion. The NT9X14EA is in these instances regarded as BCS Insertion Gating. Provisioning of the NT9X14EA is conditional on having NT9X13MB processors in the SNSE Compute Module. Refer to ECM-632 for SNSE provisioning rules.

The above requirements apply for the following SNSE USLs:

For the U.S., either of:

NTXC57AA DMS100 BCS35 S/W LOAD FOR SNSE ENET SERIES 20
 NTXC58AA DMS100/200 BCS35 S/W LOAD FOR SNSE SERIES 20
 NTXC59AA DMS200 BCS35 S/W LOAD FOR SNSE SERIES 20

For Canada, either of:

NTXC63AA SMART MANAGEMENT SNSE SERIES 20
 NTXC64AA UNIVERSAL S/W SNSE SERIES 20 FOR TOLL

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- @@ A minimum of 16M of MS memory is required when adding SCP II and Billing Server Also when adding SNSE S/W (Package NTP44AA in MS load MNC)
- ## The PEC NT9X44AC represents Software Load Module SLM1A which is used with SNSE.

MODULE BCS	TOPS MP TPC Shelf	
00		0
26 MIN PACKFL	NO CHANGE NTNX61AA	
27 MIN PACKFL	NTNX63AA in each TPC shelf NTNX61AC	
28 MIN PACKFL	NO CHANGE from BCS 27 NTNX61AC	
29 MIN PACKFL	NO CHANGE from BCS 28 NTNX61AC	
30 MIN PACKFL	NO CHANGE from BCS 29 NTNX61AC	
31 MIN PACKFL	NO CHANGE from BCS 30 NTNX61AC	

Continued....

32	NO CHANGE from BCS 31
----- MIN PACKFL	----- NTNX61AC
33	NO CHANGE from BCS 32
----- MIN PACKFL	----- NTNX61AC
34	NO CHANGE from BCS 33
----- MIN PACKFL	----- NTNX61AC
35	NO CHANGE from BCS 34
----- MIN PACKFL	----- NTNX61AC
36	NO CHANGE from BCS 35
----- MIN PACKFL	----- NTNX61AC
00	0

Figure 11. BCS Requirements Table for TOPS MP

MODULE BCS	ISDN IAC/LGCI/ DTCI/LTCI	ISDN LCMI	ISDN RCCI
26	NO CHANGE	NO CHANGE	N/A
MIN PACKFL	NT6X02NA NTBX40BC(IAC)	NTBX31AA	
27	Ext. SP Mem.	NO CHANGE from BCS 26	N/A
MIN PACKFL	NT6X02NA NTBX40BC(IAC)	NTBX31AA	
28	NO CHANGE from BCS 27	NTBX34AB	N/A
MIN PACKFL	NT6X02NA NTBX40BC(IAC)	NTBX31AC	
29	NO CHANGE from BCS 28	NO CHANGE from BCS 28	N/A
MIN PACKFL	NT6X02NA NTBX40BC(IAC)	NTBX31AC	
30	NO CHANGE from BCS 29	NO CHANGE from BCS 29	Ext. MP Mem* Ext. SP Mem*
MIN PACKFL	NT6X02NA NTBX40BC(IAC)	NTBX31AC	NT6X12DA
31	NO CHANGE from BCS 30	NO CHANGE from BCS 30	NO CHANGE from BCS 30
MIN PACKFL	NT6X02NA NTBX40BC(IAC)	NTBX31AC	NT6X12DA

Continued....

32	IAC must be replaced with LGCI/LTCI	NO CHANGE from BCS 31	NO CHANGE from BCS 31
----- MIN PACKFL	----- NT6X02NA	----- NTBX31AC	----- NT6X12DC(new) NT6X12DA
33	NO CHANGE from BCS 32	NO CHANGE from BCS 32	NO CHANGE from BCS 32
----- MIN PACKFL	----- NT6X02NA	----- NTBX31AC	----- NT6X12DC(new) NT6X12DA
34	NO CHANGE from BCS 33	NO CHANGE from BCS 33	Unified Proc XPM+ Term PB EISP
----- MIN PACKFL	----- NT6X02NA	----- NTBX31AC	----- NT6X12DE
35	NO CHANGE from BCS 34	NO CHANGE from BCS 34	NO CHANGE from BCS 34
----- MIN PACKFL	----- NT6X02NA	----- NTBX31AC	----- NT6X12DE
36	NO CHANGE from BCS 35	NO CHANGE from BCS 35	NO CHANGE from BCS 35
----- MIN PACKFL	----- NT6X02NA	----- NTBX31AC	----- NT6X12DE

Figure 12. BCS Requirements Table for ISDN

- * The RCCI is always provided with Ext. MP and SP Memory CPs and is shown here for information only.

\ MODULE ----- BCS REQUIRED \		BASE LPP (INCLUDES LMS AND LIS)	STP	SSP/SEP	EIU
35		NO CHANGE FROM BCS 34	NO CHANGE FROM BCS 34	NO CHANGE FROM BCS 34	NO CHANGE FROM BCS 34
36		NO CHANGE FROM BCS 35	NO CHANGE FROM BCS 35	NO CHANGE FROM BCS 35	NO CHANGE FROM BCS 35
0	0	0	0	0	0

Figure 13. BCS-35 Requirements Table for LPPs (First of 3)

\ MODULE ----- BCS REQUIRED \		MDR7	FRIU	DMS-PH	NIU
35		NO CHANGE FROM BCS 34	NO CHANGE FROM BCS 34	NO CHANGE FROM BCS 34	NO CHANGE FROM BCS 34
36		NO CHANGE FROM BCS 35	NO CHANGE FROM BCS 35	NO CHANGE FROM BCS 35	NO CHANGE FROM BCS 35
0	0	0	0	0	0

Figure 14. BCS-35 Requirements Table for LPPs (Second of 3)

\ MODULE ----- BCS REQUIRED \		SEP	APU	VPU	
35		NO CHANGE FROM BCS 34	APU INTRODUCED	VPU INTRODUCED	
36		NO CHANGE FROM BCS 35	NO CHANGE FROM BCS 35	NO CHAGE FROM BCS 35	
0	0	0	0	0	0

Figure 15. BCS-35 Requirements Table for LPPs (Third of 3)

NOTE

new = Product Engineering Codes (PEC) for an initial office receiving a BCS load

upg = PEC for an existing office which is upgrading a BCS load
Refer to ECM-620 for minimum hardware required for LPP applications in BCS 34.

CAUTION

Before attempting BCS loading of STP LPPs in which the LIUs use NTEX22AA (4M) processors, ensure that DATAFILL memory requirements do not cause memory capacity to be exceeded. LIU memory requirement calculations are detailed in SEB 92-01-001. Refer to ECM-620 for LIU provisioning rules.

Where LIU memory requirements exceed 4M, replace NTEX22AAs with NTEX22BBs. In these instances, the NTEX22BBs should be treated as Feature Insertion Gating material. Refer to Section "Feature Insertion Gating Hardware." "Feature Insertion Gating Hardware" on page 22-5 .

All other hardware is feature hardware. The BCS feature related hardware information and details on the BCS Gating hardware should be obtained from Advanced Provisioning Information (API) documents or Engineering Change Memorandums (ECM) on the feature. This feature related hardware should be ordered in the appropriate specs.

1.2.4 Office Layout Information

Not applicable.

1.2.5 Traffic Tables

Not applicable.

1.3 Product/System Specification

1.3.1 Physical Characteristics

Not applicable.

1.3.2 EMI/Earthquake Information

Not applicable.

1.3.3 Sparing Information

Not applicable.

1.3.4 Power Feed and Fusing Requirements

1.3.5 Current Drain Information

1.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

1.4.1 Required Software Packages and Interdependencies

Some hardware may require additional software packages to function. Refer to SMS and/or SOLID software databases.

1.4.2 Software Usage Restrictions

Not applicable.

1.4.3 Memory Provisioning

Not applicable.

1.5 Real Time Impact

Not applicable.

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2.0 ECM547 - Software to Hardware Cross-reference

2.1 Overview

This product provides a software to hardware cross-reference.

The document provides a general guide to hardware required per a software feature package. If detailed hardware engineering information is required, the reader will need to refer to the appropriate API/ECMs. The cross-reference is based on the SOLID market rollout report and what is generally available for the specific BCS in that report.

2.2 Hardware Provisioning

2.2.1 Hardware Usage Restrictions

Refer to specific API/ECMs for detailed engineering information.

2.2.2 Hardware Dependencies

Refer to specific API/ECMs for detailed engineering information.

2.2.2.1 P and C Side Port Requirements

Not applicable

2.2.2.2 DMS BUS Port Requirements

Not applicable

2.2.2.3 Circuits Per Card

Not applicable

2.2.2.4 Discrimination Numbering

Not applicable

2.2.3 Provisioning Considerations

Refer to specific API/ECMs for detailed engineering information.

2.2.4 Office Layout Information

Not applicable.

2.2.5 Traffic Tables

Not applicable.

2.3 Product/System Specification

2.3.1 Physical Characteristics

Not applicable.

2.3.2 EMI/Earthquake Information

Not applicable.

2.3.3 Sparing Information

Not applicable.

2.3.4 Power Feed and Fusing Requirements

Not applicable.

2.3.5 Current Drain Information

Not applicable.

2.4 Software Provisioning

For NTX software packages to PLC/SOC mappings for CSP02 and beyond refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

2.4.1 Required Software Packages and Interdependencies

Not applicable.

2.4.2 Software Usage Restrictions

This document is detailing specific hardware needs of feature packages.

2.4.3 Memory Provisioning

Not applicable.

2.5 Real Time Impact

Not applicable.

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3.0 ECM709 - APC06 Requirements

3.1 Overview

The product requirements for APC are varied in terms of the hardware components, interfaces and software required. The APC market applications include alternate toll carriers and local tandems, advance business services, private network overlays; evolving into local access, international carriers, and specialized services overlays.

The hardware platform for the DMS-100 APC switch is the DMS-100 SuperNode switching architecture. Two configurations are available; SuperNode and SuperNode Size Enhanced (SNSE). The SNSE has a single SuperNode Control Cabinet (SCC) which houses the DMS-Core, ENET and LPP functions. The SuperNode configuration has a higher capacity than the SNSE configuration, which is intended for use in small exchange applications.

The primary purposes of this ECM is to ensure that hardware changes required for the deployment of the APC06 software release load are defined for use by Installation, Engineering, and SAEs.

This document contains APC06 Load Gating Hardware, Functionality Required Hardware, Upgrade Paths, Non-Supported Configurations, MS load, and Non-CM Software Compatibility for the CM, Non CM, and Peripheral hardware platforms.

