



DEFINITY®

Enterprise Communications Server

Release 9

System Description

555-233-200

Issue 2

November 2000

Notice

Every effort was made to ensure that the information in this book was complete and accurate at the time of printing. However, information is subject to change. This document was prepared by the Avaya Product Publications, Denver, CO

Your Responsibility for Your System's Security

Toll fraud is the unauthorized use of your telecommunications system by an unauthorized party, for example, persons other than your company's employees, agents, subcontractors, or persons working on your company's behalf. Note that there may be a risk of toll fraud associated with your telecommunications system and, if toll fraud occurs, it can result in substantial additional charges for your telecommunications services. You and your system manager are responsible for the security of your system, such as programming and configuring your equipment to prevent unauthorized use. The system manager is also responsible for reading all installation, instruction, and system administration documents provided with this product in order to fully understand the features that can introduce risk of toll fraud and the steps that can be taken to reduce that risk. Avaya does not warrant that this product is immune from or will prevent unauthorized use of common-carrier telecommunication services or facilities accessed through or connected to it. Avaya will not be responsible for any charges that result from such unauthorized use.

If you suspect that you are being victimized by toll fraud and require assistance, contact the Toll Fraud Intervention Hotline at +1 800 643 2353 or contact your local Avaya representative.

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Standards Compliance

The equipment described in this book complies with the following standards, as applicable:

Australia AS3548 (AS/NZ3548)	FCC Part 15 and Part 68	ITU-T (Formerly CCITT)	CSA C222 Number 225
ANSI	EN55022	IEC 950	ISO-9000
CISPR22	EN50081	IPNS	TS001
DEFINITY®	EN50082	National ISDN-1	National ISDN-2
DPNSS	ETSI	UL 1459	UL 1950I
ECMA	IEC 825		

Electromagnetic Compatibility Standards

This product complies with and conforms to the following, as applicable:

Limits and Methods of Measurements of Radio Interference Characteristics of Information Technology Equipment, EN55022 (CISPR22), 1993

EN50082-1, European Generic Immunity Standard

FCC Part 15

Australia AS3548

The DEFINITY ECS conforms to Class A (industrial) equipment. Voice terminals conform to Class A equipment per the following standards.

Electrostatic Discharge (ESD) IEC 1000-4-2

Radiated radio frequency field IEC 1000-4-3

Electrical Fast Transient IEC 1000-4-4

Lightning effects IEC 1000-4-5

Conducted radio frequency IEC 1000-4-6

Mains frequency magnetic field IEC 1000-4-8

Low frequency mains disturbance

Federal Communications Commission Statement

Part 68: Answer-Supervision Signaling. Allowing this equipment to be operated in a manner that does not provide proper answer-supervision signaling is in violation of Part 68 rules. This equipment returns answer-supervision signals to the public switched network when

- answered by the called station,
- answered by the attendant, or
- routed to a recorded announcement that can be administered by the CPE user.

This equipment returns answer-supervision signals on all DID calls forwarded back to the public switched telephone network. Permissible exceptions are:

- A call is unanswered.
- A busy tone is received.
- A reorder tone is received.

Avaya attests that this registered equipment is capable of providing users access to interstate providers of operator services through the use of access codes. Modification of this equipment by call aggregators to block access dialing codes is a violation of the Telephone Operator Consumers Act of 1990.

This equipment complies with Part 68 of the FCC Rules. On the rear of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive RENs on the telephone line may result in devices not ringing in response to an incoming call. In most, but not all areas, the sum of RENs should not exceed 5.0. To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company.

REN is not required for some types of analog or digital facilities.

Means of Connection

Connection of this equipment to the telephone network is shown in the following table.

Manufacturer's Port Identifier	FIC Code	SOC/REN/A.S. Code	Network Jacks
Off/On premises station	OL13C	9.0F	RJ2GX, RJ21X, RJ11C
DID trunk	02RV2-T	0.0B	RJ2GX, RJ21X
CO trunk	02GS2	0.3A	RJ21X
CO trunk	02LS2	0.3A	RJ21X
Tie trunk	TL31M	9.0F	RJ2GX
Basic Rate Interface	02IS5	6.0F, 6.0Y	RJ49C
1.544 digital interface	04DU9-BN, 1KN, 1SN	6.0F	RJ48C, RJ48M
I20A2 channel service unit	04DU9-DN	6.0Y	RJ48C

If the terminal equipment (DEFINITY® System) causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice is not practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

If trouble is experienced with this equipment, for repair or warranty information, please contact the Technical Service Center at 1-800-242-2121 or contact your local Avaya representative. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

It is recommended that repairs be performed by Avaya certified technicians.

The equipment cannot be used on public coin phone service provided by the telephone company. Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

This equipment, if it uses a telephone receiver, is hearing aid compatible.

Canadian Department of Communications (DOC) Interference Information

This digital apparatus does not exceed Class A limits for radio noise emission set out in the radio interference regulation of the Canadian Department of Communications.

Le Présent Appareil Numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils manicules de la class A prescrites dans le reglement sur le brouillage radioélectrique édité par le ministère des Communications du Canada.

European Union Declaration of Conformity

Avaya Inc. Business Communications Systems declares that the DEFINITY ECS equipment specified in this book bearing the "CE" (*Conformité Européenne*) mark conforms to the European Union Directive 1999/5/EC. The CE mark indicates conformance to the European Union Electromagnetic Compatibility Directive (89/336/EEC) and Low Voltage Directive (73/23/EEC). This equipment has been certified to meet CTR3 Basic Rate Interface (BRI) and CTR4 Primary Rate Interface (PRI) as applicable, CTR12, and CTR13.

The CE mark is applied to the following products:

- Global AC-powered multicarrier cabinet (MCC) with 20 Hz, 25 Hz, and 50 Hz ring generator
- DC-powered multicarrier cabinet (MCC) with 25 Hz and 50 Hz ring generator
- AC-powered single-carrier cabinet (SCC) with 20 Hz, 25 Hz, and 50 Hz ring generator
- AC-powered compact single-carrier cabinet (CSCC) with 20 Hz and 25 Hz ring generator
- AC-powered compact modular cabinet (CMC) with 20 Hz, 25 Hz, and 50 Hz ring generator

Enhanced DC-power system

DEFINITY One (CFS) cabinet with 20 Hz, z25 Hz, and 50 Hz ring generator

ETS standards referenced by CTR3 and CTR4

	CTR3	CTR4
L1:	ETS300012	ETS300011
L2:	ETS300125	ETS300125
L3:	ETS300102	ETS300102
Safety:	ETS300047	ETS300046

The Declarations of Conformity covering these products have been signed by the Vice President of DEFINITY ECS R&D, Avaya Inc. Copies of these DoCs Declarations of Conformity can be obtained by contacting your local sales representative.

Network Connections

Digital Connections - The equipment described in this document can be connected to the network digital interfaces throughout the European Union.

Analogue Connections - The equipment described in this document can be connected to the network analogue interfaces throughout the following member states:

Belgium
Germany
Greece
Italy
Luxembourg
Netherlands
Spain
United Kingdom

LASER Product

The DEFINITY ECS may contain a Class 1 LASER device if single-mode fiber-optic cable is connected to a remote expansion port network (EPN). The LASER device operates within the following parameters:

Maximum power output: -5 dBm

Wavelength: 1310 nm

Mode field diameter: 8.8 microns

CLASS 1 LASER PRODUCT IEC 825 1993

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

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Avaya Inc. formed as a result of Lucent's planned restructuring, designs builds and delivers voice, converged voice and data, customer relationship management, messaging, multi-service networking and structured cabling products and services. Avaya Labs is the research and development arm for the company.

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About This Book

Purpose

This book gives you the broad overview of the components of the DEFINITY® Enterprise Communications Server (ECS) that you need when you are planning an installation, ordering equipment, or learning about the system and its parts. It is not intended to replace or modify instructions provided in other, task-specific documentation, such as installation, administration, or maintenance documents.

This book is also used for the ProLogix, DEFINITY BCS, and GuestWorks products. It contains references to Category A, which refers to ECS and ProLogix, and Category B, which refers to DEFINITY BCS and GuestWorks.

Intended Audience

This book is for customers, Avaya marketing and sales representatives, field technicians, and educators who teach basic DEFINITY information to field technicians and customers.

Standards Compliance

The equipment in this document complies with the following standards (as applicable):

- ITU-T (Formerly CCITT)
- ECMA
- ETSI
- IPNS
- DPNSS
- National ISDN-1
- National ISDN-2
- ISO-9000
- ANSI

- FCC Part 15 and Part 68
- EN55022
- EN50081
- EN50082
- UNI 3.1
- CISPR22
- Australia AS3548 (AS/NZ3548)
- Australia AS3260
- IEC 825
- IEC 950
- UL 1459
- UL 1950
- CSA C222 Number 225
- TS001
- ILM1 3.1

Systems Supported

This book covers the system updates from R8 to R9. The primary interest of this book is the R9 system.

1—Overview of DEFINITY ECS R9

This document provides a general overview of the DEFINITY ECS R9.

The ProductName

The DEFINITY ECS is a digital voice communications switch that processes and routes telephone calls and data communications from one endpoint to another. See [Figure 1 on page 2](#).

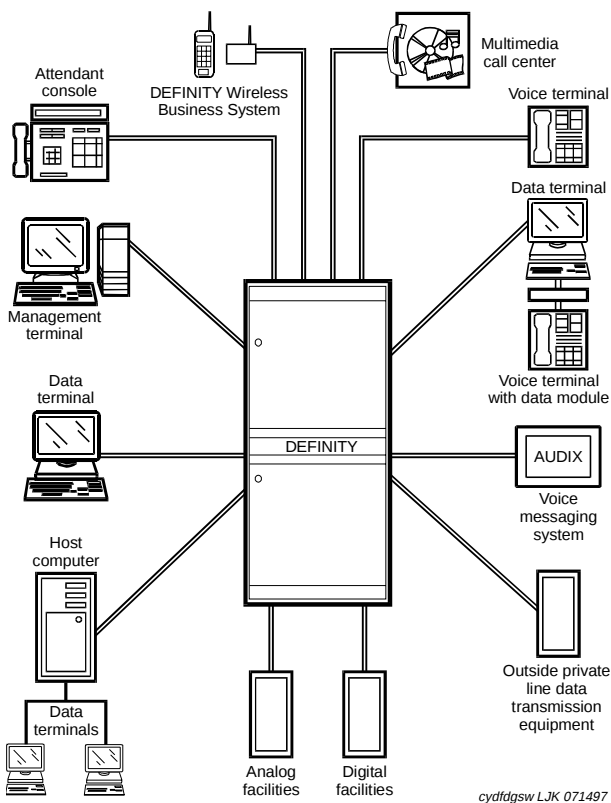


Figure 1. The System as a Digital Switch

All endpoints are external to the system. The voice and data signals going to the endpoints enter and leave the system through *port circuits*. The system makes high-speed connections between analog and digital trunks, data lines connected to host computers, data-entry terminals, personal computers (PCs), and Internet Protocol (IP) network addresses.

The system converts all incoming (external source) analog signals to internal digital signals. Incoming (internal or external source) digital signals are not converted. Inside the system, voice is always coded digitally. Outgoing digital signals from the system are converted to analog signals for the analog lines and trunks.

System Components

The basic system component is the Port Network (PN), consisting of port circuits connected to internal buses that allow the circuits to communicate with each other. See [Figure 2 on page 5](#).

Processor Port Network (PPN)

The required Processor Port Network (PPN) contains the Switch Processing Element (SPE). The SPE is a computer that operates the system, processes calls, and controls the PN containing the port circuits.

Expansion Port Network

An Expansion Port Network (EPN) (optional) contains additional ports that increase the number of connections to trunks and lines.

Center Stage Switch (CSS)

A CSS (optional for 3 PNs or less) in the DEFINITY ECS R9r is the central interface between the PPN and the EPNs. The CSS consists of 1, 2, or 3 switch nodes (SN). One SN can expand the system from 1 EPN to up to 15 EPNs. Two SNs can expand the system to up to 29 EPNs. Three SNs can expand the system to up to 43 EPNs.

**NOTE:**

The number of EPNs that can be connected with 2 or 3 SNs may be less than the numbers given, depending on the internal SN-to-SN traffic.

ATM Switch (Not available with Category B)

The Asynchronous Transfer Mode (ATM) switch is a replacement option for the CSS. Several Avaya ATM switch types can provide DEFINITY ECS port network connectivity. Non-Avaya ATM switches that comply with the ATM standards set by the European Union can also provide DEFINITY ECS port network connectivity.

Main System Configuration

[Figure 2 on page 5](#) shows the following 6 main system configurations:

1. Basic system consisting of a Processor Port Network (PPN) only.
2. Direct-connect system with 3 PNs (1 PPN and 1 or 2 EPNs) connected directly together.
3. Center Stage Switch (CSS)-connected system with up to 15 EPNs interconnected by 1 SN to the PPN.
4. CSS-connected system with up to 29 EPNs connected by 2 SNs to the PPN, and up to 43 EPNs connected by 3 SNs to the PPN.
5. ATM switch-connected system with up to 43 EPNs.
6. Multiple ATM switches over a wide area with up to 43 EPNs.

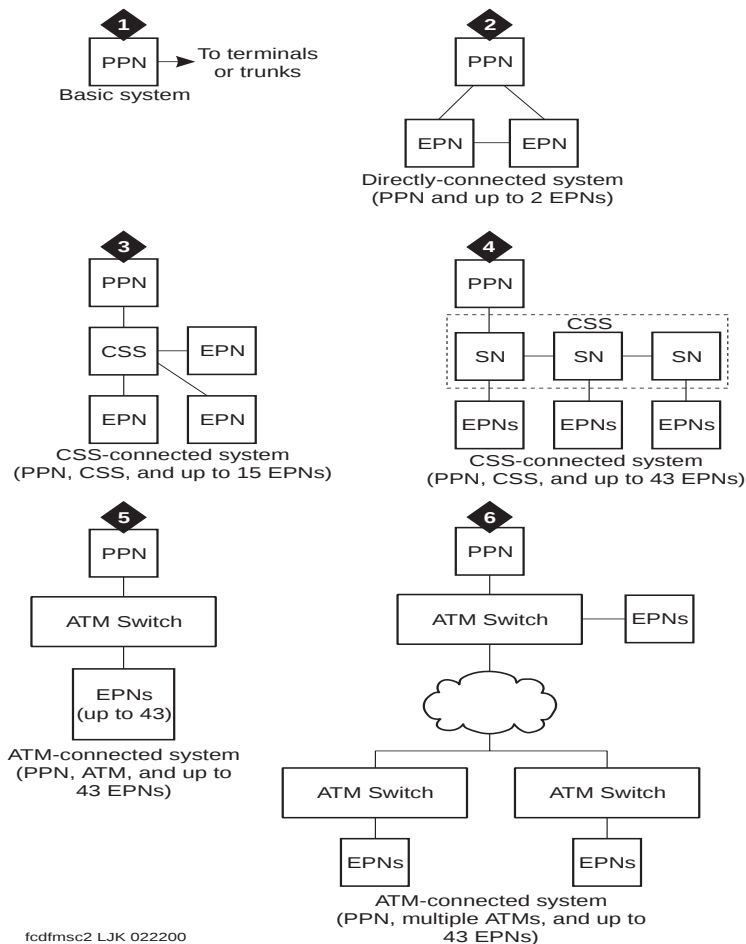


Figure 2. Main System Configurations

System Configurations

Figure 3 shows a direct-connect system with an SPE in the PPN. Buses route voice and data calls between external trunks and lines.