Load Gating Hardware is identified because it is required to be shipped and installed before the loading of a Software Release (such as a APC06 PCL) is attempted in the target DMS. Software is now ordered via PCLs. Each Software Release Stream contains several different PCLs. The Load Gating Hardware is common to all PCLs in a particular Software Release Stream.

If loading of the PCL is attempted before the Load Gating Hardware has been installed, a load abort will occur.

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+-----+ LOAD GATING HARDWARE +-----+	
Load Gating Hardware is, for a specific Software Release	
Stream (such as APC06), the hardware that is deemed to be	
necessary to load and run the specific Software Release.	
+-----+	
+-----+ FUNCTIONALITY REQUIRED HARDWARE +-----+	
Functionality Required Hardware (aka Service Activation	
Hardware) - is the hardware, incremental to the Load Gating	
Hardware, which is needed to enable a software functionality	
to function correctly. The software load may be inserted	
without this hardware but the Function may not be placed in	
service without it. Not all functionalities require	
additional hardware.	
+-----+	

Figure 16. DEFINITIONS.

Load Gating Hardware for SW releases can be found in API 325.

3.2 Hardware Provisioning

3.2.1 Hardware Usage Restrictions

The NT40 is not supported in DMSE offices.

3.2.2 Hardware Dependencies

The APC06 Software Release Load needs, at a minimum, the load gating hardware shown in this document. Additional Functionality Required Hardware will also be required in order to enable specific Functions.

3.2.2.1 P and C Side Port Requirements

Not applicable

3.2.2.2 DMS BUS Port Requirements

Not applicable

3.2.2.3 Circuits Per Card

Not applicable

3.2.2.4 Discrimination Numbering

Not applicable

3.2.3 Provisioning Considerations

The hardware listed is the minimum required for the SuperNode or SNSE switching platform to load the software and perform basic functions. The NT40 is not supported in DMSE offices.

3.2.3.1 ECM References

The Load Gating Hardware PECs shown in the Load Gating Hardware table are intended to highlight the minimum hardware required. For provisioning details, refer to the appropriate product API/ECM and Engineering Manual Sections (EMS). Some of the most relevant API/ECMs are listed below. API/ECM references are also indicated in the Load Gating Hardware table.

PRODUCT	ECM	ECM NAME
CM	626	DMS-SuperNode
CM	632	DMS-SuperNode SE
DTC/LGC/LTC	373	Detail/Building Block Engineering
DTCI/LGCI/LTCI	616	ISDN Common Peripheral Equipment (CPEI)
ENET-Dual	627	128K Enhanced Network Dual Cabinet ENET
ENET-Single	635	Single Cabinet Enhanced Network
FLIS/LPP	612	Fiberized LIS (FLIS or Single Shelf LPP)
IOE	613	Bld Block - IOE Engineering
LIM	620	Bld Block/Detail Engineering - LIM
MS	626	DMS-SuperNode
RSC-S	691	Model B Remote Switching Center - SONET
SLM	626	DMS-SuperNode
SLM	632	DMS-SuperNode SE
XPM+	678	XPM Plus For Base Non-ISDN XPM

Figure 17. ECM REFERENCES.

APC06 Load Gating Hardware

Load Gating Hardware is identified because it is required to be shipped and installed before the loading of a Software Release (such as a APC06 PCL) is attempted in the target DMS. Software is now ordered via PCLs. Each Software Release Stream contains

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several different PCLs. The Load Gating Hardware is common to all PCLs in a particular Software Release Stream.

If loading of the PCL is attempted before the Load Gating Hardware has been installed, a load abort will occur.

The PECs shown below are the minimum functional level required. Higher levels may be used unless specifically prohibited in this document. In instances where the PEC shown is no longer orderable, new orders will be shipped with the current manufacturing baseline version.

RELEASE	PRODUCT	LOAD GATING HARDWARE	ECM
APC06	CM	SN and SNSE OFFICES:(NT 40 not supported)	626
		9X13MB SN20 &	632
		9X26AB RTIF &	
		9X14EA 96 MB Mem &	
		9X12AD Port CP	
	MS	SN OFFICES: 16 MB Minimum Required	626
		9X13DD 16MB Proc/Mem	
		OR	
		9X13DB 4MB Proc. &	
		9X14DB 24MB Mem	
	LMS	NO OTHER CONFIGURATIONS ARE SUPPORTED.	
		ALL LPP/LMS OFFICES:	620
		9X13DD 16MB Proc/Mem	
		OR	
		9X13DB 1MB Proc. &	
	LPP	9X14DB 24MB Mem	
		NO OTHER CONFIGURATIONS ARE SUPPORTED.	
		LPP/LMS OFFICES WITH MORE THAN 1K TRUNKS:	620
		EX22BA or BB 8MB LIU	612
	ENET	9X13KA 16 MB Processor	627
			635
0	0		0

Continued.....

...APC06 Continued

RELEASE	PRODUCT	LOAD GATING HARDWARE	ECM
	DTC+	MX77AA Unified Processor	373
	DTCI LTCI	BX02BA EDCH	373
0	0		0

Figure 18. APC06 LOAD GATING HARDWARE.**APC06 XPM+ Requirements**

NOTE: ANY HOST SITE WHICH HAS MP/SP PROCESSORS AND REQUIRING XPM06 OR ABOVE MUST BE UPGRADED TO THE MX77 UNIFIED PROCESSOR.

APC06 Functionality Required Hardware

Functionality Required Hardware (aka Service Activation Hardware) is the hardware, incremental to the Load Gating Hardware, which is needed to enable a software functionality to function correctly. The software load may be inserted without this hardware but the Function may not be placed in service without it. Not all functionalities require additional hardware.

The following small subset of Functionality Required Hardware is listed due to its importance in placing an actual line in service.. Refer to the appropriate ECM for a complete listing of required hardware.

RELEASE	PRODUCT	FUNCTIONALITY REQUIRED	HARDWARE	ECM
APC06	SLM	SN and SNSE OFFICES:		626
		9X44AD SLM III		632
	DTC LGC	6X40FB DS-512 I/F CP		644
		6X40AD DS-30 I/F CP		646
				648
	RLCM- EDC	6X51BA RLCM (Extended Distance Capability)		691
		6X50AB DS-1 Interface Card		
	LTC+	MX76BA Messaging Card		691
		6X50BA DS-1 Interface Card		
	GPP	BX01AC EISP		568
	LPP	9X62CB Interface PB		620 612

Figure 19. APC06 FUNCTIONALITY REQUIRED HARDWARE.

3.2.3.2 Nonsupported Products And Configurations

This section is intended to list MD products and configurations that are no longer supported or that have had restrictions added.

RELEASE	PRODUCT	NONSUPPORTED PRODUCTS AND CONFIGURATIONS	ECM
APC06	ENET	9X13FA 4 MB Processor	627
	LPP	EX22AA LIU7 9X13CA	612
	DTCI LTCI	BX02AA DCH	693
0	0		0

Figure 20. APC06 NONSUPPORTED HARDWARE.**3.2.3.3 MS Loads**

RELEASE	MS LOAD	DESCRIPTION
APC06	MUC00006	16 Mb Universal MS Load
0	0	

Figure 21. MS LOADS.**3.2.3.4 Non-CM Software Compatibility**

Software loads that do not reside on the Computing Module are referred to as Non-CM Loads (NCLs). NCL loads require certain levels of PCLs in the switch, as indicated in the table below. For a given APC06 release, the required NCL release level needed to implement a product is shown.

For provisioning details, refer to the appropriate product ECM.

Starred items (*) are recommended.

NONCM PRODUCT	APC05	APC06	API/ECM
EDRAM	SLM:	SLM:	ECM 531
Enhanced	EDRM0004-	EDRM0004-	
Digital	EDRMSLM004	EDRMSLM004	
Recorded	9-Track:	9-Track:	
Announcement	EDRM0005-	EDRM0005-	
Machine	EDRM9T005	EDRM9T005	
CTMJ	GLP00007	GLP00007	
(Japanese	GLNCL001	GLNCL001	
CTM)			
If upgrade of the EDRAM load is required, it should be upgraded to the latest to the latest version available.			

Figure 22. NON-CM SOFTWARE COMPATIBILITY.

3.2.4 Office Layout Information

Not applicable.

3.2.5 Traffic Tables

Not applicable.

3.3 Product/System Specification

3.3.1 Physical Characteristics

Not applicable.

3.3.2 EMI/Earthquake Information

Not applicable.

3.3.3 Sparing Information

Not applicable.

3.3.4 Power Feed and Fusing Requirements

Not applicable.

3.3.5 Current Drain Information

Not applicable.

3.4 Software Provisioning

For NTX software packages to PLC/SOC mappings refer to ECM552 - Mapping of NTX/NTG Package to PCL/NCL/Option.

3.4.1 Required Software Packages and Interdependencies

Software is now ordered via PCLs. Each Software Release Stream contains several different PCLs. The APC06 related PCL order codes are:

RELEASE	PCL CODE	DESCRIPTION
APC006	ABSK003	DMS-100 APC PCL for Japan IDC
	ABSL001	DMS-100 APC PCL for Japan NTT
	ABSM005	DMS-100 APC PCL for Australasian Markets Optus and Telstra, (Also China, but only with a combined GL100-GL03 load).

Figure 23. APC06 PCL LISTING.

This information was obtained from Product Content Application (PCA).

3.4.2 Software Usage Restrictions

The software load may be inserted without Functionality Required Hardware but the Function may not be placed in service without it. Not all functionalities require additional hardware.

3.4.3 Memory Provisioning

CM Memory provisioning should be completed on every job to determine memory requirements. Currently, development of a CM Memory calculation tool to support APC06 loads is in development on the FACET, Flexible Advanced Capacity Engineering Tool, platform. Schedule TBD. The tool, when completed, will provide memory requirements for the selected PCL and office parameters. In addition, the tool will also project memory requirements beyond the currently available software release to support long range planning activities.

Series 60 CPU

=====

- 1) Provide 384M (4+1 96M CP) to support up to 20K subscriber lines
- 2) Add one (1) 96M CP for every additional 10K subscriber lines

Series 70 CPU

=====

- 1) Provide 192M (2+1 96M CP) to support up to 20K subscriber lines
- 2) Add one (1) 96M CP for every additional 10K subscriber lines

3.5 Real Time Impact

Real time calculations should be run on every job to determine real time requirements. Calculation for an office is required to properly size the Central Processing Unit or Computing Module (CM) and in certain cases analyze real time capacity of certain peripheral units. Real time calculations for an individual DMS-100 office reflect the office's unique line and feature mix and call volumes. Currently, development of a CM and XPM Real Time calculation tool to support APC06 loads is in development on the FACET platform. Schedule is late 1996. The tool, when completed, will provide real time requirements for the selected PCL and office type. In addition, the tool will also project real time requirements beyond the currently available software release to support long range planning activities.