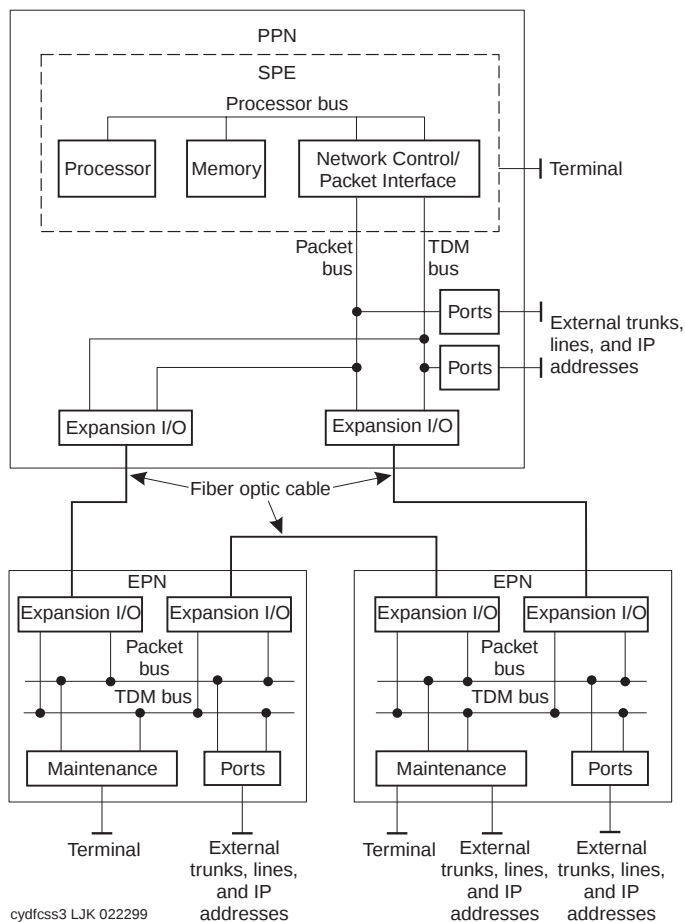


Figure 3. Components of a Direct-Connect System

Figure 4 shows a system with the added CSS to route voice and data calls between external trunks and lines.

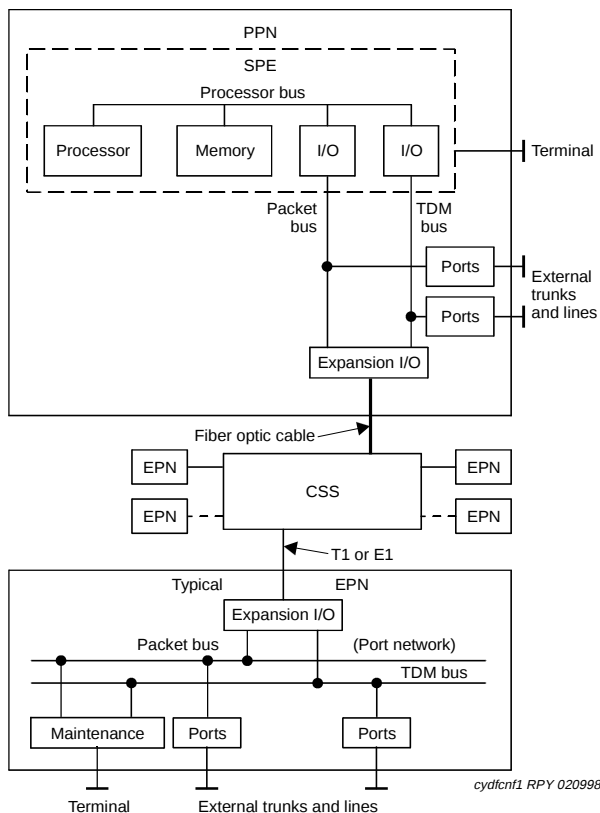


Figure 4. Components of a CSS-Connected System

NOTE:

The components of an ATM-connected system are similar to those shown in Figure 4. However, in an ATM-connected system, the CSS is replaced with an ATM switch or switches and each Expansion I/O is replaced with a TN2305 or TN2306 circuit pack.

Switch Processing Element (SPE)

When a device, such as a telephone, goes off-hook or signals call initiation, the SPE receives a signal from the port circuit connected to the device. The digits of the called number are collected and the switch is set up to make a connection between the calling and called devices.

The SPE consists of the following control circuits connected by a processor bus:

- **Processor:** All R9 systems use a Reduced Instruction Set Computer (RISC) processor. The TN2404 processor circuit pack is used in R9si systems. The TN2402 is used in R9csi systems. The UN331C is used in R9r systems.
- **Memory:** R9csi and R9si systems use 32 Mbytes of flash Read Only Memory (ROM) and 32 Mbytes of Dynamic Random Access Memory (DRAM) resident on the processor circuit pack. R9r systems require 4 TN1650B memory circuit packs to provide a total of 128 Mbytes of DRAM.
- **Storage:** In all R9 systems except R9r, translations are stored in nonvolatile memory on a PCMCIA memory card. In R9r systems, the disk drive is a nonvolatile system bootstrap and translation storage device. A R9r system can use an optic drive as backup storage.
- **Input/output (I/O) circuits:** These act as interfaces between the SPE and the time division multiplexing bus and packet bus.
- **Maintenance interface:** connects the system to an administration terminal and monitors power failure, clock signals, and temperature sensors.

Port Network (PN)

The Port Network (PN) consists of the following components:

- **Time Division Multiplexing (TDM) bus:** Has 484 time slots, 23 B channels and 1 D channel available per bus. Runs internally throughout each PN and terminates on each end. Consists of two 8-bit parallel buses: bus A and bus B. These buses carry switched digitized voice and data signals and control signals among all port circuits and between port circuits and the SPE. The port circuits place digitized voice and data signals on a TDM bus. Bus A and bus B are normally active simultaneously.

- **Packet bus:** Runs internally throughout each PN and terminates on each end. It is an 18-bit parallel bus that carries logical links and control messages from the SPE, through port circuits, to endpoints such as terminals and adjuncts.

The packet bus carries logical links for both on-switch and off-switch control between some specific port circuits in the system; for example, D-channels, X.25, and remote management terminals. Typically, the csi model does not support the packet bus, and therefore any MAPD or ISDN application rides the TDM bus. However, in R7 and later csi systems with C-LAN, the applications use the packet bus provided by the C-LAN board.

- **Port circuits:** form analog/digital interfaces between the PN and external trunks and devices providing links between these devices and the TDM bus and packet bus. Incoming analog signals are converted to pulse-code modulated (PCM) digital signals and placed on the TDM bus by port circuits. Port circuits convert outgoing signals from PCM to analog for external analog devices. All port circuits connect to the TDM bus. Only specific ports connect to the packet bus.
- **Interface circuits:** Located in the PPN and in each EPN. These are types of port circuits that terminate fiber optic cables connecting TDM buses and the packet bus from the PPN cabinet to the TDM buses and packet bus of each EPN cabinet. The fiber-optic cable also connects the CSS to the PPN and the EPNs. These interface and cabling terminations provide a transmission path between the port circuits in different PNs.

In ATM-PNC, the ATM Interface connects each PN to the ATM switch. An Expansion Interface (EI) circuit pack also terminates each end of a cable connecting the PPN to an EPN, each end of a cable connecting an EPN to another EPN, and the PN end of a cable connected between a PN carrier and an SN carrier.

A Switch Node Interface (SNI) circuit pack terminates the SN carrier end of a cable connected between an SN carrier and a PN.

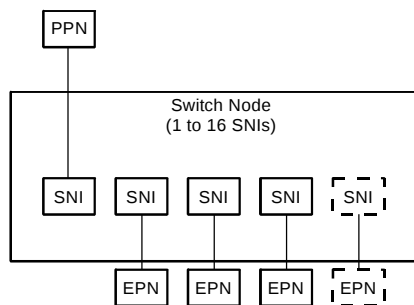
- **DS1 converter:** Converts from a fiber interface to a DS1 interface between PNs for DS1 remoting.
- **Service circuits:** Connect to an external terminal to monitor, maintain, and troubleshoot the system. Also provide tone production and detection as well as call classification, modem pooling, recorded announcements, and speech synthesis.

Center Stage Switch (CSS)

Figure 5 shows the CSS linking the PPN to EPNs by the SNI circuit packs in a SN carrier. A SN reduces the amount of interconnect cabling between the PPN and the EPNs by acting as a *hub* to distribute cabling.

A system using a CSS can connect from 3 to 43 PNs. The CSS can consist of up to 3 SN carriers. The CSS can also consist of 2, 4, or 6 SN carriers (duplicated SNs) in a critical-reliability system.

Each SN contains from 1 to 16 SNI circuit packs. Each interface can connect to a PN or another SN using fiber-optic cable. One interface always connects to the PPN and 1 connects to each EPN.



cent_ppn_0 RBP 070296

Figure 5. CSS with Switch Nodes (SNs)

In a high reliability system (with duplicated processor), 2 SNI circuit packs connect to the PPN, allowing up to 15 PNs to connect to 1 SN, up to 29 PNs to connect to 2 SNs, and up to 43 PNs to connect to 3 SNs, depending on the exact configuration chosen.

ATM Port Network Connectivity (Not available with Category B)

Several Avaya ATM switch types can provide port network connectivity for a DEFINITY ECS. Non-Avaya ATM switches that comply with the ATM standards set by the ITU can also provide DEFINITY ECS port network connectivity. In this configuration, TN2305 multi-mode or TN2306 single-mode ATM circuit packs are installed on the port networks and connected to the ATM switch with the multi- or single-mode fiber specified for the ATM switch.

Architecture

The system consists of 2 main components:

- The Oryx/Pecos real-time, multiprocessing operating system. Oryx/Pecos supports the SPE.
- Applications layer, consisting of 3 major subsystems:
 - Call processing: starts up and completes calls and manages voice and data in the system.
 - Maintenance: detects faults, recovers operations, and performs tests in the system.
 - System management: controls the internal processes necessary to install, administer, and maintain the system.

Logical interconnection between system components refers to the 2 kinds of logical links into the SPE:

- System links for internal system control
- Application links used by external applications such as adjuncts

DEFINITY ECS Hardware

DEFINITY ECS hardware is covered in detail later in this volume. The following provides only a general overview of type of equipment used in DEFINITY ECS implementations.

Carriers

Carriers hold circuit packs and connect them to power, the TDM bus, and the packet bus. There are 5 types:

- Control carrier (PPN cabinet only)
- Optional Duplicated Control Carrier (PPN cabinet only)
- Optional port carrier (PPN and/or EPN cabinets)
- Optional expansion control carrier (EPN cabinets only)
- Optional Switch Node Carrier (PPN and/or EPN cabinets)

Cabinets

The system cabinets house the carriers and all other components, including the power supply. A cabinet contains at least 1 carrier in an enclosed shelf with vertical slots to hold circuit packs. The circuit packs fit into connectors that attach to the rear of the slots.

There are 3 cabinet types:

- Compact Modular Cabinet
- Single-Carrier Cabinet
- Multi-Carrier Cabinet

Compact Modular Cabinets (csi)

The Compact Modular Cabinet (CMC) is only used as a PPN and is available as standard reliability only (no duplication). It mounts on a wall (preferred) or sits on the floor (with a floor panel). When the CMC sits on the floor, the left panel is used as the floor-mount pedestal. See [Figure 6, "Compact Modular Cabinet, Floor Mount \(Top\) and Wall Mount \(Bottom\)" on page 13](#). Up to 3 CMCs can be installed per port network.

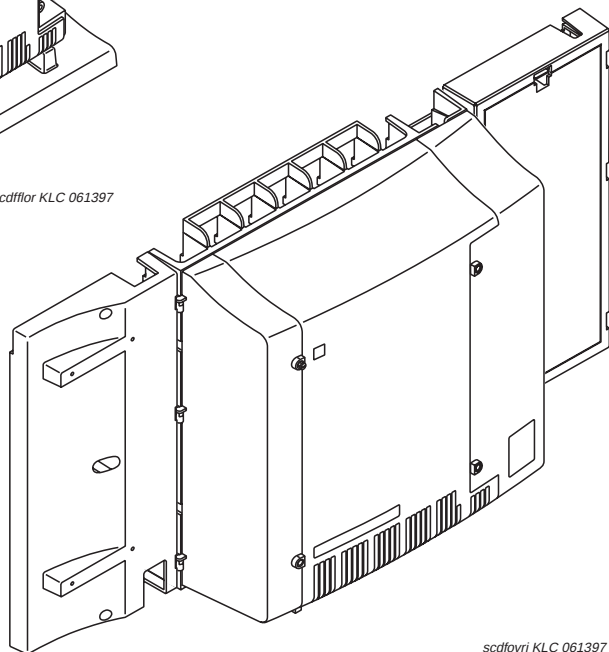
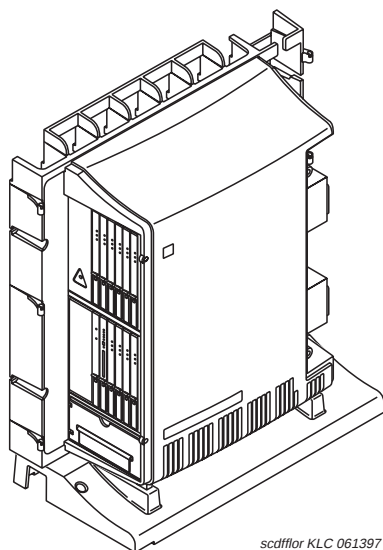


Figure 6. Compact Modular Cabinet, Floor Mount (Top) and Wall Mount (Bottom)

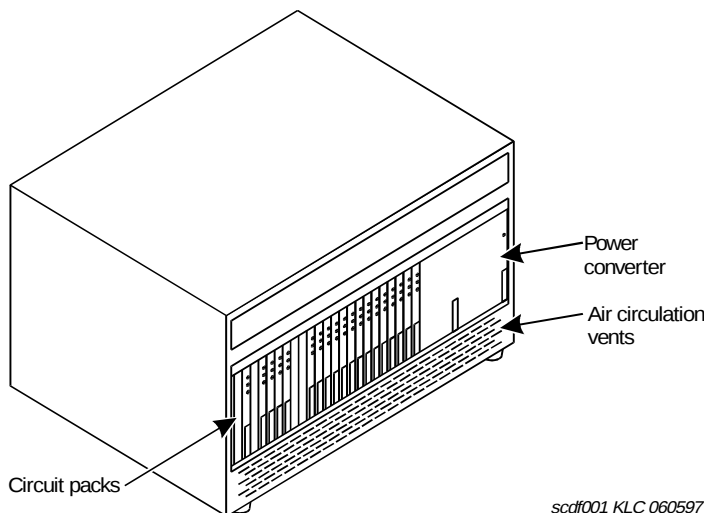
The CMC carrier contains universal port slots. The processor circuit pack resides in slot 1 and the tone-clock circuit pack resides in slot 2 of the A cabinet. The AUX connector on the side of the carrier provides power for 1 attendant console and 1 emergency transfer panel.