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4.0 ECM710 - GL03.1 Requirements

4.1 Overview

GL03.1 is based on the new Generic Services Framework (GSF) call-processing architecture. GSF is the second phase of DMS Evolution; the first phase was the software restructuring, or layering. GSF software architecture is based on the half-call model which separates calls and feature interactions into the originating call half and the terminating call half. The software design is based on Object Oriented design methodology which separates agent and feature interactions, reducing the amount of interworking code between the two. An agent is a line type, such as BRI, and a feature is a capability such as Call Forwarding Universal.

The primary purposes of this ECM is to define the hardware changes required to deploy GL03.1 software release load for Installation, Engineering, and SAEs.

This document contains the following GL03.1 information:

- load gating hardware
- functionality required hardware
- upgrade paths,
- non-Supported Configurations,
- MS load
- non-CM Software Compatibility for the CM, Non CM, and peripheral hardware platforms.

Load gating hardware is identified because it is required to be shipped and installed before loading a Software Release (such as a GL03.1 Product CM Load {PCL}).

Software is now ordered via PCLs. Each software release stream contains several different PCLs. The load gating hardware is common to all PCLs in a particular Software Release Stream.

If loading of the PCL is attempted before the load gating hardware has been installed, a load abort will occur.

GL03.1 is a limited software release. It will be delivered to the China and Columbia markets only.

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LOAD GATING HARDWARE
Load gating hardware is, for a specific software release Stream (such as GL03.1), the hardware necessary to load and run the specific software release.
FUNCTIONALITY REQUIRED HARDWARE
Functionality required hardware (aka service activation hardware) is the hardware, incremental to the load gating hardware, needed to enable a software functionality to function correctly. The software load may be inserted without this hardware but the function may not be placed in service without it. Not all functionalities require additional hardware.

Figure 24. DEFINITIONS

4.2 Hardware Provisioning

4.2.1 Hardware Usage Restrictions

Not applicable.

4.2.2 Hardware Dependencies

Not applicable.

4.2.2.1 P and C Side Port Requirements

Not applicable

4.2.2.2 DMS BUS Port Requirements

Not applicable

4.2.2.3 Circuits Per Card

Not applicable

4.2.2.4 Discrimination Numbering

Not applicable

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4.2.3 Provisioning Considerations

This section details the provisioning guidelines for this product.

4.2.4 Office Layout Information

4.2.4.1 ECM References

Not applicable.

GL03 Load Gating Hardware

GL03.1 did not introduce any load gating hardware.

GL03.1 Functionality Required Hardware

GL03.1 did not introduce any functionality required hardware.

4.2.4.2 Nonsupported Products And Configurations

GL03.1 did not MD (manufacture discontinue) any products.

4.2.4.3 Non-CM Software Compatibility

Software loads that do not reside on the Computing Module are referred to as NCL. NCL loads require certain levels of PCLs in the switch, as indicated in the table below. For a given GL100 release, the required NCL release level needed to implement a product is shown.

For provisioning details, refer to the appropriate product ECM.

Starred items (*) are recommended.

NONCM PRODUCT	GL02.1	GL03/GL03.1	API/ECM
CC MIS Call Center Management Information System	V3.0x through V4.0x	V3.0x through V4.0x	None
EDRAM Enhanced Digital Recorded Announcement Machine	SLM: EDRM0004- EDRMSLM004 9-Track: EDRM0005- EDRM9T005 GLP00007 GLNCL001	SLM: EDRM0004- EDRMSLM004 9-Track: EDRM0005- EDRM9T005 GLP00007 GLNCL001	ECM 531
If upgrade of the EDRAM load is required, it should be upgraded to the latest version available.			

Figure 25. NON-CM SOFTWARE COMPATIBILITY.

Not applicable.

4.2.5 Traffic Tables

Not applicable.

4.3 Product/System Specification

4.3.1 Physical Characteristics

Not applicable.

4.3.2 EMI/Earthquake Information

Not applicable.

4.3.3 Sparing Information

Not applicable.

4.3.4 Power Feed and Fusing Requirements

Not applicable.

4.3.5 Current drain information

Not applicable.

4.4 Software Provisioning

The PCL ordering codes for GL03.1 are as follows:

- China
 - CHN1A003
- Columbia
 - CAL1A003

4.4.1 Required Software Packages and Interdependencies

Not applicable.

4.4.2 Software Usage Restrictions

Not applicable.

4.4.3 Memory Provisioning

Not applicable.

4.5 Real Time Impact

Not applicable.

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5.0 ECM719 - EUR100 Load Gating Hardware

5.1 Overview

Load Gating Hardware requirements and PCLs for the NA100, TOPS, and STP Software Release Streams are listed.

Load Gating Hardware is identified because it is required to be shipped and installed before the loading of a Software Release (such as an NA004 PCL) is attempted in the target DMS. Software is now ordered via PCLs. Each Software Release Stream contains several different PCLs. The Load Gating Hardware is common to all PCLs in a particular Software Release Stream.

If loading of the PCL is attempted before the Load Gating Hardware has been installed, a load abort will occur.

LOAD GATING HARDWARE	
Load Gating Hardware is, for a specific Software Release Stream (such as NA004), the hardware that is deemed to be necessary to load and run the specific Software Release.	
FUNCTIONALITY REQUIRED HARDWARE	
Functionality Required Hardware (aka Service Activation Hardware) - is the hardware, incremental to the Load Gating Hardware, which is needed to enable a software functionality to function correctly. The software load may be inserted without this hardware but the Function may not be placed in service without it. Not all functionalities require additional hardware.	

Figure 26. DEFINITIONS.

5.2 Hardware Provisioning

5.2.1 Hardware Usage Restrictions

From EUR004, only BRISC is supported.

5.2.2 Hardware Dependencies

5.2.2.1 P and C Side Port Requirements

Not applicable

5.2.2.2 DMS BUS Port Requirements

Not applicable

5.2.2.3 Circuits Per Card

Not applicable

5.2.2.4 Discrimination Numbering

Not applicable

5.2.3 Provisioning Considerations

The hardware listed is the minimum required for the SuperNode or SNSE switching platform to load the software and perform basic functions. The NT40 is not supported in DMSE offices.

5.2.3.1 EUR100 Load Gating Hardware

The Load Gating Hardware PECs shown in the Load Gating Hardware table are intended to highlight the minimum hardware required. For provisioning details, refer to the appropriate product ECM and Engineering Manual Sections (EMS). Some of the most relevant ECMs are listed below. ECM references are also indicated in the Load Gating Hardware table.

Figure 27. ECM REFERENCES.

Load Gating Hardware is identified because it is required to be shipped and installed before the loading of a Software Release (such as an EUR06 PCL) is attempted in the target DMS. Software is now ordered via PCLs. Each Software Release Stream contains several different PCLs. The Load Gating Hardware is common to all PCLs in a particular Software Release Stream.

If loading of the PCL is attempted before the Load Gating Hardware has been installed, a load abort will occur.

Each Software Load Release needs all of the prior Releases' hardware requirements in addition to its own requirements.

The PECs shown below are the minimum functional level required. Higher levels may be used unless specifically prohibited in this document. In instances where the PEC shown is no longer orderable, new orders will be shipped with the current manufacturing baseline version.

RELEASE	PRODUCT	LOAD GATING HARDWARE	ECM
EUR003	CM	9X13BC Series 20	632 626
	SLM	9X44AB SLM II	632 626
	MS	SN OFFICES: 16 MB Minimum Required 9X13DD 16MB Proc/Mem OR 9X13DC 4MB Proc. & 9X14DB 24MB Mem NO OTHER CONFIGURATIONS ARE SUPPORTED.	626
	LPP/LMS	ALL LPP/LMS OFFICES: 9X13DD 16MB Proc/Mem OR 9X13DB 1MB Proc. & 9X14DB 24MB Mem NO OTHER CONFIGURATIONS ARE SUPPORTED.	620
	PDTC	XPM+ (NT6X45/46 MP/SP Processors must be upgraded to MX77 Unified Proc)	373
	DTCOI	XPM+ (NT6X45/46 MP/SP Processors must be upgraded to MX77 Unified Proc)	616
	PLGC	XPM+ (NT6X45/46 MP/SP Processors must be upgraded to MX77 Unified Proc)	373

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RELEASE	PRODUCT	LOAD GATING HARDWARE	ECM
	LGC0I	XPM+ (NT6X45/46 MP/SP Processors must be upgraded to MX77 Unified Proc)	373
EUR004	CM	BRISC only (SN50)	626
	SLM	9X44AB SLM II	632
	MS	9X13DD 16MB P/M OR 9X13DC 4MB P & 9X14DB 24 MB M	
	LPP/LMS	LPP/LMS OFFICES WITH MORE THAN 1K TRUNKS: EX22BA/BB 8MB LIU	620 612
	DTC	NONE	373
	DTC0I	BX02BA EDCH for BRI	714
	NOTE - The BX02BA is ISDN Feature Gating. Beginning in NA005 to update the ISDN peripheral software this circuit pack is required prior to the insertion of the peripheral load.		
	LGC0I	BX02BA EDCH	714
0	0		0

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RELEASE	PRODUCT	LOAD GATING HARDWARE	ECM
EUR006	CM	INITIALS: SN60 9X14EA 96 MB Mem & 9X12AD Port CP	626 632
	MS	SN OFFICES: 16 MB Minimum Required 9X13DD 16MB Proc/Mem OR 9X13DC 4MB Proc. & 9X14DB 24MB Mem NO OTHER CONFIGURATIONS ARE SUPPORTED.	626 632
	SLM	9X44AB SLM II	626 632
	DTCI	Note: BX02BA EDCH not required for DTCI PRI applications.	616
	LTCI	BX01AB EISP & BX02BA EDCH	714
	RSCS		714
	ENET	9X13KA 16 MB Processor	627 632 635
0	0		0

Figure 28. EUR100 LOAD GATING HARDWARE.

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RELEASE	PRODUCT	LOAD GATING HARDWARE	ECM
EUR008	CM	INITIALS: SN60 9X14EA 96 MB Mem & 9X12AD Port CP	626 632
	MS	SN OFFICES: 16 MB Minimum Required 9X13DD 16MB Proc/Mem OR 9X13DC 4MB Proc. & 9X14DB 24MB Mem NO OTHER CONFIGURATIONS ARE SUPPORTED.	626 632
	SLM	9X44AB SLM II	626 632
	DTCI	Note: BX02BA EDCH not required for DTCI PRI applications.	616
	LTCI	BX01AB EISP & BX02BA EDCH	714
	RSCS		714
	ENET	9X13KA 16 MB Processor	627 632 635
	0	0	0

Figure 29. EUR100 LOAD GATING HARDWARE.

NOTE: AS OF NA005/XPM06 THE MP/SP PROCESSORS (6X45/6X46) ARE NO LONGER SUPPORTED. ANY HOST SITE WHICH HAS MP/SP PROCESSORS AND REQUIRING XPM06 OR ABOVE MUST BE UPGRADED TO THE MX77 UNIFIED PROCESSOR. MP/SP PROCESSORS ARE STILL SUPPORTED IN OPAC AND RLCM IN XPM06 AND BEYOND. (THE AX74 WILL BE REQUIRED IN FUTURE NA100 RELEASES FOR LIMITED APPLICATION AND PRODUCTS.)

EUR100 Functionality Required Hardware

Functionality Required Hardware (aka Service Activation Hardware) - is the hardware, incremental to the Load Gating Hardware, which is needed to enable a software functionality to function correctly. The software load may be inserted without this hardware but the Function may not be placed in service without it. Not all functionalities require additional hardware.

The following small subset of Functionality Required Hardware is listed to be consistent with the North American DMS-100/200 Three Year Hardware Plan, Rel 97 -1.0 which refers to this hardware as Service Activation Hardware.

For a complete list of Functionality Required Hardware refer to ECM 591.

RELEASE	PRODUCT	FUNCTIONALITY REQUIRED HARDWARE	ECM
EUR004	RSC-S	ONLY IF ISDN IS REQUIRED: BX01AB EISP & BX02BA EDCH	691

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RELEASE	PRODUCT	FUNCTIONALITY REQUIRED HARDWARE	ECM
EUR06		None listed in the Three Year Hardware Plan	

Figure 30. EUR100 FUNCTIONALITY REQUIRED HARDWARE.

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This information was obtained from the North American DMS-100/200 Three Year Hardware Plan, Rel 97-1.0 authored by Jim Miller. This Power Point file is updated on a bi-monthly basis. The latest version can be obtained at the following AppleShare location:

RTP.CA4 / NA-100 H/W Mac (Moore Mac) / Public Folder / Baseline Hardware

Guest access is permitted.

Nonsupported Products And Configurations

This section is intended to list MD products and products and configurations that are no longer supported or that have had restrictions added.

Once a product is shown in a Software Release the requirement is the same for all following Software Releases of the same type, unless specifically shown as changed.

Clarification:

The products shown in the Product column will no longer be supported as of the software release shown. The Nonsupported Products And Configurations column explains what products must be used instead or new restrictions on an existing product.

RELEASE	PRODUCT	NONSUPPORTED PRODUCTS AND CONFIGURATIONS	ECM
EUR004	MP/SP Proc. (6X45/ 6X46)	As of XPM06 only the MX77 Unified processor will be supported in hosts. All MP/SP (6X45/6X46) processors must be upgraded. OPAC and RLCM still support MP/SP.	N/A
	MSB7	Must be replaced by LPP for CCS7.	271
			551

Continued.....

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RELEASE	PRODUCT	NONSUPPORTED PRODUCTS AND CONFIGURATIONS	ECM
EUR006	MSB7	This product is MD - EOL for Europe being defined	271 612 620
EUR008		None identified for this release.	
0	0		0

Figure 31. EUR100 NONSUPPORTED HARDWARE.

This information was obtained, in part, from the North American DMS-100/200 Three Year Hardware Plan, Rel 97-1.0 authored by Jim Miller. This Power Point file is updated on a bi-monthly basis. The latest version can be obtained at the following AppleShare location:

RTP.CA4 / NA-100 H/W Mac (Moore Mac) / Public Folder / Baseline Hardware

Guest access is permitted.

Additional information was obtained from the S/W GATING MATERIALS document.

5.2.3.2 TOPS Gating Hardware

TOPS Gating Hardware By Release

The following Gating hardware is MANDATORY for TOPS. The platform will not support any Product (PCL, etc.) in the absence of this hardware.

TOPS loads have the same hardware requirements as NA100 loads. Refer to the NA100 GATING HARDWARE BY RELEASE section for detailed requirements. As of NA005 there will be no solo TOPS loads, only NA/TOPS combos.

RELEASE	PRODUCT	LOAD GATING HARDWARE	ECM
TOPS003	Refer to	NA003 Gating Hardware requirements.	
TOPS004	Refer to	NA004 Gating Hardware requirements.	
0	0		0

Figure 32. TOPS LOAD GATING HARDWARE.

TOPS XPM+ Requirements

XPM+ is not supported in TOPS001 and is optional in TOPS003 and TOPS004. It will be required beginning with XPM06 and beyond. Therefore, beginning with TOPS005 and the NA005 combo PCLs which use XPM06, XPM+ will be required. EDCH and EISP are required on ETMS (XPM+) applications.

5.2.3.3 STP Gating Hardware

STP Gating Hardware By Release

The following Gating hardware is MANDATORY for STP. The platform will not support any Product (PCL, etc.) in the absence of this hardware. (Note - 8 Meg LIU is now a minimum requirement. Also, an additional 18 Meg of CM memory will be required for STP Release 002 configurations, above the BCS based STP product.)

RELEASE	PRODUCT	LOAD GATING HARDWARE	ECM
STP002	CM	SN OFFICES: (NT 40 not supported) 9X13BC Series 20	626
	SLM	SN OFFICES: 9X44AB SLM II	626
	MS	SN OFFICES: 7 MB Minimum Required 9X13DB 1MB Proc. & 9X14BB 6MB Mem	626
	LPP/LMS	ALL LPP/LMS OFFICES: EX22BA 8MB LIU	620
0	0		0

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RELEASE	PRODUCT	LOAD GATING HARDWARE	ECM
STP003			
	CM SLM	Same as STP002 Same as STP002	626
	MS	SN OFFICES: 16 MB Minimum Required 9X13DD 16MB Proc/Mem OR 9X13DC 4MB Proc. & 9X14DB 24MB Mem NO OTHER CONFIGURATIONS ARE SUPPORTED.	626
	LPP/LMS	ALL LPP/LMS OFFICES: 9X13DD 16MB Proc/Mem OR 9X13DB 1MB Proc. & 9X14DB 24MB Mem NO OTHER CONFIGURATIONS ARE SUPPORTED.	620
	LIM/LIU	The 24-slot and 36-slot LIM configurations are supported. However, only 2-slot LIU7s are supported.	620
0	0		0

Figure 33. STP LOAD GATING HARDWARE.**5.2.4 Office Layout Information**

Not applicable.

5.2.5 Traffic Tables

Not applicable.

5.3 Product/System Specification

5.3.1 Physical Characteristics

Not applicable.

5.3.2 EMI/Earthquake Information

Not applicable.

5.3.3 Sparing Information

Not applicable.

5.3.4 Power Feed and Fusing Requirements

Not applicable.

5.3.5 Current Drain Information

Not applicable.

5.4 Software Provisioning

5.4.1 Required Software Packages and Interdependencies

5.4.1.1 NA100 PCL Listing By Release

RELEASE	PCL LOAD	DESCRIPTION
NA001	CDN001 LEC001 LET001	CDN DMS-100/200 (VO ONLY) US DMS-100/200 (VO ONLY) US DMS-100/200 TOPS Combo (VO ONLY)
NA002	CDN002 LEC002 LET002	CDN DMS-100/200 US DMS-100/200 US DMS-100/200 TOPS Combo (LAB ONLY)
NA003	CDN003 LEC003 LET003 LTT003	CDN DMS-100/200 US DMS-100/200 US DMS-100/200 TOPS Combo CDN DMS-100/200 TOPS Combo
NA004	ATVB004 CDNB004 LATB004 LAVB004 LECB004 LETB004 LSTB004	CDN DMS-100/200/Autovon Combo CDN DMS-100/200 US DMS-200 US DMS-100/200/Autovon Combo US DMS-100/200 US DMS-100/200 TOPS Combo US DMS-100/200/STP Combo
NA005	ATVB005 CDNB005 LECB005 LETB005 LTTB005	CDN DMS-100/200/Autovon Combo CDN DMS-100/200 US DMS-100/200 US DMS-100/200 TOPS Combo CDN 100/200/TOPS Combo
0	0	

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RELEASE	PCL LOAD	DESCRIPTION
NA006	LECB006 LETB006 LAVB006 LSTB006 LWW0006	US/CDN DMS-100/200 US/CDN DMS-100/200 TOPS Combo US/CDN DMS-100/200/Autovon Combo US/CDN DMS-100/200/STP Combo (DMS-INode) US/CDN DMS-100/200/MTX Combo (Wireline - Wireless PCL)
NA007	LEC00007 LET00007 LETX0076 LAVB007	US/CDN DMS-100/200 US/CDN DMS-100/200 TOPS Combo US/CDN DMS-100/200/TOPS Combo, V0 Lab only US/CDN DMS-100/200/Autovon Combo
NA008	LEC0008 LET0008 LAV0008 LWW00805 LWW00806	US/CDN DMS-100/200 US/CDN DMS-100/200 TOPS Combo US/CDN DMS-100/200/Autovon Combo US/CDN DMS-100/200/MTX Combo US/CDN DMS-100/200/MTX Combo
0	0	

Figure 34. NA100 PCL LISTING.

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RELEASE	PCL LOAD	DESCRIPTION
NA009	LEC0009 LET0009	US/CDN DMS-100/200 US/CDN DMS-100/200 TOPS Combo
NA010	LEC0010 LET0010	US/CDN DMS-100/200 US/CDN DMS-100/200 TOPS Combo
NA011	LEC0011 LET0011	US/CDN DMS-100/200 US/CDN DMS-100/200 TOPS Combo
NA012	LEC0012 LET0012	US/CDN DMS-100/200 US/CDN DMS-100/200 TOPS Combo
0	0	

Figure 35. NA100 PCL LISTING.

5.4.1.2 EUR100 PCL Listing By Release

The PCL listing for EUR100 is TBD.

5.4.1.3 TOPS PCL Listing By Release

RELEASE	PCL LOAD	DESCRIPTION
TOPS003	LET003 LTT003 TOPS003 USTOPS003 CDNTOPS003	US DMS-100/200 TOPS Combo CDN DMS-100/200 TOPS Combo Global DMS-200 TOPS Standalone US DMS-200 TOPS Standalone CDN DMS-200 TOPS Standalone (Lab Only)
TOPS004	LET004 TOPS004	US DMS-100/200 TOPS Combo Global DMS-200 TOPS Standalone
TOPS005	LETB005 LTTB005	US DMS-100/200 TOPS Combo CDN DMS-100/200 TOPS Combo
TOPS006	LETB006	US/CDN DMS-100/200 TOPS Combo
TOPS007	LET0007 LETX076	US/CDN DMS-100/200 TOPS Combo US/CDN DMS-100/200/TOPS Combo, VO Lab only
TOPS008	LET0008	US/CDN DMS-100/200 TOPS Combo
0	0	

Figure 36. TOPS PCL LISTING.