Single-Carrier Cabinets (si, r)

Up to 4 Single-Carrier Cabinets (SCC) can be stacked to form a single PN. DEFINITY ECS si supports 3 cabinet stacks for a total of 3 PNs. See [Figure 7](#), "Typical Single-Carrier Cabinet".

Single-Carrier Cabinets come in any of 4 configurations:

- A basic control cabinet that contains a TN2404 processor, tone clock, and a power converter (si model only)
- An expansion control cabinet that contains additional port circuit packs, interfaces to the PPN, a maintenance interface and a power converter
- A duplicated control cabinet that contains the same equipment as the basic control cabinet (si model only)
- A port cabinet that contains port circuit packs and a power converter



scdf001 KLC 060597

Figure 7. Typical Single-Carrier Cabinet

Multi-Carrier Cabinets (si, r)

A Multi-Carrier Cabinet (MCC) is a 70 in. (178 cm) cabinet that has up to 5 carriers (see [Figure 8](#), “Typical Multi-Carrier Cabinet”). The 3 types of Multi-Carrier Cabinets are as follows:

- PPN cabinet contains the ports, SPE, an interface to an EPN cabinet, and/or a CSS.
- EPN cabinet contains additional ports, interfaces to the PPN and other EPN cabinets, the maintenance interface, and optional interfaces to other EPN cabinets and/or a switch node (in an SN in a CSS-connected system).
- Auxiliary cabinet contains equipment used for optional, system-related hardware, such as rack-mount equipment.

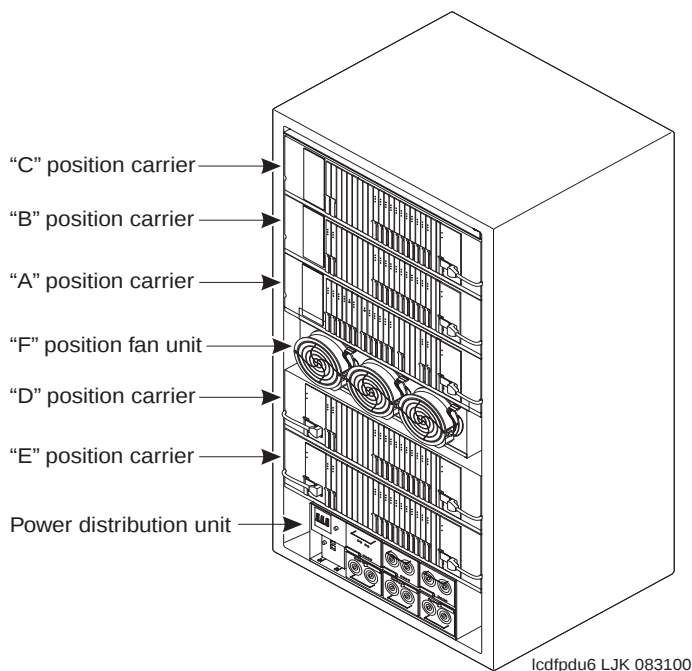


Figure 8. Typical Multi-Carrier Cabinet

Comparing System Versions

To compare the differences between the system version and the carrier version, see [Table 1](#) and [Table 2](#).

Table 1. System Versions

System	PPN	Maximum EPNs	Connection Method
Release 9csi	1	0	Does not apply
Release 9si	1	2	Direct (fiber only)
Release 9r	1	43	Direct, CSS or ATM

Table 2. Carriers

Carrier Type	R9csi	R9si	R9r
Basic control	PPN	PPN	PPN
Duplicated control	Does not apply	PPN	PPN
Port	PPN	PPN and EPN	PPN and EPN
Expansion control	Does not apply	EPN	EPN

Integrating Adjunct, Peripheral, and Third-Party Products

The ProductName can work with a wide range of external equipment, applications, and peripherals. It provides extensive support for third-party equipment and applications, such as external ringing equipment and music-on-hold systems. The CallVisor Adjunct-Switch Application Interface (Not available with Category B) gives independent application developers access to DEFINITY ECS features and routing information from within their own applications.

Supported Telephones

- 300-series attendant consoles (301A, 302A, 302B, 302C).
- 500-, 2500-, 6200-, 7100-, 8100-, 9100-series analog telephones (some 7100 series sets may not be available)

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Integrating Adjunct, Peripheral, and Third-Party Products

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- 602/603/606 CallMaster sets. The 603 and 606 telephones display the full 8-bit OPTREX character set of graphical characters, including Eurofonts, and the Japanese katakana character alphabet (some 602 and 603 CallMaster sets may not be available).
- 4600-series IP telephones use the IP technology with Ethernet line interfaces and downloadable firmware. These telephones emulate DCP 6400-series telephones and provide all of the same features except for the group listen speakerphone feature. The first release of the 4600-series IP telephones will use the dual connection architecture introduced in Release 8 to register and communicate with the DEFINITY switch. This series of telephones includes the 4606, 4612, and 4624 models.
- The 6400-series 2-wire DCP telephones connect to a digital line circuit pack and allow the use of both I-Channels for voice. The number of displayed characters is 27 for calls involving a single ID. If more than one party's ID displays, the ID truncates to 15 characters.

These telephones also display the full 8-bit OPTREX character set of graphical characters, including Eurofonts, and the Japanese katakana character alphabet.

- 7300-series hybrid (some sets may not be available)
- 7400-series DCP telephone (some sets may not be available)
- The 8400-series DCP telephone connects to a digital line circuit pack and uses one I-channel for voice (the 8411 uses both I-channels). The number of displayed characters for calls involving a single ID is 27. If more than one party's ID displays, the ID truncates to 15 characters.

This telephone also displays the full 8-bit OPTREX character set of graphical characters, including Eurofonts, and the Japanese katakana character alphabet.

- The 7500 series and 8500-series ISDN-BRI sets extend the existing ISDN-BRI to allow connection of telephones designed to a variety of BRI specifications.
- 9000-series cordless sets (TransTalk 9000)
- The 9400-series DCP telephones 9403B, 9410D, and 9434D display the full 8-bit OPTREX character set of graphical characters, including Eurofonts, and the Japanese katakana character alphabet. The number of non-United States displayed characters is 27 for calls involving a single ID. If more than one party's ID displays, the ID truncates to 15 characters.
- 9601 DEFINITY Wireless Business System telephone



NOTE:

Other telephones are available. Contact your Avaya representative for more information.

IP Softphones (Not available with Category B)

IP Softphones extend the level of DEFINITY services. They turn a PC or a laptop into an advanced telephone. You can place calls, take calls and handle multiple calls on your PC. There are 4 types of IP Softphones available. They are:

- Telecommuter application -- a multifunction station that runs on a PC plus a conventional telephone. Call control is done on the Softphone and the voice path is on the telephone set. This IP Softphone offers dual connection and is intended to be used by home workers who require PSTN quality audio. The MedPro board is not used in this application.
- Road-warrior application -- a multifunction station that is based entirely on the PC. It is used when there is only a single telephone line available to access the IP network and the DEFINITY. This IP Softphone is intended to use by your traveling associates. The MedPro board is used for the road-warrior application.
- CentreVu IP Agent -- This Softphone is the telecommuter application that has been configured to use the CentreVu IP Agent user interface software. It is used as a Call Center agent station. Like the telecommuter application, CentreVu IP Agent offers dual connection and does not use the MedPro board.
- Native H.323 -- This is an IP-connected Softphone running off-the-shelf H.323 software. It operates as a single-line phone with limited features, which are activated by Feature Access Codes. The MedPro board is used for the Native H.323 application.



NOTE:

For information about the 4600-series IP telephones, see [“Supported Telephones” on page 16](#).

Duplication

Duplication is a strategy to create fully redundant systems. Duplication minimizes single failure points that can interrupt call processing. Four system duplication options are available:

- Standard reliability--this is the only reliability configuration option available for DEFINITY ECS csi model. The standard reliability option does not duplicate the Tone-Clock(s), the Control Carrier, or any inter-PN connectivity.
- High reliability--duplicates the hardware that is associated with the SPE. The Control Carrier is duplicated, which provides duplicate SPEs and Tone-Clocks. Inter-PN connectivity and EPN Tone-Clocks are not duplicated. The strategy is to duplicate items that are associated with the SPE so that a single fault will not cause the loss of the SPE. High reliability is available with DEFINITY si and r models.
- Critical reliability--(not available with Category B) is available with DEFINITY si and r models and requires the full duplication of the SPE, inter-PN connectivity, and the Tone-Clocks.
- ATM Network Duplication--(not available with Category B) requires full duplication of the inter-PN connectivity and the Tone-Clocks.

As duplication increases, the maximum number of port carriers and port circuit packs per cabinet decreases. The information regarding the needed hardware can be found in [Chapter 3](#).

Administration

A management terminal connects to the system for administrative purposes. Enter commands at the terminal to display administration screens (forms). The forms list data and allow you to add, change, and remove system and voice-terminal features. For system administration information, consult the *DEFINITY Enterprise Communications Server Administrator's Guide*.

Connecting with TCP/IP Networks

LAN Gateway

With the optional J58890MA-1List 2 LAN Gateway circuit-pack assembly installed, DEFINITY ECS works with PC/LAN-based communications applications that support the CallVisor Adjunct-Switch Application Interface (ASAI) (Not available with Category B).

C-LAN

TCP/IP Connectivity is provided over Ethernet or Point-to-Point Protocol (PPP) to adjuncts such as CMS Call Center and INTUITY AUDIX and for DCS connectivity. The C-LAN circuit pack (TN799) provides a “bridge” from the TDM bus to the packet bus on DEFINITY ECS csi.

IP Asynchronous Links

The IP Asynchronous Links feature enables DEFINITY ECS to transfer existing asynchronous adjunct connectivity to an Ethernet (TCP/IP) environment. IP Asynchronous Links is a simple, session-layer, proprietary protocol that creates value for the customer in the following ways:

- Reduces the cost of connecting to DEFINITY ECS for various adjuncts
- Allows for an open architecture to transport information and increases the speed at which data is transferred
- Allows customers to manage applications from both on-site and remote locations
- Allows for several system management applications to run on a single PC, thus reducing hardware requirements
- Provides “IP Services” forms to support more flexible administration
- Guarantees data delivery through a reliable session-layer protocol
- Supports customers' existing serial hardware investment through use of Network Terminal Servers

IP Asynchronous Links supports switch server applications and DCS over analog trunks, as described in the following sections.

Switch Server Applications

IP Asynchronous Links provides a telnet server to interconnect C-LAN Ethernet clients to system management applications on DEFINITY ECS via TCP/IP or TCP/IP and RS232 signals. IP Asynchronous Links supports the following server applications:

- SAT
- DSA
- DNA
- DNM (One Vision)

- Proxy Agent
- ProVision
- Enterprise Directory Solutions

Server applications send data to DEFINITY ECS, and the telnet server supports 80 Kbps data throughput. Current application screen interactions are supported, as are current simultaneous session limits on DEFINITY ECS (8 for r models and 5 for si and csi models). The telnet server satisfies all current terminal emulation modes (51x, 4410, 4425, vt220, hp262x, pctt, and so forth).

Access security for system management applications over TCP/IP is provided by the existing Access Security Gateway (ASG) feature. Through either a local or a remote node/port, users can specify the remote client IP address and port number from which the switch can accept service requests. ASG must be enabled on the system-parameters customer-options form. ASG must also be enabled for at least one customer login. The user can administer a timeout period ranging from 5 to 999 minutes, but there is currently no provision for data encryption over the LAN.

DCS Over Analog Trunks (via PPP)

DEFINITY ECS offers a cost-effective alternative for providing DCS over analog trunks by using an office router connected to a C-LAN. Using PPP via an external modem, the office router converts Ethernet IP packets to be transmitted over analog facilities. The administration of the modem, router, and terminal server occurs outside of DEFINITY ECS.

Network Control/Package Interface

Communicates control channel messages between the processor circuit pack and the distributed network of port circuit packs on the TDM bus. The NetPkt circuit pack (TN2401) provides 8 asynchronous data channels that process and route information directly from the processor circuit pack to customer-connected equipment.

IP Media Processor (Not available with Category B)

Provides VoIP (voice over internet protocol) audio access to DEFINITY ECS for local stations and outside trunks. The IP Media Processor provides audio processing for between 32 and 64 voice channels and supports hairpin connections, as well as shuffling

Overview of DEFINITY ECS R9

Connecting with ATM Port Networks (Not available with Category B)

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of calls between IP-IP direct connections. It can perform echo cancellation, silence suppression, fax relay service, and DTMF detection. The IP Media Processor can be updated using the firmware download feature.

Connecting with ATM Port Networks (Not available with Category B)

ATM-PNC

ATM Port Network Connectivity (ATM-PNC) provides an alternative to the CSS configurations for connecting the PPN to one or more EPNs. ATM-PNC replaces the CSS in a DEFINITY R8r and later network with an ATM switch or network. ATM-PNC is available with all three DEFINITY ECS reliability options—standard, high, and critical. In addition, it offers ATM-PNC duplication.

ATM-PNC integrates delivery of voice, video, and data via ATM over a converged large-bandwidth network, providing reduced infrastructure cost and improved network manageability. ATM-PNC uses standards-based open interfaces that can be provisioned with either new or existing DEFINITY ECS systems.

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Connecting with ATM Port Networks (Not available with Category B)

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ATM-CES

ATM-CES (Circuit-Emulation Service) lets the DEFINITY ECS emulate ISDN-PRI trunks on an ATM facility. These virtual trunks can serve as integrated access, tandem, or tie trunks. ATM-CES trunk emulation maximizes port network capacities by consolidating trunking. For example, the CES interface can define up to ten virtual circuits for tie-line connectivity, consolidating onto one circuit card network connectivity that usually requires multiple circuit packs.

ATM WAN Spare Processors

An ATM WAN spare processor (WSP) provides a disaster recovery option for DEFINITY ECS G3r expansion port networks deployed over an ATM WAN. An ATM WAN WSP acts as a PPN in the event of a catastrophic failure in the network. That is, a WSP functions as a PPN if the main PPN is not functional or is not communicating to one or more of the other EPNs.

DEFINITY ECS is highly reliable, but when it overlays a converged network infrastructure, DEFINITY's reliability and availability depend on the entire infrastructure, not just its own hardware and software. ATM WAN WSPs can be placed in a DEFINITY ATM port network configuration to provide a backup arrangement of PPNs, thus maintaining the availability of DEFINITY's features and functions.

A WSP continually monitors a connection to the main PPN to determine if the PPN is actively communicating with EPNs. From 1 to 7 WSPs may be established in an ATM port network, and each is given a priority role to avoid its contending with control EPNs. Each WSP will become active if it cannot establish communications with both the main PPN and a WSP of higher priority. The WSP will wait an administered interval (from 5 to 99 minutes) and then take control within approximately 15 minutes. Although calls are not preserved while the switchover takes place, the WSP enables customers to be back in business within a reasonable amount of time.

Returning to normal operation under control of the PPN requires a manual restart sequence. When control is returned to the PPN, the WSP returns to a standby status. Calls are not preserved during the return to normal operation; you may therefore want to schedule the return to normal operation for a time when it will be least disruptive.

NOTE:

ATM WSPs cannot be used for critical reliability switches.

NOTE:

ATM WSP cannot be used with a conventional CSS.

IP Solutions

DEFINITY ECS IP Solutions brings together the flexibility of IP networks with the richness of voice communication. It allows investment protection and optimization in IP, ATM, and PSTN networks. Full applications, features, and management capabilities are carried into the IP environment. Remote workers have full access to communication system features from their PCs.

Although voice quality can and will vary based on LAN conditions, Release 9 IP Solutions offers a feature that enables users to increase the quality of voice communications. The Quality of Service feature enables users to administer and download the Differentiated Services Type-of-Service value to optimize voice quality. The Quality of Service feature reduces latency by implementing buffers in the audio-processing board and assists some routers in prioritizing audio traffic.

Release 9 IP Solutions also introduces hairpin and IP-IP direct connections, two features that make voice communications more efficient. These features increase the efficiency of voice communications by reducing both per port costs and IP bandwidth usage. Hairpin connections route the voice channel connecting two IP endpoints so that the voice goes through the media processor board in IP format, thereby bypassing the DEFINITY TDM bus. IP-IP direct connections route the voice channel connecting two IP endpoints by sending the voice directly through the LAN or WAN between the two endpoints, instead of carrying a mixed connection of IP signaling and TDM bus signaling.

[Figure 9 on page 25](#) shows the trunk and line connections available with IP Solutions.

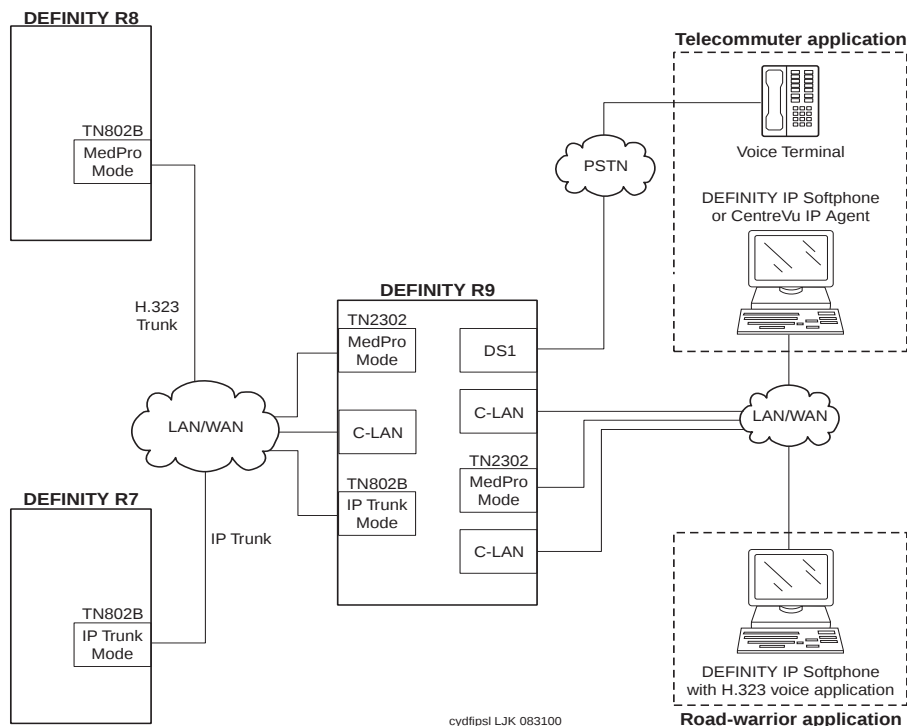


Figure 9. IP Solutions

As shown in [Figure 9](#), DEFINITY ECS IP Solutions supports IP connectivity for two types of trunks and three types of IP Softphones.

NOTE:

The Avaya R300 Remote Office Communicator (R300) also offers full access to communication system features for remote workers. For information about how the R300 is linked to DEFINITY ECS, see [Figure 10 on page 30](#).

DEFINITY ECS IP Solutions is implemented using the TN2302AP, which is an IP-media processor circuit pack inside the DEFINITY ECS. The TN2302AP IP-media processor, introduced in Release 8.3, provides H.323 trunk connections and H.323 voice processing for IP phones. The features that use the TN2302AP also require the TN799/TN799B/TN799C C-LAN circuit pack. The Release 7 IP trunk and TN2302AP H.323 trunk are not interoperable; that is, the TN2302AP H.323 in trunk mode cannot communicate with a Release 7 IP trunk. However, the TN2302AP H.323 trunk can communicate with a TN802B in MedPro mode.

Trunks

DEFINITY ECS IP Solutions supports two trunk configurations:

- H.323 Trunk
- IP Trunk

H.323 Trunk

MedPro mode supports the H.323 version 2 protocol and interoperates with H.323 version 2 endpoints, including stations, trunks, and gateways. The TN2302AP or the TN802B IP Interface in MedPro mode enables H.323 trunk service using IP connectivity between two DEFINITY ECS systems. H.323 trunk groups can be configured as DEFINITY-specific tie trunks supporting ISDN trunk features such as DCS+ and QSIG, or as generic tie trunks permitting interconnection with other vendors' H.323 v2-compliant switches, or as direct-inward-dial (DID) type of "public" trunks providing access to the switch for unregistered users. The TN2302AP or the TN802B in MedPro mode requires the TN799B for signaling.

For Release 9, the TN2302AP IP Media Processor replaces the MedPro circuit pack in DEFINITY H.323 VoIP applications.

IP Trunk

In Release 9, the IP Trunk mode will typically be chosen for interoperability with existing TN802 (as opposed to the TN802B) IP Interface circuit packs.

The IP Trunk mode allows trunk groups to be defined as DS1 tie lines between DEFINITY ECS systems over a customer's data network. Each IP Interface circuit pack in IP Trunk mode provides a basic twelve-port package that can be expanded up to a total of 30 ports.

The benefits of IP Trunk include a reduction in long distance voice and fax expenses, facilitating global communications, providing a full-function network with data and voice convergence and optimizing networks by using the available network resources.

Each TN802 and TN802B in IP Trunk mode requires a connection to a modem, an incoming line for Avaya remote access, and direct access to the NT server on the hard disk using pcANYWHERE, version 8 or later. The TN2302AP does not require connection to a modem, an incoming line, or access using pcANYWHERE. A TN802B or TN2302AP in the IP Trunk mode does not require the TN799B.

⇒ NOTE:

The H.323 trunk and the IP trunk are the only features of IP Solutions supported by Category B products. All other IP Solutions features are supported by Category A products only.

IP Softphones

DEFINITY IP Softphones operate on a PC equipped with Microsoft Windows 95/98/NT and with TCP/IP connectivity to DEFINITY ECS. Release 9 IP Softphones offer the following enhancements to information display, security, and serviceability:

- The administrator can obtain information about the connection type.
- The administrator can list registered IP stations.
- The IP endpoint capacities are based on endpoint product types.

DEFINITY IP Solutions supports four IP Softphone configurations:

- Road-warrior application (voice over IP)
- Telecommuter application (dual-connection)
- CentreVu IP Agent (dual-connection)
- Native H.323

Road-warrior application

The road-warrior application of the DEFINITY IP Softphone enables travellers to use the DEFINITY ECS feature set from temporary remote locations anywhere in the world, such as a hotel room. The road-warrior application consists of two software applications running on a PC that is connected to DEFINITY ECS over an IP network. The single network connection between the PC and DEFINITY ECS carries two channels, one for the signaling path and one for the voice path. DEFINITY IP Softphone software handles the call signaling and an H.323 V2-compliant audio application, such as Avaya iClarity, which runs in the background, handles the voice communications. The user places and receives calls via the IP Softphone interface on the PC and uses a headset or handset connected to the PC (or the PC's microphone and speakers) to speak and listen.

On DEFINITY ECS, the road-warrior application of the IP Softphone requires the TN799B (C-LAN) for signaling and the TN802B or TN2302AP IP Interface circuit pack assembly running in MedPro mode for voice processing. Each VoIP Softphone requires the administration of two stations — an H.323 station and one of the types of DCP station.

Telecommuter application

The telecommuter application of the DEFINITY IP Softphone enables telecommuters to use the full DEFINITY ECS feature set from home. It consists of a PC and a telephone with separate connections to DEFINITY ECS. The PC is connected to DEFINITY ECS over an IP network to provide the signaling path. The PC runs the DEFINITY IP Softphone software to provide the user interface for call control. A standard telephone is connected to DEFINITY ECS over the public switched telephone network (PSTN) to provide a high-quality voice path. The user places and receives calls via the IP Softphone interface on the PC and uses the telephone handset to speak and listen.

On DEFINITY ECS, the telecommuter application of the IP Softphone requires the TN799B (C-LAN) for signaling. The TN802B or TN2302AP IP Interface is not used for the telecommuter application. Each instance of the telecommuter application requires the administration of the set that will be emulated.

CentreVu IP Agent

The DEFINITY CentreVu IP Agent is a variation of the telecommuter application. The CentreVu IP Agent emulates an Avaya set and provides use of the call end capabilities required for Call Center operations from a remote location, such as the agent's home.

Native H.323

This is an IP-connected softphone running off-the-shelf H.323 software. It operates as a single-line phone with limited features, which are activated by Feature Access Codes.

Avaya R300 Remote Office Communicator (R300)

The DEFINITY R300 feature offers a cost-effective method for providing full functionality at a remote site. The remote telephony available through the R300 has all the capabilities of telephony that is connected directly. Because voice and data can share the same WAN link between the DEFINITY and the remote site, the R300 provides voice and data convergence.

The R300 acts like a simple switch at the remote site for connections between remote stations and local access trunks. It is a rack-mounted box that features two expansion slots. One slot houses a DSP blade for VoIP support; the other slot houses a new combo blade that supports the DCP as well as the analog line and trunk connections. The R300 supports 12 remote dial access data channels, up to 24 DCP sets, and 2 analog lines from a host DEFINITY. A single DEFINITY switch can support multiple R300 units, as shown in [Table 3](#).

Table 3. R300 Units Supported by DEFINITY

DEFINITY Model	Maximum Number of R300 Units Supported
r	250
si	80
csi	80
DEFINITY One (cfs)	16

The R300 can support the 12/BRI, 24/T1, or 30/E1 data modems for remote access to either the local or the host LAN. The R300 terminates at the local LAN and supports local PSTN connections that use the following methods:

- [2 T1 + T1 drop-and-insert]
- [2E1]
- [6 BRI U/ST V.35 serial port connections]

Typically, the host DEFINITY is linked to the R300 as shown in [Figure 10](#).

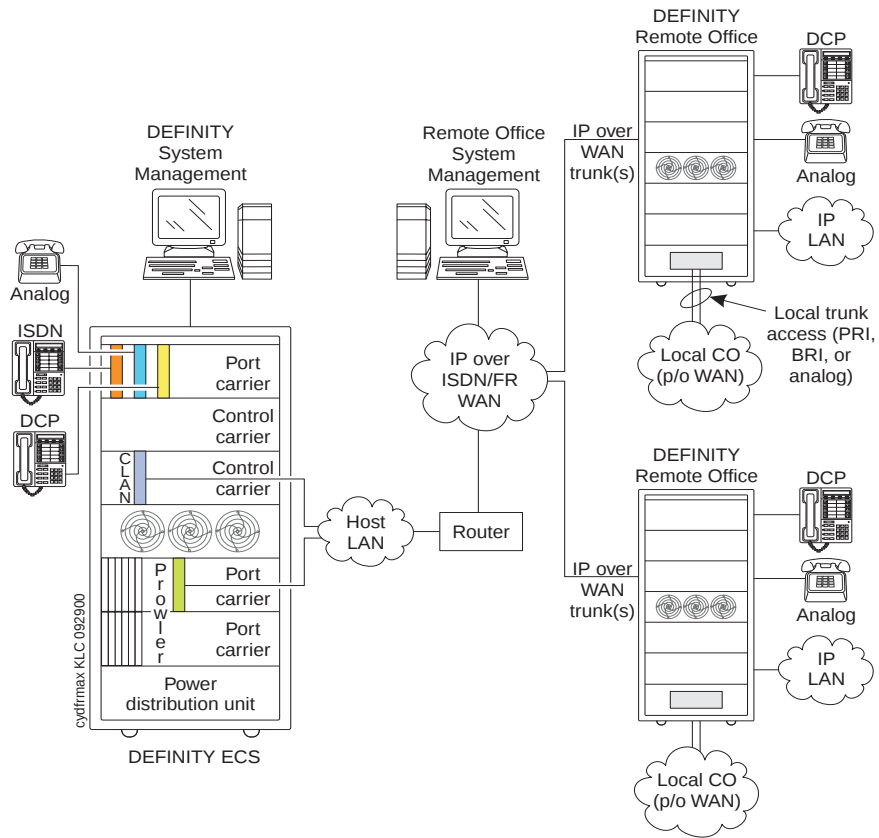


Figure 10. Avaya R300 Remote Office Communicator

International Requirements

The DEFINITY system complies with the regulations of many countries and supports a wide range of languages, including user-defined languages. These are a few examples of the country-specific features that are available:

- Terminal-display language
- Tone plans and customizable tones (within selected tone plan)
- Transmission, conference-loss, and tone-loss plans
- Ringing
- 12- or 16-kHz periodic pulse metering (PPM)
- A-Law or μ -Law companding
- ISDN and non-ISDN, bit-oriented digital protocols
- Analog, line and trunk port impedances
- Gain and loss characteristics
- 1.544-Mbps T1 and CEPT 2.048-Mbps E1 protocols
- DS1 port administration (DS1 framing, signaling, line coding, and companding on CEPT trunks).