5.4.1.4 STP PCL Listing By Release

RELEASE	PCL LOAD	DESCRIPTION
STP002	STBA002 STMR002 STSE002	STP Base STP MDR7 STP with SEAS
STP003	STBA003 STMD002 STSE003	STP Base STP with MDR7 STP with SEAS
0	0	

Figure 37. STP PCL LISTING.

5.4.2 Software Usage Restrictions

Not applicable.

5.4.2.1 MS Load Requirements

The following MS Loads are required for the specified NA100 Release. These same MS Loads are also required for EUR100 and TOPS Releases The MS load shown should be ordered for all PCLs within the associated release.

RELEASE	MS LOAD	DESCRIPTION
UK002	MEC00001	ENET 10M MS Load NOTE: per SuperNode Engineering Manual Section NT9X01JB, EMA4-03-001, this load supports JNET/ENET/SSLPP/PH and requires a minimum of 10M (9X13DC/14BB).
	MIC00001	ENET 10+M MS Load NOTE: per SuperNode Engineering Manual Section NT9X01JB, EMA4-03-001, this load supports JNET/ENET/SSLPP/SCPII and requires: 9X13DD (16M) OR 9X13DC/14DB (28M)
	MNC00001	SNSE 16M MS Load
	MSC00001	JNET 7M MS Load NOTE: per SuperNode Engineering Manual Section NT9X01JB, EMA4-03-001, this load supports JNET only and requires a minimum of 7M (9X13DB/14BB).
0	0	

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RELEASE	MS LOAD	DESCRIPTION
EUR003	MUC00004	16 Mb Universal MS Load This MS load is the only one required, regardless of whether the site is SuperNode, SNSE, ENET or JNET. NOTE: MUC00001 MS load is valid only for CSP03 and should not be ordered for any customer jobs. CSP03 is NOT contained in any of the NA100 Releases. NA001-3 contain CSP02, NA004 contains CSP04.
EUR004	MUC00005	16 Mb Universal MS Load
EUR006	MUC00007	16 Mb Universal MS Load
EUR008	MUC00008	16 Mb Universal MS Load
0	0	

Figure 38. EUR100 MS LOAD REQUIREMENTS.**5.4.2.2 EUR100 MS Load Requirements****5.4.2.3 TOPS MS Load Requirements**

The MS Load requirements for TOPS Releases are the same as for the equivalent Release.

5.4.2.4 STP MS Load Requirements

STP is an off-stream release and uses different MS Loads than EURO. The following MS loads are available for STP loads.

RELEASE	MS LOAD	DESCRIPTION
STP002	MSC00002	JNET 7M MS Load
STP003	MUC00042	16Mb Universal MS Load for STP03 PCLs
STP004	MUC00079	16Mb Universal MS Load for STP04 PCLs
0	0	

Figure 39. STP MS LOAD REQUIREMENTS.

5.4.3 Memory Provisioning

The CM Memory provisioning tool (Memcalc) should be run on every job, via NT-ACCESS, to determine memory requirements. Memcalc will provide detailed calculations for memory requirements based on the content of the selected PCL and office specific parameters. In addition to the detailed view, the tool also projects memory requirements beyond the current Generally Available software release to support network provider's long range planning activities. The tool accounts for planned new developments, such as new services and system enhancements.

5.5 Real Time Impact

Real time calculations should be run on every job to determine real time requirements. Calculation for an office is required to properly size the Central Processing Unit or Computing Module (CM) and in certain cases analyze real time capacity of certain peripheral units. Real time calculations for an individual DMS-100 office reflect the office's unique line and feature mix and call volumes. Based on these variables, the Real::Time tool calculates real time requirements for the DMS CM and peripherals. Output is displayed in both tabular and graphical formats.

5.5.1 System Capacity

The processor requirements shown as Load Gating are the minimum required at a particular Software Release. Depending on variables such as number of lines, trunks, features activated, future planned expansion, etc., additional processing capacity/memory may be required.

Prior to initial or extension order completion and submission, capacity studies are required to guarantee adequate capacity utilizing resources are provisioned. Currently, the following resource requirements associated with a particular order must be identified.

For additional information, contact your regional performance representative.

Resource	Tool	Platform
CM Real Time	Real::Time	FACET
XPM Real Time	Real::Time	
CM Memory	Memcalc	

Figure 40. CAPACITY RESOURCES AND TOOLS.

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6.0 ECM724 - 100i requirements for BCS42 and up

6.1 Overview

Product/System Overview

1 0i has been developed for POTS switching in the international (Non-North American) market. The SuperNode and SuperNode SE configurations are used. There are no plans to deploy XA-Core or Spectrum in the 100i market. Customers desiring these platforms will have to transition to GL100.

It is Nortel's goal to MD'd the 100i program and replace it with GL100. Part of the BCS42i and BCS43i program is to get customers up to the minimum GL100 hardware requirements. This will allow the transition to GL100 with little or no reconfiguration.

7.0 100i Hardware baseline

The following list the minimum hardware requirements for 100i:

- DMS SuperNode or SuperNode SE
- BRISC Series 50 or 60 processor (UP)
 - For BCS42i, the Series 50 processor is supported temporary as part of a the upgrade to the Series 60 processor.
 - The 60 Series is required in BCS43i.
- SLM III
- XPMs with Unified Processor (MX77)
 - NT6X45/46 MP/SP are supported in BCS42i and below as follows:
 - Turkey or China market
 - ILGC

7.1 SuperNode/SE

Both SuperNode and SuperNode SE configurations are supported in 100i. The SuperNode is available in both the NT9X01JA and NT9X01JB cabinet configurations. The SuperNode SE is available in the NT9X01MB cabinet configuration.

The SuperNode/SE is comprised of the Computing Module (CM) and System Load Module (SLM).

For more information, see ECM 626 and 632.

Note: NT40 is not supported in the 100i market after BCS36.

7.1.1 Computing Module

1 0i requires a 60 Series BRISC processor. The 50 Series processor can be used interim as part of an upgrade to the 60 Series.

7.1.1.1 5 BRISC

The 50 BRISC processor is the NT9X10AA (SR50 Processor). The NT9X14DB (memory) and NT9X26DA/DB (RTIF) are required with the NT9X10AA.

NOTE: The 50 BRISC processor is only supported in the interim for BCS42i. It is not supported in BCS43i.

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7.1.1.2 6 BRISC

The 60 BRISC processor is the NT9X10AA (SR60 Processor). The NT9X14EA (memory) and NT9X26DB/DC (RTIF) are required with the NT9X10AA.

7.1.2 SYSTEM LOAD MODULE

The System Load Module (SLM) provides the mass storage media of hard disk and supports a streaming tape. The SLM III (NT9X44AD) is a requirement for 100i.

7.2 DMS-BUS

1 0i supports the DMS-Bus subsystem in both SuperNode and SuperNode SE configurations. The SuperNode DMS-Bus contains two (2) NT9X0440. The SuperNode SE DMS-Bus contains one (1) NT9X0470.

For more information, see ECM 626 and 632.

For 100i, the DMS-Bus must have a minimum of 16 MB of memory. The following will upgrade the DMS-Bus to 16 MB of memory:

- NT9X13DD - Processor with 16 MB
- OR -
- NT9X13DC - Processor with 4 MB
- AND -
- NT9X14DB - Memory Pack 24 MB

7.3 Switching Network

1 0i supports both the Junctoured Network (JNET) and Enhanced Network (ENET).

For more information, see ECM 626 and 632.

7.3.1 ENET

The ENET is cabinet based equipment. 100i supports all three versions of the ENET:

- NT9X05AB/AC (128,000 channels)
- NT9X05AD (64,000 channels)
- NT9X0810 (16,000 channels)
 - must have the NT9X13KA processor with 100i

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7.3.2 JNET

DMS-100G supports the following Dual Shelf Network Equipment (DSNE):

- (NT8X10AA) junctored network.
- Network Frame Planes Combined (Int'l) (NT5X13BA/BB)

100i does NOT support the Network Frame (NT0X48xx).

7.4 XPMS with unified processor (MX77)

The following XPMS are supported by 100i. 100i supports both frame and cabinetized configured XPMS.

- PCM30 Digital Trunk Controller Plus (PDTG+)
- Digital Trunk Controller Offshore Plus (DTCO+)
- International Line Group Controller Plus (ILGC+)
- International Line Group Controller (ILGC)
- Link Interface Module (LIM)
 - Link Interface Unit Shelf (LIS)
 - Local Message Shelf (LMS)
- Link Peripheral Processor (LPP)
 - Fiberized Link Interface Shelf (FLIS)/Single Shelf LPP (SSLPP)

The following are supported ONLY in China and Turkey market with BCS42i and BELOW:

- International Digital Trunk Controller (IDTC)
- Digital Trunk Controller Offshore (DTCO)

7.5 Peripheral Module

The following peripheral modules are supported by 100i.

- Conference Circuits
- Enhanced/Recorded Announcement Machine (E/DRAM)
- Input Output Controller (IOC)
- Integrated Service Module (ISM)
- International Maintenance Trunk Module (IMTM)

- International Remote Line Concentrating Module (IRLCM)

7.5.1 Conference Circuits

1 0i supports the Conference Trunk Modules, NT1X81AA.

1 0i supports the International Conference Circuits, NT3X67BA/BB.

7.5.2 Enhanced/Digital Recorded Announcement Machine

(E/DRAM)

1 0i supports both DRAM (NT2X58AU) and EDRAM (NT1X80AA). See ECM 531 for more information.

7.5.3 Input Output Controller (IOC)

1 0i supports the NT1X61AG, Input Output Controller Module with the NT1X62CB, Input Output Controller.

For more information on the IOC, see ECM 316, I/O Controller Module.

7.5.4 Integrated Service Module (ISM)

1 0i supports the ISM. The ISM is a replacement for the IMTM. It is available in both cabinet (NTFX40AA) and frame (NTFX40BA) configurations.

7.5.5 International Maintenance Trunk Module (IMTM)

1 0i supports the IMTM (NT2X58AT) with the NT2X58AY fill. For more information, see ECM 266.

7.5.6 International Remote Line Concentrating Module (IRLCM)

1 0i supports the IRLCM, NT6X14AA. The IRLCM can support between two and six PCM-30 links from the LGC at the host. It can also support up to 640 subscriber lines locally.

An IRLCM is equipped with one LCM (line concentrating module), RMM (remote maintenance module) and a host interface equipment shelf.

See ECM 605 and 286 for more information.