The switch has many other non-USA features.

2—Site Requirements

This section describes the wall and floor area, and loading specifications for various DEFINITY ECS cabinets.

Floor Area

For maintenance access, floor plans typically allocate space around the front, ends, and rear of the cabinets. Floor area requirements vary between cabinets. Dimensions and clearances for all cabinet configurations are listed in [Table 4](#).

Table 4. Cabinet Dimensions and Clearances

Cabinet Type	Height	Width	Depth	Clearance
Compact Modular 1-cabinet	25.5 in. (64.8 cm)	24.5 in. (62.2 cm)	12 in. (30.5cm)	Left, Right, and Front 12 in. (30.5 cm)
2-cabinets	51 in. (129.6 cm)	24.5 in. (62.2 cm)	12 in. (30.5 cm)	
3-cabinets	76.5 in. (194.4 cm)	24.5 in. (62.2 cm)	12 in. (30.5 cm)	

Continued on next page

Table 4. Cabinet Dimensions and Clearances — Continued

Cabinet Type	Height	Width	Depth	Clearance
Single-Carrier 1-cabinet	20 in. (51 cm)	27 in. (69 cm)	22 in. (56 cm)	38 in. (97 cm) between cabinet and wall
2-cabinets	39 in. (99 cm)	27 in. (69 cm)	22 in. (56 cm)	
3-cabinets	58 in. (1.5 m)	27 in. (69 cm)	22 in. (56 cm)	
4-cabinets	77 in. (2 m)	27 in. (69 cm)	22 in. (56 cm)	
Multi-Carrier ¹	70 in. (1.8 m)	32 in. (81 cm)	28 in. (71 cm)	Rear 38 in. (97 cm) Front 36 in. (91 cm)
Cable slack manager ²	7 in. (18 cm)	32 in. (81 cm)	38 in. (97 cm)	
DC power cabinet ³	20 in. (51 cm)	27 in. (69 cm)	22 in. (56 cm)	38 in. (97 cm) Front and Rear

Continued on next page

Table 4. Cabinet Dimensions and Clearances — Continued

Cabinet Type	Height	Width	Depth	Clearance
Large battery cabinet				38 in. (97 cm)
100 Amp	27 in. (69 cm)	55 in. (140 cm)	21 in. (53 cm)	Front and Rear
200 Amp	42 in. (107 cm)	55 in. (140 cm)	21 in. (53 cm)	
300 Amp	42 in. (107 cm)	55 in. (140 cm)	21 in. (53 cm)	
400 Amp	57 in. (145 cm)	55 in. (140 cm)	21 in. (53 cm)	

1. Includes the auxiliary cabinet, the global AC cabinet, and the global DC cabinet.
2. Used with Multi-Carrier and Single-Carrier cabinets.
3. Requires a floor area of 8 square feet (0.74 square m). Also requires 38 in. (97 cm) between cabinet and wall.

Floor Load Requirements

The equipment room floor must meet the commercial floor loading code of at least 50 lbs. per square foot (242 kg per square meter). Floor plans typically allocate space around the front, ends, and rear (if necessary) of the cabinets, for maintenance access. Additional equipment room floor support may be required if the floor load is greater than 50 lbs. per square foot (242 kg per square meter). See the table below.

Table 5. Cabinet Weights and Floor Loadings

Type	Weight	Floor Loading	Remarks
Compact Modular	50 lb. (22.7 kg)		Typically wall mounted. However, if there is only one cabinet, then it can be floor-mounted.
Single-Carrier	125 lb. (56 kg)	31 lb./sq. ft. (148.9 kg/m ²)	
Multi-Carrier	200-800 lb. (90-363 kg)	130 lb./sq. ft. (624.2 kg/m ²)	Includes Auxiliary, Global AC and Global DC cabinets
100-Amp battery	400 lb. (181 kg) max.	180 lb./sq. ft. (871.2 kg/m ²)	
200-Amp battery	815lb. (370 kg) max.	328 lb./sq. ft. (1587.5 kg/m ²)	
300-Amp battery	1480 lb. (671 kg) max.	476 lb./sq. ft. (2303.8 kg/m ²)	
400-Amp battery	1580 lb. (717 kg) max.	625 lb./sq. ft. (3025 kg/m ²)	

Floor-Plan Guidelines

DEFINITY ECS floor plans vary with the size and shape of the equipment room and the extent of future growth. Future growth includes a new or upgraded system, adjuncts and peripherals, and the cross-connect field. See [“Cross-Connect Field” on page 47](#).

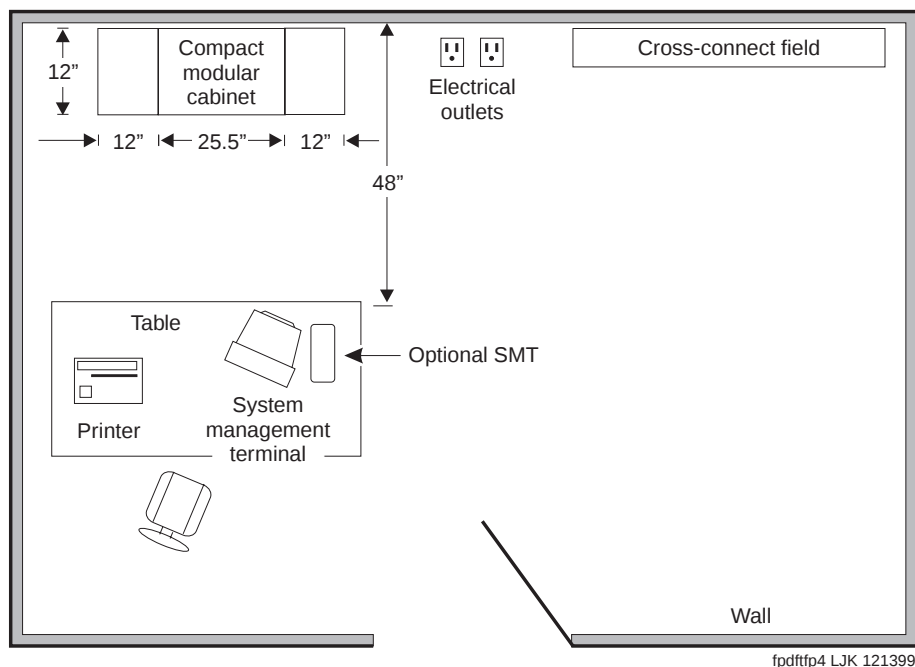
For floor standing cabinets, reserve the area behind a cabinet for the cross-connect field and the cable slack manager. For wall mounted cabinets, reserve the area beside the cabinets for the cross-connect field. [Figure 11 on page 38](#) through [Figure 16 on page 45](#) show typical floor plans. All dimensions are shown in inches. Refer to [Table 12 on page 58](#) for power requirements.

Compact Modular Cabinet (CMC) Configuration Guidelines

The cross-connect field is either to the rear or right of the cabinet. To allow service access, the table for the management terminal and printer, which are optional, is away from the equipment area. See [Figure 11 on page 38](#) and [“Table Area” on page 46](#) for requirements. In an installation where no cross-connect field is present, an cross-connect field can be installed in the CMC right panel.

The following steps are pre-installation guidelines:

1. Locate the power outlets outside the cross-connect field area. The outlets must not be controlled by a wall switch or be shared with other equipment.
2. Locate the trunk/auxiliary field inside the cross-connect field, if desired.
3. Ground the system. See [“Approved Grounds” on page 68](#).
4. Each cabinet requires either: NEMA 5-15R receptacle (or equivalent) for United States installations or local IEC 320 cord set (or equivalent) for non-United States installations.



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Figure 11. Typical Compact Modular Cabinet Floor Plan

NOTE:

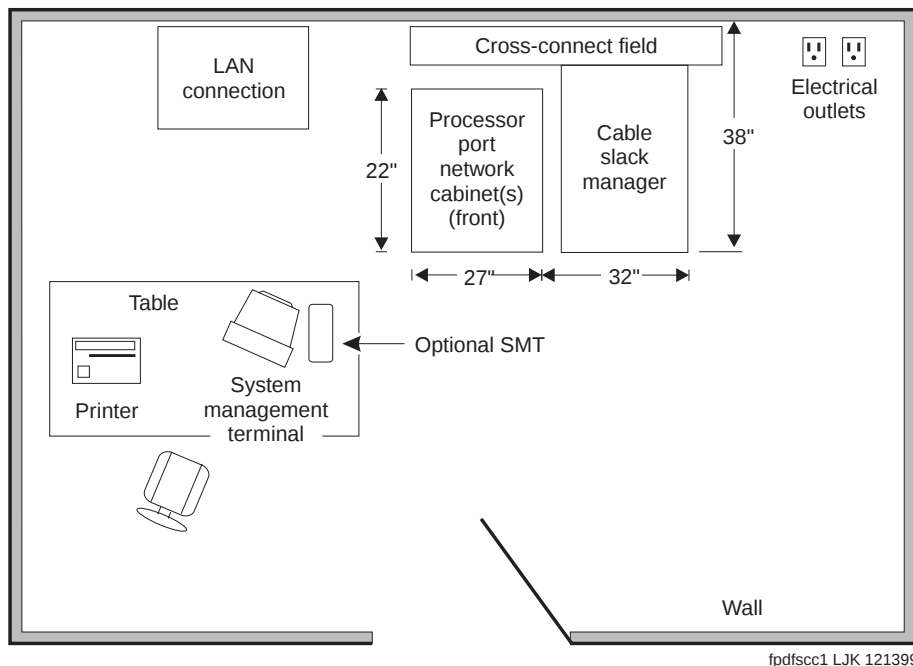
To provide power for testing equipment and peripherals, locate electrical outlets at intervals that are in accordance with local codes. Also, ensure that you locate the main shutoff switch near the door in accordance with local codes.

Single-Carrier Cabinet Configuration Guidelines

The cross-connect field can be directly behind the cable slack manager. To allow service access, the table for the management terminal and printer, which are optional, is away from the equipment area. See [Figure 12 on page 40](#) and ["Table Area" on page 46](#) for requirements.

The following steps are pre-installation guidelines:

1. Locate the power outlets outside the cross-connect field area. The outlets must not be controlled by a wall switch or be shared with other equipment.
2. Locate the trunk/auxiliary field inside the cross-connect field, if desired.
3. Ground the system. See ["Approved Grounds" on page 68](#).
4. For fiber connections between PNs, use a 20-foot (6.1 m) multimode fiber optic cable.
5. Install earthquake protection (if required). See ["Earthquake Protection" on page 76](#).
6. Each cabinet requires either: NEMA 5-15R, NEMA 5-20R receptacle (or equivalent) for United States installations or local cord set (or equivalent) for non-United States installations.



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Figure 12. Typical Single-Carrier Cabinet Floor Plan

NOTE:

To provide power for testing equipment and peripherals, locate electrical outlets at intervals that are in accordance with local codes. Also, ensure that you locate the main shutoff switch near the door in accordance with local codes.

Multi-Carrier Cabinet Configuration Guidelines

The cross-connect field is directly behind the cable slack manager. To allow service access, the table for the management terminal and printer, which are optional, is away from the equipment area. See [Figure 13 on page 42](#) and ["Table Area" on page 46](#) for requirements. The following steps are pre-installation guidelines:

1. Locate the power outlets outside the cross-connect field area. The outlets must not be controlled by a wall switch or be shared with other equipment.
2. For the PPN cabinets, use either a NEMA 5-50R receptacle (or equivalent) or a NEMA L14-30R receptacle (or equivalent) power outlet or: 220 VAC, 50-60 Hz power outlet for the Global AC Cabinet.
3. For the Auxiliary Cabinet, use a NEMA 5-20R receptacle (or equivalent).
4. Allow at least 3 feet (91.4cm) of space in front of the cabinet to permit the door to open.
5. Ground the system. See ["Approved Grounds" on page 68](#).
6. Install earthquake protection (if required). See ["Earthquake Protection" on page 76](#).
7. Locate the LAN connection field inside the cross-connect field, if desired.
8. Fiber connections between PNs use a 20-foot (6.1 m) multimode fiber optic cable.

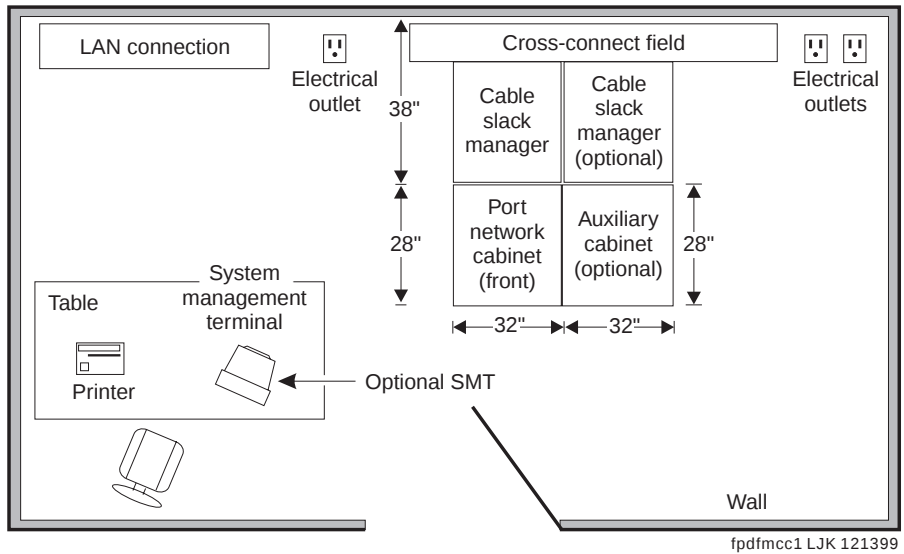


Figure 13. Typical Multi-Carrier Cabinet Floorplan

NOTE:

To provide power for testing equipment and peripherals, locate electrical outlets at intervals that are in accordance with local codes. Also, ensure that you locate the main shutoff switch near the door in accordance with local codes.

Additional Floor Plans

The following floor plans illustrate recommendations for other possible installations. See [Figure 14](#), [Figure 15 on page 44](#), [Figure 16 on page 45](#), and [Figure 17 on page 46](#).

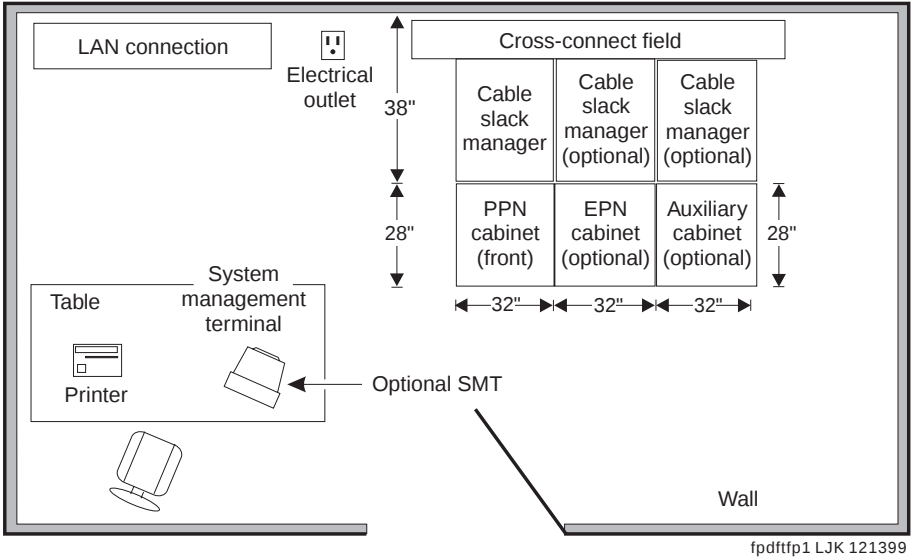


Figure 14. Typical Floor Plan with EPN and Auxiliary Cabinet

NOTE:
To provide power for testing equipment and peripherals, locate electrical outlets at intervals that are in accordance with local codes. Also, ensure that you locate the main shutoff switch near the door in accordance with local codes.

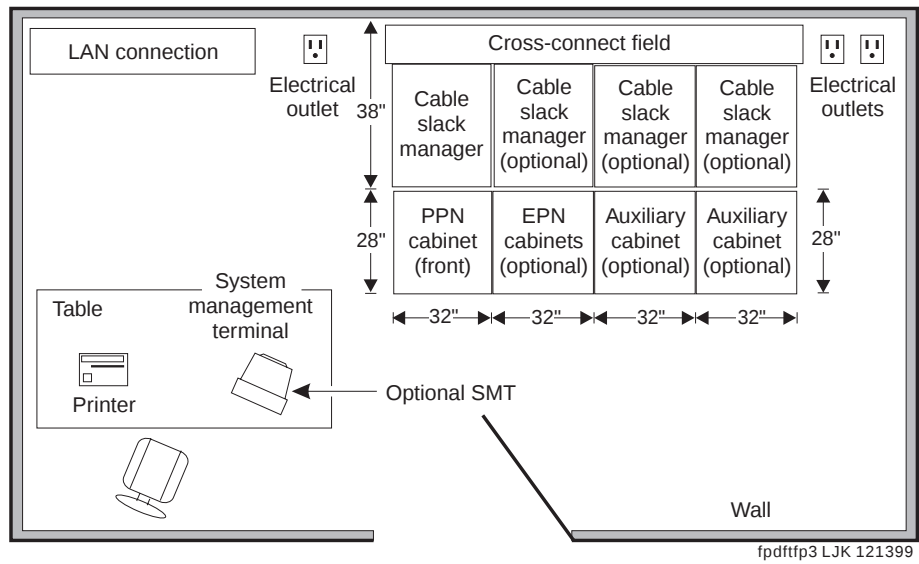


Figure 15. Typical Floor Plan with an additional EPN and Auxiliary Cabinets

NOTE:

To provide power for testing equipment and peripherals, locate electrical outlets at intervals that are in accordance with local codes. Also, ensure that you locate the main shutoff switch near the door in accordance with local codes.

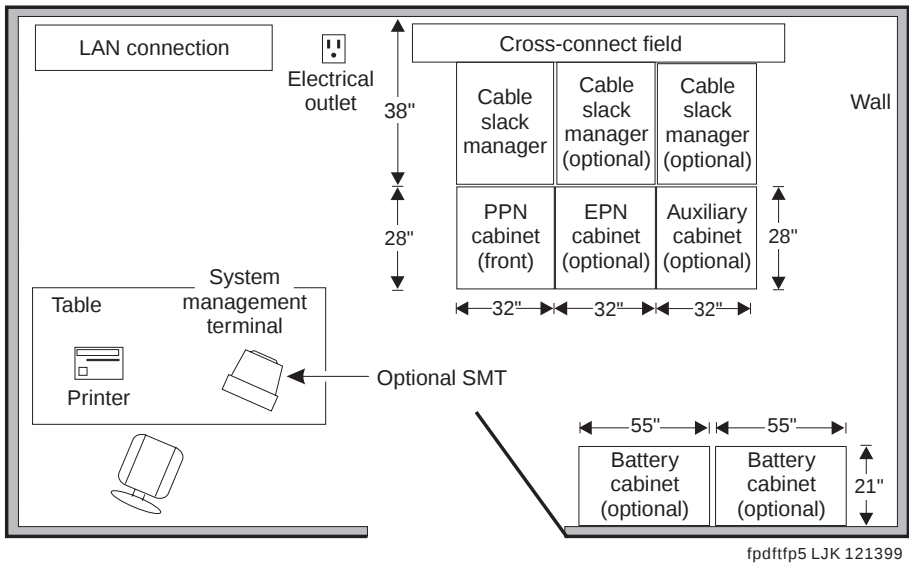


Figure 16. Typical Floor Plan with Battery Cabinets

NOTE:
To provide power for testing equipment and peripherals, locate electrical outlets at intervals that are in accordance with local codes. Also, ensure that you locate the main shutoff switch near the door in accordance with local codes.

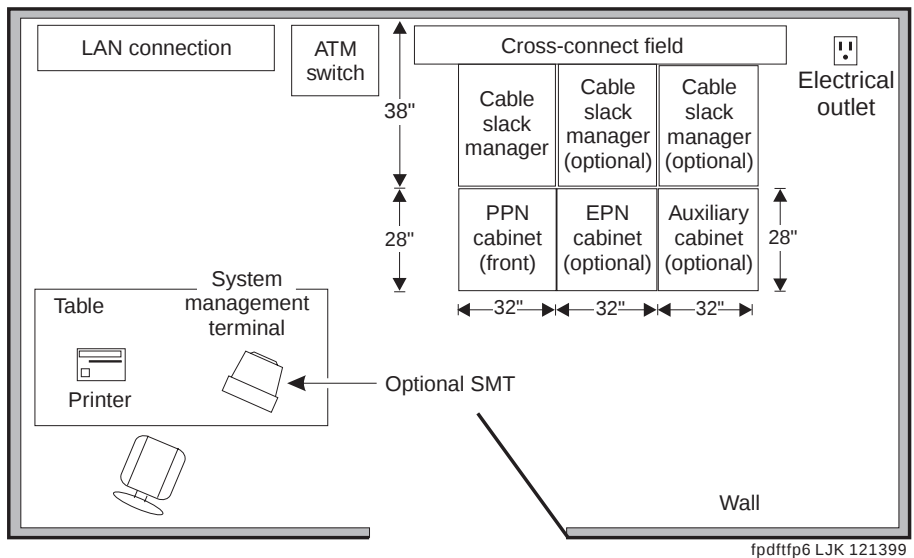


Figure 17. Typical Floor Plan with ATM Switch (Not available with Category B)

NOTE:

To provide power for testing equipment and peripherals, locate electrical outlets at intervals that are in accordance with local codes. Also, ensure that you locate the main shutoff switch near the door in accordance with local codes.

Table Area

Reserve the table area in the equipment room for the optional management terminal and printer, if so equipped. Terminals require approximately 3.2 square feet (0.3 square m) of area.

Cross-Connect Field

The cross-connect field equipment is located a specified distance from the DEFINITY cabinets and must meet specific requirements. An optional cross-connect field can be installed in the CMC right panel.

For new installations, Avaya personnel may install the cross-connect field. For more details about the cross-connect field and other site requirements, refer to the following documents:

- *DEFINITY Communications System Generic 1 and Generic 3 Main Distribution Field Design*, 555-230-630
- *DEFINITY Communications System Generic 3 Planning and Configuration*, 555-230-601



NOTE:

The cross-connect field is wired to the external environment (trunks and lines outside of the building) by telephone company personnel.

Environmental Considerations

This section details the environmental considerations for the Multi-Carrier and Single-Carrier cabinets. For information about the DEFINITY Wireless Business System, refer to [Appendix A](#).

Heat Dissipation

Typical heat dissipation Compact Single-Carrier, Single-Carrier, Multi-Carrier are shown in [Table 6 on page 48](#).

Table 6. Typical Heat Dissipation for Various Cabinet Configurations

Cabinet type	Number in Stack	With Terminals?	Gram-Cals./ Hour	BTUs/Hour	Watts
Compact Modular	1	No	810 kg	202	234
		Yes	1500 kg	378	439
Single-Carrier	1	Yes	1700 kg	438	499
	4 (max.)	Yes	5700 kg	1436	1672
Multi-Carrier	1	No	4200 kg	1058	1232
		Yes	6600 kg	1662	1935
	3	Yes	570	2285	660

Altitude and Air Pressure

At altitudes above 5,000 feet (1,525 meters), the maximum short-term temperature limit reduces by 1° Fahrenheit for each 1,000 feet (305 meters) of elevation above 5,000 feet (1,525 meters). For example: at sea level, the maximum short-term temperature limit is 120° F (49° Celsius). At 10,000 feet (3,050 meters), the maximum short-term temperature limit is 115° F (46° C).

The normal operating air pressure range is: 9.4 to 15.2 psi (lbs. per sq. in.) (648 to 1,048 millibars).

Temperature and Humidity

Install the equipment in a well-ventilated area. Maximum equipment performance is achieved at an ambient room temperature between 40 and 120° F (4° and 49° C) for short term operation (not more than 72 consecutive hours or 15 days in a year) and up to 110° F (43° C) for continuous operation.

The relative humidity range is 10 to 95% at up to 84° F (29° C). Above this, maximum relative humidity decreases from 95% down to 32% at 120° F (49° C). Installations outside these limits may reduce system life or affect operation. The recommended temperature and humidity range is 65° to 85° F (18° to 29° C) at 20 to 60% relative humidity. See [Table 7](#).

Table 7. Temperature and Relative Humidity

Room Temperature (Degrees Fahrenheit)	Room Temperature (Degrees Celsius)	Relative Humidity (%)
40 to 84	4.4 to 28.8	10 to 95
86	30.0	10 to 89
88	31.1	10 to 83
90	32.2	10 to 78
92	33.3	10 to 73
94	34.4	10 to 69
96	35.6	10 to 65
98	36.7	10 to 61
100	37.8	10 to 58
102	38.9	10 to 54
104	40.0	10 to 51
106	41.1	10 to 48
108	42.2	10 to 45
110	43.3	10 to 43
112	44.4	10 to 40
114	45.6	10 to 38
116	46.7	10 to 36
118	47.8	10 to 34
120	48.9	10 to 32

Air Purity

The Compact Modular Cabinet, Single-Carrier and Multi-Carrier Cabinets contain an air filter to reduce particulates flowing through the equipment. Do not install the cabinet where the air may be contaminated by excessive dust, lint, carbon particles, paper fiber contaminants, or metallic contaminants. For example, do not install the cabinet near paper handling equipment such as copiers and high-speed printers, which introduce paper dust and print particles into the environment. Corrosive gases above the levels in [Table 8](#) must be avoided.

Table 8. Allowable Concentrations for Atmospheric Contaminants

Contaminant	Average Concentration Not to Exceed
All particulate matter	185 micrograms/cubic meter
Nitrate	12 micrograms/cubic meter
Total hydrocarbons equivalent to methane	10 ppm (parts per million)
Sulphur dioxide	0.20 ppm (parts per million)
Oxides of nitrogen	0.30 ppm (parts per million)
Total oxidants equivalent to ozone	0.05 ppm (parts per million)
Hydrogen sulfide	0.10 ppm (parts per million)

Lighting

Lighting must be bright enough to allow personnel to perform their tasks. The recommended light intensity is 50 to 70 footcandles (538 to 753 lumens/m²) to meet the Occupational Safety and Health Act (OSHA) standards.

Radio Frequency Noise

Noise is introduced into the system through trunk or station cables, or both. Electromagnetic fields near the system control equipment may cause system noise. Place the system and cable runs in areas where high electromagnetic field strengths do not exist. Radio transmitters (AM or FM), television stations, induction heaters, motors with commutators of 0.25 horsepower (187 watts) or greater, and similar equipment are leading causes of interference.

Small tools with universal motors are generally not a problem when they operate on separate power lines. Motors without commutators generally do not cause interference. Field strengths below 1.0 volt per meter are unlikely to cause interference.

Measure weak fields with a tunable meter. Measure field strengths greater than 1.0 volt per meter with a broadband meter.

Estimate field strengths of radio transmitters by dividing the square root of the emitted power in kilowatts by the distance from the antenna in kilometers. This yields the approximate field strength in volts per meter and is relatively accurate for distances greater than about half a wavelength (150 meters for a frequency of 1000 kHz).

Acoustic Noise Generated by Cabinets

Acoustic noise levels are provided below. In all types of cabinet configurations, if the system cabinet door is open, there is an additional 1 dBA (decibels measured acoustically) of noise. [Table 9](#) lists some typical noise figures for various cabinet combinations.

Table 9. Noise Generated by Cabinets

Cabinet Type	Operating Condition	Additional Noise Generated	At Distance
Multi-Carrier	Running, low-fan speed	51 dBA	5 ft. (1.5 m)
	Running, high-fan speed	56 dBA	5 ft. (1.5 m)
	Tape drive reading data	2 dBA	5 ft. (1.5 m)
	Tape drive fast-winding	1 dBA	5 ft. (1.5 m)
Single-Carrier	1 cabinet	48 dBA	5 ft. (1.5 m)
Single-Carrier	2 cabinets	2 dBA (50 dBA total)	5 ft. (1.5 m)
	3 cabinets	4 dBA (52 dBA total)	5 ft. (1.5 m)
	4 cabinets	5 dBA (53 dBA total)	5 ft. (1.5 m)

Electromagnetic Compatibility Standards

This product complies with and conforms to the following EMC standards (as applicable):

- Limits and Methods of Measurements of Radio Interference Characteristics of Information Technology Equipment, EN55022 (CISPR22), 1993
- EN50082-1, European Generic Immunity Standard
- FCC Part 15
- Australia AS3548



NOTE:

The DEFINITY system conforms to Class A (industrial) equipment. Voice terminals meet Class B requirements.

- Electrostatic Discharge (ESD) IEC 1000-4-2
- Radiated radio frequency field IEC 1000-4-3
- Electrical Fast Transient IEC 1000-4-4
- Lightning effects IEC 1000-4-5
- Conducted radio frequency IEC 1000-4-6
- Mains frequency magnetic field IEC 1000-4-8
- Low frequency mains disturbance IEC 1000-4-11

European Union Standards

Avaya Business Communications Systems declares that the DEFINITY equipment specified in this document bearing the "CE" mark conforms to the European Union Electromagnetic Compatibility Directives.