For emergency standalone (ESA), the IRLCM supports the following packs:

- NT2X48CC - 4 Channel Digitone Receiver
- NT6X45AF - LGC/DTC Processor CP

- NT6X47AC - Master Processor Memory CP
- NT6X75KA - ESA Clock and Tone CP

RMM supports the following circuit packs:

- NTAX74AA - processor

7.6 Supported Line Cards

The following line cards are supported in 100i:

- NT6X17BA - World Line Card Type 'A' (ECM 629)
- NT6X18BA - World Line Card Type 'B' (ECM 629)
- NT6X93AA - Type 'A' Line Card (Turkey) (ECM 629)
- NT6X93BA - Type 'A' Line Card (CEP) (ECM 629)
- NT6X93CA - Type 'A' Line Card (China) (ECM 383)
- NT6X93DA - Type 'A' Line Card (Morocco) (ECM 629)
- NT6X93EA - Type 'A' Line Card (Australia) (ECM 629)
- NT6X93FA - Type 'A' Line Card (China) (MD) (ECM 383)
- NT6X94AA - Type 'B' Line Card (Turkey) (ECM 307)
- NT6X94AB - Type 'B' Line Card (Turkey) (ECM 307)
- NT6X94BA - Type 'B' Line Card (CEP) (EMS NT6X05BA)
- NT6X94BB - Type 'B' Line Card (CEP) (MD) (ECM 327)
- NT6X94CA - Type 'B' Line Card (China) (MD) (ECM 383)
- NT6X93DA - Type 'B' Line Card (Morocco) (ECM 536)
- NT6X95AB - Metering Tone Generator Card (MD) (ECM 383)

For a list of line cards not supported, see Non-Supported Products and Configurations .

7.7 AX74 PROCESSOR

With 100i, the AX74 processor is NOT supported in any XPM configuration.

It is supported in the IRLCM as an AIM based RMM controller.

7.8 PCM-30 INTERFACES

The following PCM-30 Interfaces are supported in the 100i market:

- NT6X27AA
- NT6X27AB
- NT6X27AC
- NT6X27BA
- NT6X27BB

7.9 MF/DTMF Tone Receiver

The following MF/DTMF tone receivers are supported in the 100i market:

- NT6X92CA - Universal Tone Receiver
- NT6X92AA - Universal Tone Receiver

7.10 Ringing Generator

The following ringing generators are supported in the 100i market.

- NT6X30DA - China Ringing Generator (ILCM)
- NT6X30DB - China Ringing Generator (ILCM)
- NT6X60DA - China Ringing Generator (IRLCM)
- NT6X30BB - Ringing Generator (Intl) (LCM)
- NT6X60DB - Ringing Generator (Intl) (IRLCM)

7.11 Maintenance and Test Circuits

The following maintenance and test circuits are supported in the 100i market.

- NT5X30AA - 101 Test Line/Monitor Talk
- NT1X00AE - ROH Tone, 102 Test Trunk, 1020 Hz, -10 dBm
- NT1X00AF - ROH Tone, 102 Test Trunk, 1004 Hz, -10 dBm
- NT1X00KA - 102 Test Line (Milliwatt), 950 Hz, 0 dBm
- NT1X54AA - Jack Ended Trunk
- NT2X90AD - Incoming/Outgoing Test Trunk
- NT3X09BA - Metallic Test Access (MTA)
- NT4X97AA - Maintenance Test Unit Controller

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- NT4X98BC - Maintenance Test Unit (Analog)
- | • NT2X47BA - TTU Controller (See note 1)
- | • NT2X56BA - TTU Filter (See note 1)
- | • NT1X90BA - TTT Signal Generator (See note 1)
- | • NT2X96BA - TTT PCM Level Meter (See note 1)
- NT2X71AA - Transmission Termination Trunk
- | • NT4X45AA - Enhanced Digital Test Unit (EDTU) (U-LAW/A-LAW) (See note 1)
- NT2X75BA - Loop Around Trunk
- NT6X70BA - CCS7 Continuity Tone Detector

| Note 1 : For new installations provide the NT4X45AA EDTU instead
| of the NT2X47BA/2X56BA

| TTU pair and/or the NT1X90BA/2X96BA TTT pair.

7.12 Messaging and Tone Cards

The following messaging and Tone Cards are supported in 100i market.

- NT6X69LB - Downloadable Tone Card
- NT6X69LA - Downloadable Tone Card
- NT6X69KA - China Tone Card
- NT6X69AA - Messaging Protocol & Tones Card
- NT6X69BB - Messaging Protocol & Tones Card (Turkey)
- NT6X69FA - Messaging Protocol & Tones Card (CEP)
- NT6X79BA - Tone Generator Card

7.13 Remote Oscillator

The following remote oscillator shelves are supported in 100i market:

- NT3X95AB - Stratum 2 Remote Oscillator Shelf)
- NT3X95BB - Stratum 2 Remote Oscillator Shelf)

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7.14 Load Gating/Functionality Required Hardware Definition

Load Gating Hardware is identified because it is required to be shipped and installed before the loading of a Software Release (such as BCS42i) is attempted in the target DMS.

If loading of the BCS is attempted before the Load Gating Hardware has been installed, a load abort will occur.

LOAD GATING HARDWARE

Load Gating Hardware is, for a specific Software Release Stream (such as BCS42i), the hardware that is deemed to be necessary to load and run the specific Software Release.

FUNCTIONALITY REQUIRED HARDWARE

Functionality Required Hardware (aka Service Activation Hardware) - is the hardware, incremental to the Load Gating Hardware, which is needed to enable a software functionality to function correctly. The software load may be inserted without this hardware but the Function may not be placed in service without it. Not all functionalities require additional hardware.

7.15 Hardware Provisioning

7.15.1 Hardware Usage Restrictions

For upgrades, this document assumes a minium of BCS41i.

7.15.2 Patched back hardware

The following table lists hardware that has been patched back to previous BCS loads.

Patched Back Hardware					
Product	BCS40i	BCS41i	BCS42i	BCS43i	BCS44i
NT9X13KA	X	X			
NT9X44AD	X	X			
N4X45AA			X		X

7.15.3 Hardware Dependencies

Each 100i Software release load needs all of the prior releases requirements in addition to its own requirements.

For example, BCS42i needs all of BCS41i requirements also.

7.15.3.1 P and C Side Port Requirements

Not applicable

7.15.3.2 DMS BUS Port Requirements

Not applicable

7.15.3.3 Circuits Per Card

Not applicable

7.15.3.4 Discrimination Numbering

Not applicable

7.15.4 Provisioning Considerations

The hardware listed is in list the minimum required for the SuperNode or SNSE switching platform to load the software and perform basic functions. The NT40 is not supported in 100i offices after BCS36.

ECM References

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ECM REFERENCES		
PRODUCT	ECM	ECM NAME
CIPE	669	Cabinetized International Peripheral Equipment
CLCE, CLMI, CTME, CIOE, CDSN, CSLC, CDNI, CMSS	6 6	International DMS-100 Model A Cabinet
CM	6 6	DMS-SuperNode
CM	6 2	DMS-SuperNode SE
CMS7-A	661	International Cab. Message Switch 7, Model A
CMS7-B	692	International Cab. Message Switch 7, Model B
ENET-Dual	6 7	128K Enhanced Network Dual Cabinet ENET
ENET-Single	6 5	Single Cabinet Enhanced Network
ESMA	576	ESCM-100A for DMS-100 TR-303 (ESMA)
FLIS/LPP	6 2	Fiberized LIS (FLIS or Single Shelf LPP)
IOE	6 3	Bld Block - IOE Engineering
IOM	7 5	Input Output Module
ISDN	645	International Frame Remote Contr ISDN
ITOPS	361	International TOPS
LIM	6 0	Bld Block/Detail Engineering - LIM
MS	6 6	DMS-SuperNode
RSC	6 8	Remote Switching Center (RSC)
RSC-S	691	Model B Remote Switching Center - SONET
SDM	588	SuperNode Data Manager (SDM) SDM06
SLM	6 6	DMS-SuperNode
SLM	6 2	DMS-SuperNode SE
TOPS	6 6	TOPS Engineering
TMS/ETMS	468	TOPS Message Switch (TMS)
XPM	7 4	International Extended Peripheral Modules

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7.15.5 1 0i Load Gating Hardware

Load Gating Hardware is identified because it is required to be shipped and installed before the loading of a Software Release is attempted in the target DMS.

If loading the BCS load is attempted before the load gating hardware has been installed, a load abort will occur.

Each Software Load Release needs all of the prior Releases' requirements in addition to its own requirements. Example: BCS42i needs all of BCS41i requirements.

The PECs shown below are the minimum functional level required. Higher levels may be used unless specifically prohibited in this document. In instances where the PEC shown is no longer orderable, new orders will be shipped with the current manufacturing baseline version.

The following table lists all load gating hardware for 100i. It does not list hardware that has been introduced in the 100i market but is not required. See section "Hardware Product Codes" for information on this subject.

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Load Gating Hardware			
PRODUCT	BCS42i	BCS43i	ECM
CM	SN (NT9X01JA/JB) and SNSE (NT9X01MB) (NT 40 not sup- ported) One of the fol- lowing: • 9X10AA Se- ries 50 BRISC • 9X14DB 24 MB Mem See note 1 or • 9X10AA Se- ries 60 BRISC • 9X26DB/DC RTIF • 9X14EA 96 MB Mem • 9X12AD Port CP	SN (NT9X01JA/JB) and SNSE (NT9X01MB) (NT 40 not sup- ported) • 9X10AA Se- ries 60 BRISC • 9X26DB/DC RTIF • 9X14EB 96 MB Memory • 9X12AD Port CP	626 6 2
SLM	9X44AD SLM III	9X44AD SLM III	626 6 2

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MS/ LMS	SN and SNSE OF-FICES: SN BUS contains two NT9X0440. SNSE contains one NT9X0470. The DMS Bus requires an upgrade to 16 MB. To upgrade to 16 MB, provision the following: • 9X13DD 16MB Proc/Mem • 9X13DC 4MB Proc. & 9X14DB 24MB Mem	SN and SNSE OF-FICES: SN BUS contains two NT9X0440. SNSE contains one NT9X0470. The DMS Bus requires an upgrade to 16 MB. To upgrade, provision the following: • 9X13DD 16MB Proc/Mem • 9X13DC 4MB Proc. & 9X14DB 24MB Mem	626 6 2
XPM+ PDTC+	NT6X45/46 MP/SP processors must be upgraded to MX77 unified proc. Only 3 backplane, NT6X01BA, is supported.	NT6X45/46 MP/SP upgraded to MX77 unified proc. Only 3 backplane is supported.	704
DTC0+	NT6X45/46 MP/SP processors must be upgraded to MX77 unified proc. Only 2 backplane, NT6X01AC, is supported.	NT6X45/46 MP/SP processors must be upgraded to MX77 unified proc. Only 2 backplane is supported.	704
IDTC+	NT6X45/46 MP/SP processors must be upgraded to MX77 unified proc.	NT6X45/46 MP/SP processors must be upgraded to MX77 unified processor.	704

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ILGC+	NT6X45/46 MP/SP Processors must be upgraded to MX77 unified proc for all markets except China and Turkey. See Note 2 .	NT6X45/46 MP/SP processors must be upgraded to MX77 unified proc.	704

NOTE 1 : Supported only as an interim upgrade to BRISC60.

NOTE 2 : 100i only supports the MP/SP processors (6X45/6X46) as follows:

- China and Turkey market
- ILGC
- BCS42i and BELOW

7.15.6 Functionality Required Hardware

Functionality Required Hardware is required to activate a Function/Feature and is required in addition to the Load Gating Hardware identified previously. The software load may be inserted without this hardware but the Function may not be placed in service without it.

PRODUCT	1 0i FUNCTIONALITY REQUIRED HARDWARE	ECM
CCS7	PDTC+, DTC0+, LPP, FLIS, LPP-NIU, LIS, FLIS-NIU, LIS-NIU	704 6 2

7.15.6.1 Nonsupported Products And Configurations

This section lists products and configurations that are not supported or that have restrictions.

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PRODUCT	NONSUPPORTED PRODUCTS AND CONFIGURATIONS		ECM
	BCS42i	BCS43i	
CM	NT40, NT3X45EA NT3X45EW Series 70 BRISC processor (9X10BA) RTIF for 70 Series BRISC (9X26EA) Series 70 BRISC processor (9X10CA) RTIF for 70 Series BRISC (9X26FA)	NT40, NT3X45EA NT3X45EW Series 50 BRISC processor (9X10AA) RTIF for 50 Series Series 70 BRISC processor (9X10BA) RTIF for 70 Series BRISC (9X26EA) Series 70 BRISC processor (9X10CA) RTIF for 70 Series BRISC (9X26FA)	183 6 6 6 2
DMS Bus	Synchronizable oscillator (9X53AD)	Synchronizable oscillator (9X53AD)	
JNET	Network Frame, NT0X48xx	Network Frame, NT0X48xx	626 6 2
IDTC Frame and Cabi- net	Must be upgraded to MX77 Universal	Must be upgraded to MX77 Universal	704
ILGC Frame and Cabi- net	Must be upgraded to MX77 Universal except China and Turkey	Must be upgraded to MX77 Universal	704
IOM	Not Supported.	Not Supported.	705
IOPM	Not Supported.	Not Supported.	514
LCME	Not Supported.	Not Supported.	704
LGCO +	Not Supported.	Not Supported.	704
PDTC Frame and Cabi- net	Must be upgraded to MX77 Universal	Must be upgraded to MX77 Universal	704
PLGC PLGC +	Not Supported.	Not Supported.	704
RSC-S	Not Supported	Not Supported.	691
IOPAC	TBD	TBD	
AIM	TBD	TBD	API 554

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SRU	Not Supported.	Not Supported.	527
SDM	Not Supported.	Not Supported.	563
IWS	Not supported.	Not Supported.	695
AX74 processor	Not supported.	Not Supported.	704
GPP	Not supported.	Not Supported.	704
EIU	Not supported.	Not Supported.	704
Universal Tone Reciever	NT6X92DA NT6X92EA	NT6X92DA NT6X92EA	704
PCM-30 Interfaces	NT6X27BC NT6X27BD NT6X27CA NT6X27JA NT6X27JD	NT6X27BC NT6X27BD NT6X27CA NT6X27JA NT6X27JD	704
Ringing Generators	NT6X30AE NT6X30BA NT6X30BB (Japan) NT6X30EA NT6X30GA NT6X60AE NT6X60BA NT6X60EA NT6X60FA NT6X60GA	NT6X30AE NT6X30BE NT6X30BB (Japan) NT6X30EA NT6X30GA NT6X60AE NT6X60BA NT6X60EA NT6X60FA NT6X60GA	636
Line Cards	NT6X95AA NT6X21BC NTBX26AA NTBX27AA NT6X98AA NTMX29AA NT6X33AB NT6X64AA	NT6X95AA NT6X21BC NT6X26AA NTBX27AA NT6X98AA NTMX29AA NT6X33AB NT6X64AA	307
XPM Mes- saging and tone cards	NT6X69DA NT3X68BC	NT6X69DA NT3X68BC	441
Remote Oscillator Shelf	NT3X95AB NT3X95BB	NT3X95AB NT3X95BB	626 6 2

MS Loads

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MS LOADS.		
CM LOAD	MS LOAD REQUIRED	ECM
BCS42i	MSC52AX (Std MS load) MEC42AX (ENET MS load) MNC42AX (SNSE MS load)	626
BCS43i	MSC43BR (Std MS load) MEC43BR (ENET MS load) MNC43BR (SNSE MS load)	626

7.15.7 Office Layout Information

Not applicable.

7.15.8 Traffic Tables

Not applicable.

7.16 Product/System Specification

7.16.1 Physical Characteristics

Not applicable.

7.16.2 EMI/Earthquake Information

Not applicable.

7.16.3 Sparing Information

Not applicable.

7.16.4 Power Feed and Fusing Requirements

Not applicable.

7.16.5 Current Drain Information

See ECM 800 for Current Drain information.

7.17 Software Provisioning

7.17.1 Required Software Packages and Interdependencies

| The required software packages and interdependencies for peripheral
| loads can be found in the ECM for the peripheral in question.

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7.17.2 Software Usage Restrictions

The following lists software usage restrictions for 100i.

- The 100i software may be installed without Functionality Required Hardware but the Function may not be placed in service without it. Not all functionalities require additional hardware.
- The 100i software canNOT be installed without the load gating hardware described in section " 00i Load Gating Hardware"

7.17.3 Memory Provisioning

Not applicable.

7.18 Real Time Impact

Not applicable.

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8.0 ECM801 - APC100 Requirements

8.1 Overview

The product requirements for APC are varied in terms of the hardware components, interfaces and software required. The APC market applications include alternate toll carriers and local tandems, advance business services, private network overlays; evolving into local access, international carriers, and specialized services overlays.

The hardware platform for the DMS-100 APC switch is the DMS-100 SuperNode switching architecture. Two configurations are available; SuperNode and SuperNode Size Enhanced (SNSE). The SNSE has a single SuperNode Control Cabinet (SCC) which houses the DMS-Core, ENET and LPP functions. The SuperNode configuration has a higher capacity than the SNSE configuration, which is intended for use in small exchange applications.

The primary purposes of this ECM is to ensure that hardware changes required for the deployment of the APC09 software release load are defined for use by Installation, Engineering, and SAEs.

| This document contains APC100 Load Gating Hardware, Functionality Required Hardware, Upgrade Paths, Non-Supported Configurations, MS load, and Non-CM Software Compatibility for the CM, Non CM, and Peripheral hardware platforms.

Load Gating Hardware is identified because it is required to be shipped and installed before the loading of a Software Release (such as a APC09 PCL) is attempted in the target DMS. Software is now ordered via PCLs. Each Software Release Stream contains several different PCLs. The Load Gating Hardware is common to all PCLs in a particular Software Release Stream.

If loading of the PCL is attempted before the Load Gating Hardware has been installed, a load abort will occur.

+-----+ LOAD GATING HARDWARE +-----+	
Load Gating Hardware is, for a specific Software Release	
Stream (such as APC09), the hardware that is deemed to be	
necessary to load and run the specific Software Release.	
+-----+	
+-----+ FUNCTIONALITY REQUIRED HARDWARE +-----+	
Functionality Required Hardware (aka Service Activation	
Hardware) - is the hardware, incremental to the Load Gating	
Hardware, which is needed to enable a software functionality	
to function correctly. The software load may be inserted	
without this hardware but the Function may not be placed in	
service without it. Not all functionalities require	
additional hardware.	
+-----+	

Figure 41. DEFINITIONS.

Load Gating Hardware for SW releases can be found in API 325.

8.2 Hardware Provisioning

8.2.1 Hardware Usage Restrictions

The NT40 is not supported in DMSE offices.

8.2.2 Hardware Dependencies

The APC09 Software Release Load needs, at a minimum, the load gating hardware shown in this document. Additional Functionality Required Hardware will also be required in order to enable specific Functions.

8.2.2.1 P and C Side Port Requirements

Not applicable

8.2.2.2 DMS BUS Port Requirements

Not applicable

8.2.2.3 Circuits Per Card

Not applicable

8.2.2.4 Discrimination Numbering

Not applicable

8.2.3 Provisioning Considerations

The hardware listed is the minimum required for the SuperNode or SNSE switching platform to load the software and perform basic functions. The NT40 is not supported in DMSE offices.

8.2.3.1 ECM References

The Load Gating Hardware PECs shown in the Load Gating Hardware table are intended to highlight the minimum hardware required. For provisioning details, refer to the appropriate product API/ECM and Engineering Manual Sections (EMS). Some of the most relevant API/ECMs are listed below. API/ECM references are also indicated in the Load Gating Hardware table.

PRODUCT	ECM	ECM NAME
CM	626	DMS-SuperNode
CM	632	DMS-SuperNode SE
ENET-Dual	627	128K Enhanced Network Dual Cabinet ENET
ENET-Single	635	Single Cabinet Enhanced Network
FLIS/LPP	612	Fiberized LIS (FLIS or Single Shelf LPP)
IOE	613	Bld Block - IOE Engineering
LIM	620	Bld Block/Detail Engineering - LIM
MS	626	DMS-SuperNode
RSC-S	691	Model B Remote Switching Center - SONENT
SLM	626	DMS-SuperNode
SLM	632	DMS-SuperNode SE
IXPMs	704	International XPMs
XPM & SCM	714	Domestic XPMs and SCM (Subscriber Carrier Module)

Figure 42. ECM REFERENCES.

APC100 Load Gating Hardware

Load Gating Hardware is identified because it is required to be shipped and installed before the loading of a Software Release (such as a APC09 PCL) is attempted in the target DMS. Software is now ordered via PCLs. Each Software Release Stream contains

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several different PCLs. The Load Gating Hardware is common to all PCLs in a particular Software Release Stream.

If loading of the PCL is attempted before the Load Gating Hardware has been installed, a load abort will occur.

The PECs shown below are the MINIMUM functional level required. Higher levels may be used unless specifically prohibited in this document. In instances where the PEC shown is no longer orderable, new orders will be shipped with the current manufacturing baseline version.