The "CE" (Conformité Européenne) mark indicates conformance to the European Union Electromagnetic Compatibility Directive (89/336/EEC), Low Voltage Directive (73/23/EEC), and Telecommunication Terminal Equipment (TTE) Directive (91/263/EEC) and with i-CTR3 Basic Rate Interface (BRI) and i-CTR4 Primary Rate Interface (PRI) as applicable.

The "CE" mark is applied to the following products:

- Global AC-powered Multicarrier Cabinet (MCC) with 25-Hz and 50-Hz ring generator
- DC-powered Multicarrier Cabinet (MCC) with 25-Hz ring generator
- AC-powered Enhanced Single-Carrier Cabinet (ESCC) with 25-Hz ring generator
- AC-powered Compact Single-Carrier Cabinet (CSCC) with 25-Hz ring generator
- AC-powered Compact Modular Cabinet (CMC) with 25-Hz and 50-Hz ring generator (for France)
- Enhanced DC Power System

Cabinet Power Requirements

This section describes cabinet AC- and DC-power source requirements.

Global AC MCC Power Supply

With Release 9, the DEFINITY Global MCC (GMCC) power supply, which was introduced for international systems in Release 5, becomes a global offering that applies to both US and international systems. It replaces the existing AC MCC cabinet configuration used in the US, thereby reducing the number of power supplies and distribution units associated with the MCC platform.

The GMCC automatically accepts 200- to 240-volt AC power at 50 or 60 Hz. It complies with all emissions and safety requirements for customer applications worldwide. The power system consists of NP850 Rectifiers, 649A Power Supplies, one Battery Interface/Alarm Unit, battery connections, and alarm outputs. The NP850 Rectifiers are cabinet-level power units located in the power distribution unit at the bottom of the MCC. The 649A Power Supplies are DC/DC converters that provide carrier-level power. The cabinet input cord is NEMA 6-30P in the US.

The GMCC power architecture offers both short- and long-term power backup. Batteries internal to the MCC provide short-term backup. External battery cabinets provide long-term backup. Because of its long-term power backup capabilities, the GMCC significantly reduces or eliminates the need for UPS and DC Battery Plants for most customer applications.

AC Power

Power feeders from a dedicated AC-power source (usually located outside the building) connect to an AC-load center. These feeders do not power other equipment. The AC-load center distributes the power to receptacles. The power cord from the AC-power distribution unit in each multicarrier cabinet and AC-power supply in each single-carrier cabinet plugs into a receptacle.

60 Hz Power Sources in G3 Systems

Each of the following power sources can supply 60-Hz power to the AC load in R7 and later systems:

- Single-phase, 4-wire, 120/240 VAC. See [Figure 18](#).
- Three-phase, 5-wire, 208 VAC. See [Figure 19 on page 55](#).

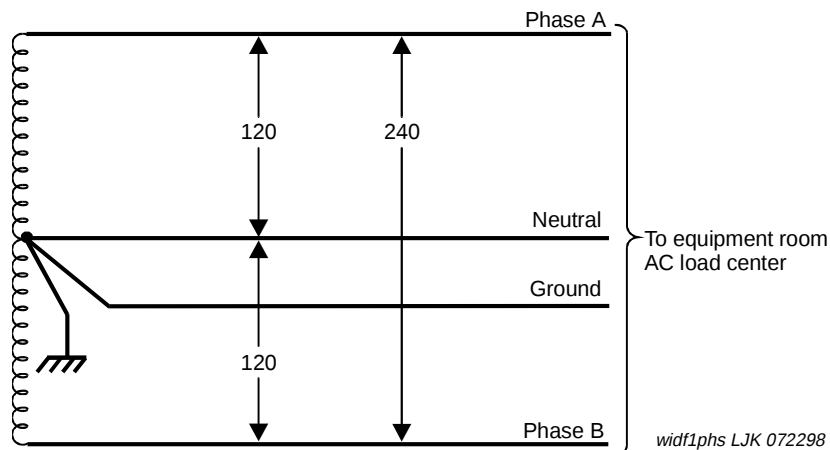


Figure 18. Single-Phase, 120/240 VAC, 60 Hz Source

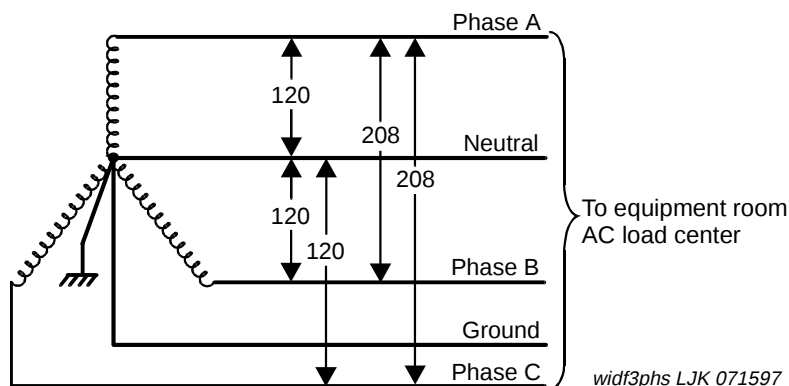


Figure 19. Three-Phase, 120/208 VAC, 60 Hz Source

50 Hz Power Sources in G3 Systems

Either of the following power sources can supply 50-Hz power to the AC- load in R7 and later systems:

- International 5-wire, Y, 220/380 VAC. See [Figure 20 on page 56](#).
- International Delta, 3-wire, 220 or 240 VAC. See [Figure 21 on page 56](#).

NOTE:

The type of power for a Multi-Carrier Cabinet is shown on the cabinet's rear door, a Single-Carrier Cabinet is shown on the cabinet's rear cover, and a Compact Modular Cabinet is shown on the right door.

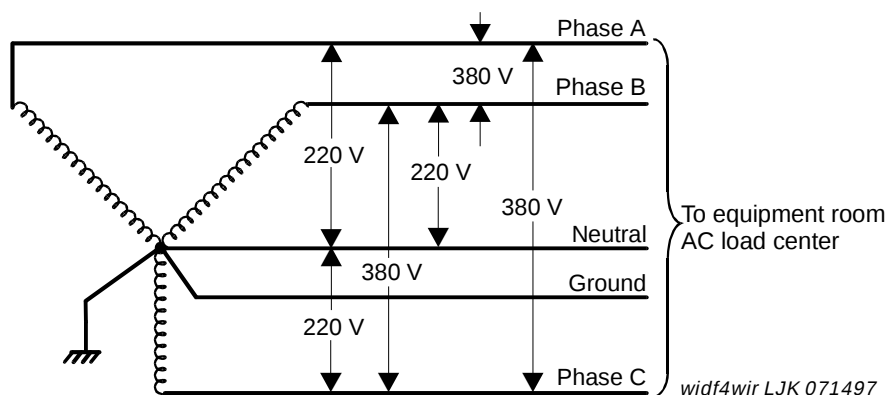


Figure 20. International, Three Phase, 220/380 VAC, 50-Hz Source

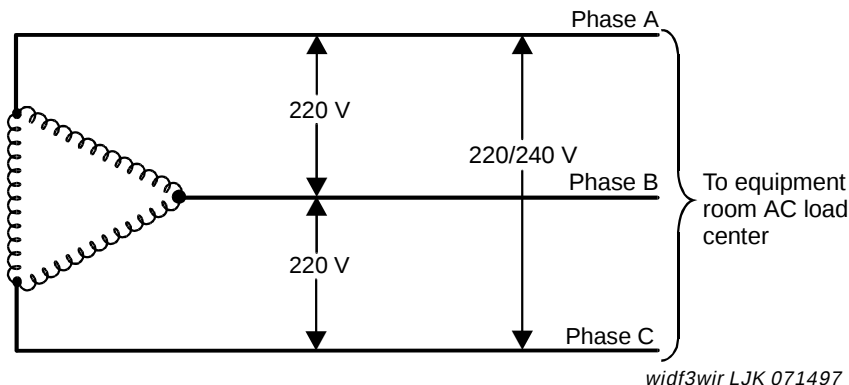


Figure 21. International Delta, 220 or 240 VAC, 50-Hz Source

Table 10 on page 57 lists the AC-power sources that can supply power to an AC-load in a cabinet. A NEMA receptacle (or equivalent) connects to the wires from the unit. The AC power cord from the power input of each unit plugs into a receptacle.

Contact your Avaya representative for the list number of each power source application.

Table 10. Cabinet AC Power Sources

Cabinet Style and Power Distribution Unit	Power Sources	Power Input Receptacles
Compact Modular Cabinet AC power supply (650A)	Single phase 120 VAC with neutral	120 VAC, 60 Hz NEMA 5-15R
	Single phase 240 VAC with neutral	240 VAC, 50 Hz IEC 320 Japan installs use country specific receptacles for 100 and 200 VAC, 50/60 Hz
Multi-Carrier Cabinet AC power distribution (J58890CE-1 and J58890CE-2)	Single phase 120 VAC with neutral	120 VAC, 60 Hz NEMA 5-50R
	Single phase 240 VAC with neutral, or single phase of 3-phase, 208 VAC with neutral	208/240 VAC, 60 Hz NEMA L14-30R
Multi-Carrier Cabinet AC Power distribution (J58890CH-1)	Single phase 176-264 VAC	200-240 Volts, 50-60 Hz NEMA L6-30R. Installations outside the United States require a receptacle suitable for use in the country of installation.
Single-Carrier Cabinet AC power supply (1217A)	Single phase 120 VAC with neutral	120 VAC, 60 Hz NEMA 5-20R or 5-15R
	Single phase of 220 VAC or Single phase of 240 VAC	220/240 VAC at country-specific receptacle

DC Power

DC-powered cabinets containing a J58890CF power distribution unit require a -42.5 to -56 VDC source at up to 75 A. Refer to [“Multi-Carrier Cabinet Power System” on page 59](#).

Refer to [“Single-Carrier Cabinet Power Systems” on page 71](#) for DC-power information.

For DEFINITY Wireless Business System power requirements, refer to [Appendix A](#).

AC and DC Load Center Circuit Breakers

The circuit breaker sizes for all AC- and DC-powered cabinets are listed in [Table 11](#) and [Table 12](#).

Table 11. Circuit Breakers for AC-Powered Cabinets

Cabinet Type	Circuit Breaker Size
Compact Modular Cabinet (120 VAC) 60 Hz	15 A
Compact Modular Cabinet (240 VAC) 50 Hz	10 A
Multi-Carrier Cabinet (120 VAC) 60 Hz	50 A
Multi-Carrier Cabinet (208 VAC) 60 Hz	30 A
Multi-Carrier Cabinet (240 VAC) 60 Hz	30 A
Multi-Carrier Cabinet (200-240 VAC) 50-60 Hz	30 A
Single-Carrier Cabinet (120 VAC)	15 or 20 A
Auxiliary cabinet (120 VAC)	20 A

Table 12. Circuit Breakers for DC-Powered Cabinets

Cabinet Type (-48 VDC)	Circuit Breaker Size
Multi-Carrier Cabinet	75 A
Single-Carrier Cabinet	25 A
Auxiliary cabinet	20 A

Multi-Carrier Cabinet Power System

These power systems consist of an AC- or DC-power distribution unit in the bottom of each cabinet and cabling to distribute output voltages to power unit circuit packs in the carriers. These power systems also consist of power-converter circuit packs in the carriers supplying DC- power to the circuit pack slots. [Chapter 3](#) describes the AC-version 631DA1 and 631DB1 power units and the DC-version 644A, 645B, and 649A power converters.

[Table 13](#) lists the input and output voltages of power unit circuit packs in the carriers of Multi-Carrier Cabinets.

Table 13. Power Units in Multi-Carrier Cabinets

Model	Inputs			Outputs		
	120 VAC	144VDC	-48 VDC	+5 VDC 60 A	-5 VDC 6 A	-48 VDC 8 A
AC 631DA1	yes	yes	no	yes	no	no
AC 631DB1	yes	yes	no	no	yes	yes
DC 644A	no	no	yes	yes	no	no
DC 645B	no	no	yes	no	yes	yes
DC 649A	no	no	yes	yes	yes	10 A

AC and DC Power Distribution

A typical AC-power distribution unit for a Multi-Carrier Cabinet contains the circuit breakers, ring generator, optional batteries, and optional battery charger. The power distribution cables carry 120 VAC during normal operation and 144 VDC from optional batteries if AC power fails. Another cable connects 120 VAC to the battery charger.

DC-powered cabinets require a -42.5 to -56 VDC source at up to 75 A.

AC Power Distribution

Figure 22 shows an AC Power Distribution Unit and Battery Charger (J58890CE-2 List 15 or later). This unit sits at the bottom of some Multi-Carrier Cabinets.

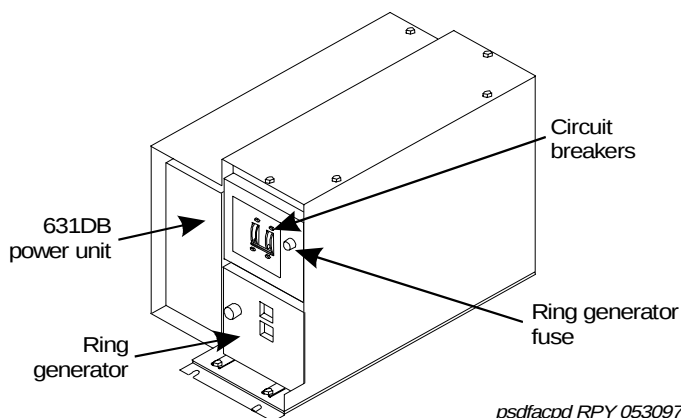
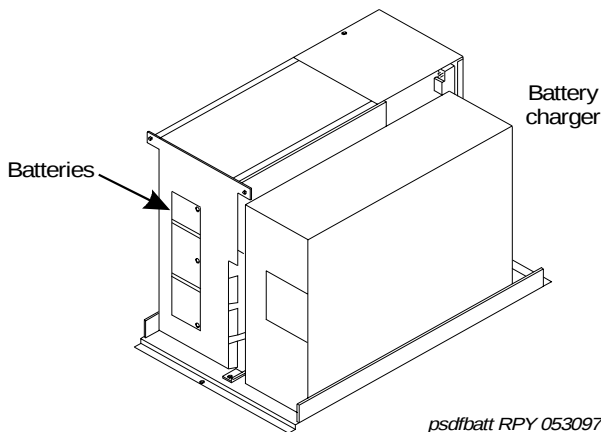


Figure 22. AC Power Distribution Unit (J58890CE-2) (Front)

The AC-Power Distribution Unit contains the following additional components not shown in the figure:

- Electromagnetic Interference (EMI) filter
- AC input fuse
- 5 circuit breakers (1 for each carrier)
- 20-amp fuses
- Signal connector
- -48 VDC fan power

The optional battery charger (List 11) sits at the bottom of some multicarrier cabinets. See Figure 23 on page 61.



psdfbatt RPY 053097

Figure 23. Battery Charger (Optional Part of J58890CE-2) (Front)

The battery charger is used only without an Uninterruptible Power Supply (UPS). The charger contains:

- Three 48-VDC batteries for backup power to the cabinet
- A DC-power relay to switch the batteries into the power circuit if a main power failure is detected

Circuit Breaker

The circuit breaker protects the AC input power to the cabinet and serves as the main AC input disconnect switch. The circuit breaker has 2 poles for 120 VAC or 3 poles for 208/240 VAC. If a problem develops, the circuit breaker automatically trips (opens) and removes the AC power input.