RELEASE	PRODUCT	LOAD GATING HARDWARE	ECM
APC09		THERE IS NO NEW LOAD GATING HARDWARE IDENTIFIED FOR APC09.	
APC08	CM	SN and SNSE OFFICES:(NT 40 not supported) 9X10 88K Processor	626 632
	MS	SN OFFICES: 16 MB Minimum Required 9X13DD 16MB Proc/Mem OR 9X13DB 4MB Proc. & 9X14DB 24MB Mem NO OTHER CONFIGURATIONS ARE SUPPORTED.	626
	LMS	ALL LPP/LMS OFFICES: 9X13DD 16MB Proc/Mem OR 9X13DB 1MB Proc. & 9X14DB 24MB Mem NO OTHER CONFIGURATIONS ARE SUPPORTED.	620
	LPP	LPP/LMS OFFICES WITH MORE THAN 1K TRUNKS: EX22BA or BB 8MB LIU	620 612
	ENET	9X13KA 16 MB Processor	627 635
0	0		0

Continued.....

...APC08 Continued

RELEASE	PRODUCT	LOAD GATING HARDWARE	ECM
	DTC+	MX77AA Unified Processor	714
	DTCI LTCI	BX02BA EDCH	714
0	0		0

Figure 43. APC100 LOAD GATING HARDWARE.

APC100 XPM+ Requirements

NOTE: ANY HOST SITE WHICH HAS MP/SP PROCESSORS AND REQUIRING XPM06 OR ABOVE MUST BE UPGRADED TO THE MX77 UNIFIED PROCESSOR.

APC100 Functionality Required Hardware

Functionality Required Hardware (aka Service Activation Hardware) is the hardware, incremental to the Load Gating Hardware, which is needed to enable a software functionality to function correctly. The software load may be inserted without this hardware but the Function may not be placed in service without it. Not all functionalities require additional hardware.

The following small subset of Functionality Required Hardware is listed due to its importance in placing an actual line in service.. Refer to the appropriate ECM for a complete listing of required hardware.

RELEASE	PRODUCT	FUNCTIONALITY REQUIRED	HARDWARE	ECM
APC09	CM	NT9X10CA Series 70	EM	
	IOM	FX30AA/FX31AA/	FX32AA/BA/CA	705
APC08	SLM	SN and SNSE OFFICES: 9X44AD SLM III		626 632
	MS	9X53AD (clock)		
	DTC LGC	6X40FB DS-512 I/F CP 6X40AD DS-30 I/F CP		704
	RLCM- EDC	6X51BA RLCM (Extended Distance Capability) 6X50AB DS-1 Interface Card		691
	LTC+	MX76BA Messaging Card 6X50BA DS-1 Interface Card		691
	GPP	BX01AC EISP		568
	LPP	9X62CB Interface PB		620 612
0	0	0	0	0

Figure 44. APC100 FUNCTIONALITY REQUIRED HARDWARE.

8.2.3.2 Nonsupported Products And Configurations

This section is intended to list MD products and configurations that are no longer supported or that have had restrictions added.

RELEASE	PRODUCT	NONSUPPORTED PRODUCTS AND CONFIGURATIONS	ECM
APC09	IOC	IOC Shelf and Cards	613
APC08	ENET	9X13FA 4 MB Processor	627
	LPP	EX22AA LIU7 9X13CA	612
	DTCI LTCI	BX02AA DCH	693
0	0		0

Figure 45. APC100 NONSUPPORTED HARDWARE.

8.2.3.3 MS Loads

RELEASE	MS LOAD	DESCRIPTION
APC08	MUC00008	16 Mb Universal MS Load
APC09	MUC00009	16 Mb Universal MS Load
0	0	

Figure 46. MS LOADS.

8.2.3.4 Non-CM Software Compatibility

Software loads that do not reside on the Computing Module are referred to as Non-CM Loads (NCLs). NCL loads require certain levels of PCLs in the switch, as indicated in the table below. For a given APC08 release, the required NCL release level needed to implement a product is shown.

For provisioning details, refer to the appropriate product ECM.

Starred items (*) are recommended.

NONCM PRODUCT	APC05	APC06	APC08	API/ECM
EDRAM	SLM:	SLM:		ECM 531
Enhanced	EDRM0004-	EDRM0004-	EDRM0008-	
Digital	EDRMSLM004	EDRMSLM004	(EDRMSLM008-	
Recorded	9-Track:	9-Track:	PM Load);	
Announcement	EDRM0005-	EDRM0005-	EDRM001	
Machine	EDRM9T005	EDRM9T005	(EDRMVF0001-	
			voice Files)	
CTMJ	GLP00007	GLP00007	9-Track:	
(Japanese	GLNCL001	GLNCL001	EDRM0007	
CTM)			(EDRM9T007)	
If upgrade of the EDRAM load is required, it should be upgraded to the latest version available.				

Figure 47. NON-CM SOFTWARE COMPATIBILITY.

8.2.4 Office Layout Information

Not applicable.

8.2.5 Traffic Tables

Not applicable.

8.3 Product/System Specification

8.3.1 Physical Characteristics

Not applicable.

8.3.2 EMI/Earthquake Information

Not applicable.

8.3.3 Sparing Information

Not applicable.

8.3.4 Power Feed and Fusing Requirements

Not applicable.

8.3.5 Current Drain Information

Not applicable.

8.4 Software Provisioning

8.4.1 Required Software Packages and Interdependencies

Software is now ordered via PCLs. Each Software Release Stream contains several different PCLs. The APC06 related PCL order codes are:

RELEASE	PCL CODE	DESCRIPTION
APC006	ABSK003 ABSL001 ABSM005	DMS-100 APC PCL for Japan IDC DMS-100 APC PCL for Japan NTT DMS-100 APC PCL for Australasian Markets Optus and Telstra, (Also China, but only with a combined GL100-GL03 load).
APC008	ABSK005 ABSL002 ABSM007	DMS-100 APC PCL for Japan IDC DMS-100 APC PCL for Japan NTT DMS-100 APC PCL for Australasian Markets Optus and Telstra, (Also China, but only with a combined GL100-GL03 load).
APC009	ABSK006 ABSM008	DMS-100 APC PCL for Japan IDC DMS-100 APC PCL for Australasian Markets Optus and Telstra, (Also China, but only with a combined GL100-GL03 load), also BayanTel, Binariang, Lanka Bell.

Figure 48. APC100 PCL LISTING.

This information was obtained from Product Content Application (PCA).

8.4.2 Software Usage Restrictions

The software load may be inserted without Functionality Required Hardware but the Function may not be placed in service without it. Not all functionalities require additional hardware.

8.4.3 Memory Provisioning

CM Memory provisioning should be completed on every job to determine memory requirements. Currently, development of a CM Memory calculation tool to support APC loads is in development on the FACET, Flexible Advanced Capacity Engineering Tool, platform. Schedule TBD. The tool, when completed, will provide memory requirements for the selected PCL and office parameters. In addi-

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tion, the tool will also project memory requirements beyond the currently available software release to support long range planning activities.

8.5 Real Time Impact

Real time calculations should be run on every job to determine real time requirements. Calculation for an office is required to properly size the Central Processing Unit or Computing Module (CM) and in certain cases analyze real time capacity of certain peripheral units. Real time calculations for an individual DMS-100 office reflect the office's unique line and feature mix and call volumes. Currently, development of a CM and XPM Real Time calculation tool to support APC08 loads is in development on the FACET platform. Schedule is late 1996. The tool, when completed, will provide real time requirements for the selected PCL and office type. In addition, the tool will also project real time requirements beyond the currently available software release to support long range planning activities.

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8.6 Header Descriptions

PRODUCT NAME: the name of the product

Indentation meanings:

DRU (Development Release Unit)	- Zero spce indentation
Functional Group	- 2 space indentation
Functionality	- 4 space indentation

ORDCODE: the product's order code

OPTION: Software Optionality Control (SOC)

REQ. PRODUCT NAME: the Required Product's name

ORD/PEC: the Required Product's ORDCODE or PEC

GRP/REL: Grp = some number
Rel = a boolean Relationship

The Grp number shows how the required products are related to each other. For example, given the following:

PRODUCT NAME	ORD/PEC	GRP/REL
DMSCCM02		
AIN ESSENTIALS	NT9X14DB	0AND
AIN ESSENTIALS	TEL00008	0AND
AIN ESSENTIALS	NT9X13DB	10R
AIN ESSENTIALS	NT9X13DD	10R
AIN ESSENTIALS	NT1X75BA	2XOR
AIN ESSENTIALS	NT1X80AA	2XOR

This shows that DMSCCM02 AIN ESSENTIALS requires (NT9X14DB -AND- TEL00008) and one/both of (NT9X13DB -OR- NT9X13DD) and one of -EITHER- (NT1X75BA or NT1X80AA).

Boolean Relationships:

x AND y	= must have both x and y
x OR y	= must have one or both of x and y
x XOR y	= must have either x or y but not both
NOT x	= must not have x

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8.7 PCL: LEC0010

PRODUCT NAME	ORDCODE	OPTN	REQ.	PRODUCT NAME	ORD/PEC	GRP/REL
DMSBASE11						
BASE	BASE0001	YES	MUC00010		MUC00010	0AND
BASE C0 DATA CHG CAPTURE	BASE0011	YES				
BASE SN SR50 PROCESSOR	BASE0005	YES	33MHZ 88K BRISC CPU CIRCUIT PACK	NT9X10AA		0AND
BASE SN SR50 PROCESSOR	BASE0005	YES	PORT CARD WITH PARITY	NT9X12AD		0AND
BASE SN SR50 PROCESSOR	BASE0005	YES	MEMORY 24MEG CIRCUIT PACK (BCS-26)	NT9X14DB		10R
BASE SN SR50 PROCESSOR	BASE0005	YES	MEMORY 96M CP	NT9X14EA		10R
BASE SN SR50 PROCESSOR	BASE0005	YES	BRISC RTIF CIRCUIT PACK	NT9X26DA		20R
BASE SN SR50 PROCESSOR	BASE0005	YES	BRISC RTIF CIRCUIT PACK	NT9X26DB		20R
BASE SN SR50 PROCESSOR	BASE0005	YES	BRISC RTIF CIRCUIT PACK - SERIES 50	NT9X26DC		20R
BASE SN SR60 PROCESSOR	BASE0006	YES	33MHZ 88K BRISC CPU CIRCUIT PACK	NT9X10AA		0AND
BASE SN SR60 PROCESSOR	BASE0006	YES	MEMORY 96M CP	NT9X14EA		0AND
PRINTED JUN 30, 1998 + 10:49:46	NOTE: XCOUPLED FUNCTION AL GROUPS AND FUNCTION ALITIES ARE EXCLUDED					

PCL: LEC0010

PRODUCT NAME			PRODUCT NAME		
ORDCODE	OPTN	REQ.	ORD/PEC	GRP/REL	
PRINTED BY MARSDEN, JAMES					
WEB REPORTER RELEASE 407					
CUSTOMER SERVICE					

DMS-100 FAMILY
NORTH AMERICAN DMS-100
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