48-VDC Batteries

The 3 series-connected 48-VDC batteries produce a nominal 144 VDC, fused at 20 A. The batteries trickle-charge from the battery charger.

Battery Charger

When AC power restores after an outage, the battery charger converts a 120 VAC input to a DC voltage that recharges the batteries (usually within 24 hours).

DC Power Relay

This relay disconnects the batteries from a system when using AC power. The relay also disconnects the batteries if power fails for more than 10 minutes in a standard reliability system, 5 minutes in high and critical reliability systems, and 10 minutes in an expansion port network (EPN). This protects the batteries from over-discharging.

Electromagnetic Interference (EMI) Filters

The EMI filters suppress noise voltage on the AC input line to the unit.

Ring Generator

The ring generator converts the -48 VDC input to a 67 VAC to 100 VAC, 20 Hz or 25 Hz ringing voltage. The analog line circuit packs use this AC voltage output to ring voice terminals. The AC outputs route from the ring generator to port carriers, expansion control carriers, and control carriers.

Fuses

20-Amp fuses protect the power on each cable going from the AC- Power Distribution Unit to power converters in the carriers.

Figure 24 shows AC power distribution in some Multi-Carrier Cabinets. The DC-power distribution cables are on both sides of the cabinet. These cables supply power to each of the carriers. The optional battery charger is at the right side of the Power Distribution Unit.

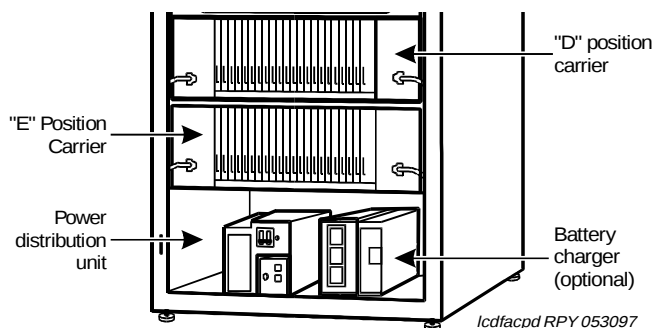


Figure 24. AC Power Distribution in Multi-Carrier Cabinets

Power Backup

If AC power fails, three 48-VDC batteries power the system for 10 seconds in a PPN cabinet, for 15 seconds in an EPN cabinet, and for 10 minutes in the control carrier in a standard reliability system. The batteries also supply system power for 5 minutes in the control carrier in high and critical reliability systems, and for 10 minutes in the expansion control carrier in the A position of an EPN cabinet (R7r and later only).

Uninterruptible Power Supply (UPS)

An external, Uninterruptible Power Supply (UPS) provides a longer backup time than holdover batteries (holdover times vary from less than 10 minutes to up to 8 hours) and can replace the batteries and battery charger. The unit connects from the AC-power source to a cabinet's AC-power cord. If AC power fails, the unit supplies its own AC power to the cabinet.

AC Power Distribution Unit (J58890CH-1)

Figure 25 shows a typical AC Power Distribution Unit used in some Multi-Carrier Cabinets. The unit sits at the bottom of the cabinet.

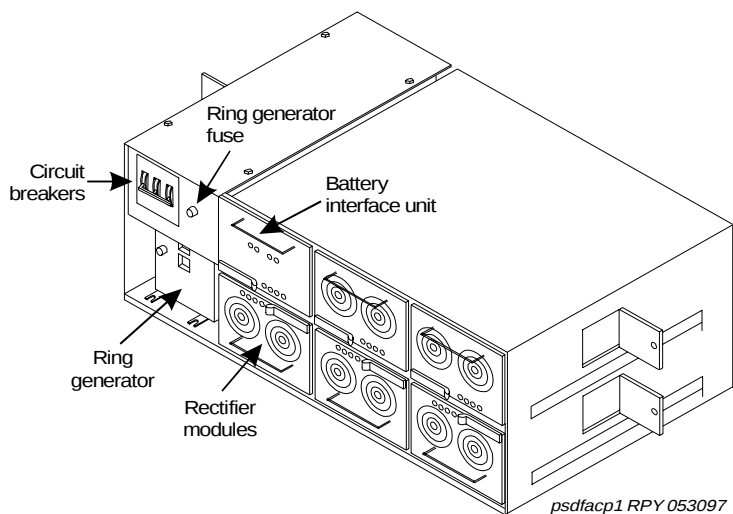


Figure 25. AC Power Distribution Unit (J58890CH-1) (Front)

Power Backup

There are 2 types of battery assemblies used for power backup: small and large. The small batteries are typically located at the center rear of a Multi-Carrier Cabinet. The large batteries are typically located inside the battery cabinet.

Small Batteries

The small battery is an 8 AH (Amp-hour) battery fused for short circuit protection and is charged by the J58890CH-1. The batteries also contain a thermal sensor that changes the charging voltage depending on battery temperature. See [Figure 26](#).

The small batteries provide short-term battery holdover. If AC power fails, 48 VDC batteries power the system for 10 seconds in a PPN cabinet, for 15 seconds in an EPN cabinet, and for 10 minutes in the control carrier in a standard reliability system. The batteries also provide system power for 5 minutes in the control carrier in high and critical reliability systems, and for 10 minutes in the expansion control carrier in the A position of an EPN cabinet (R7r and later only).

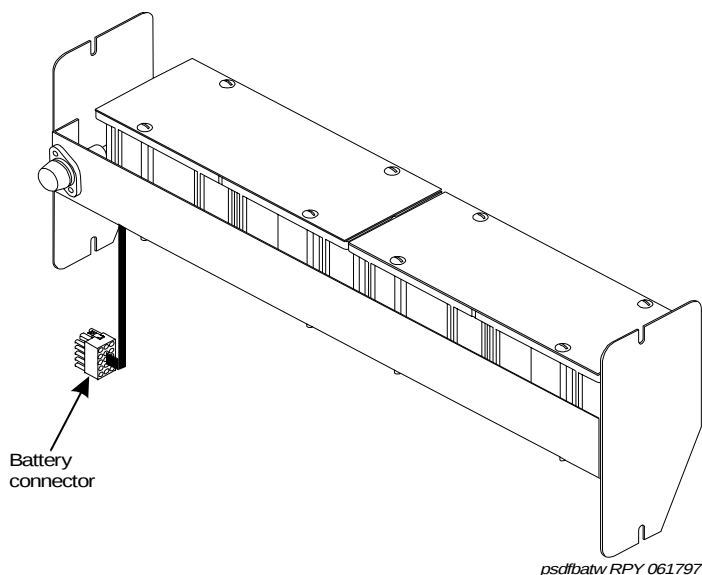


Figure 26. Small Battery Assembly

Large Batteries

The large batteries can supply holdover times of 2 to 8 hours, depending on the number of batteries. When using large battery holdover, 1 battery cabinet is required per system. The 24-cell battery cabinet must have float voltage of 54.2 VDC. The 23-cell battery cabinet must have a float voltage of 51.75 VDC. The batteries are circuit breaker protected and are charged by the J58890CH-1.

The batteries also contain a thermal sensor that changes the charging voltage, depending on the battery temperature. The batteries provide extended holdover. Battery holdover and recharge times for a typical 2500-Watt load are shown in [Table 14](#). A typical large battery cabinet, (200 A) is shown [Figure 27](#).

Table 14. Battery Holdover and Recharge Times

Cabinet Type	Holdover Time	Recharge Time
100 A	2 hours	7 hours
200 A	4 hours	13 hours
300 A	6 hours	20 hours
400 A	8 hours	26 hours

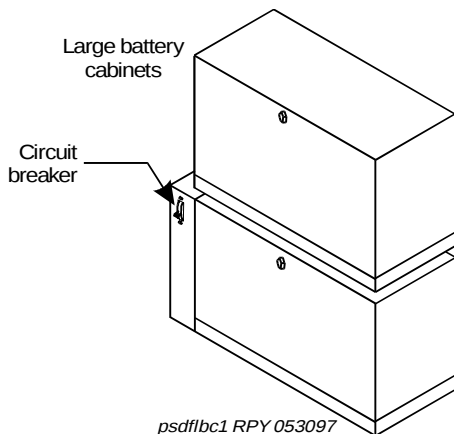


Figure 27. Typical Large Battery Cabinets

DC Power Distribution

The typical distribution system has a DC power converter and cables to provide the power to the system circuit packs.

DC Power Distribution Unit (J58890CF-2)

Figure 28 shows a Power Distribution Unit in some DC-powered Multi-Carrier Cabinets. The unit sits at the bottom of the cabinet and contains the ring generator, 20-amp circuit breakers, terminal blocks, and system fan power.

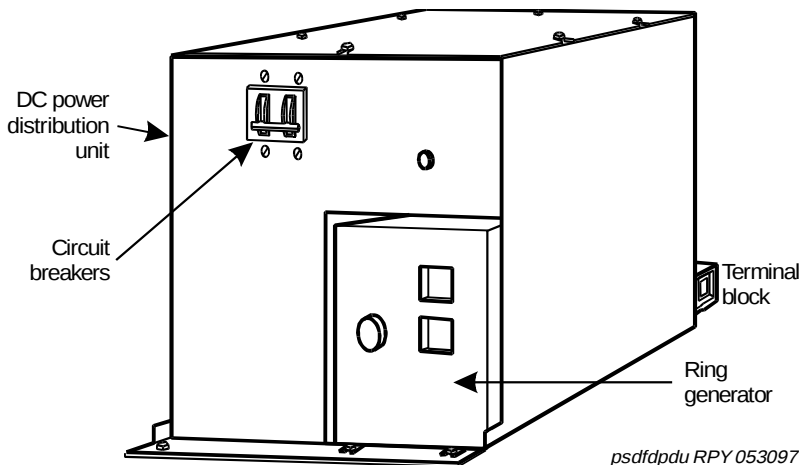


Figure 28. DC Power Distribution Unit (J58890CF-2) (Front)

Ground Isolation

Each peripheral connecting to a DEFINITY System, via the Asynchronous Electronic Industries Association (EIA) RS-232 interface, requires either a 105C, a 105D or a 116A Isolator Interface. The interface isolates ground between the system and external adjuncts.

The Isolator Interface is behind a PPN control carrier or behind an EPN expansion control carrier. The 105C, 105D, or the 116A installs at the RS-232 interface between the peripheral equipment and the interface connector.

Figure 29 shows the power distribution in some Multi-Carrier Cabinets with short term battery holdover (small battery). In R7r and later systems, the power distribution cables are on the right hand side of the cabinet only. This is because the 649A DC power converter circuit pack replaces 2 power converters at either end of each carrier. Switch node (SN) carriers require two 649As and 2 cables.

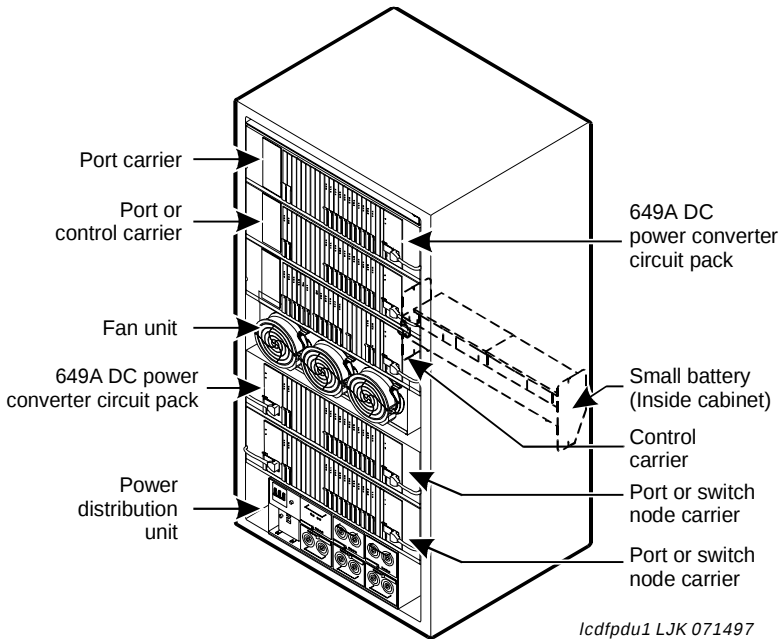


Figure 29. Power Distribution in Multicarrier Cabinets

Figure 30 shows the DC-power distribution in some Multi-Carrier Cabinets with extended battery backup (large batteries). In R7r and later systems, the power distribution cables are on the right side of the cabinet only. This is because the 649A DC power converter circuit pack replaces 2 power converters at either end of each carrier. Switch node (SN) carriers require two 649As and two cables.

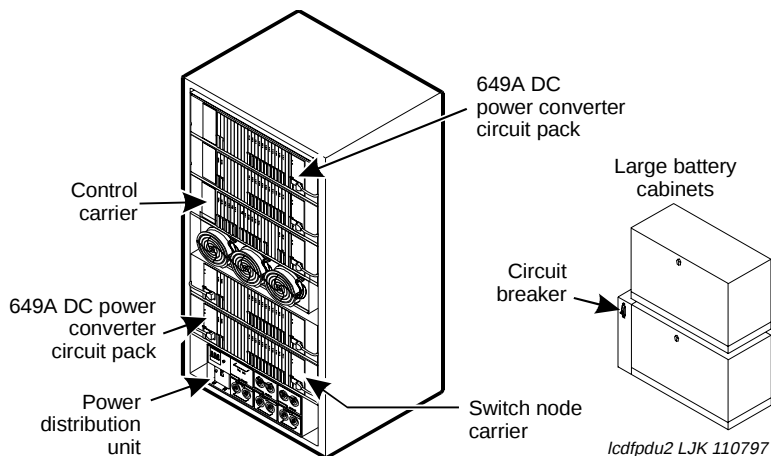


Figure 30. DC Power Distribution in Multicarrier Cabinets

DC Power Converter (649A)

The 649A converts the -48 VDC from the Power Distribution Unit to outputs of -48 VDC at 10 A, $+5$ VDC at 60 A, and -5 VDC at 6 A. These outputs distribute power to circuit pack slots in the carriers.

AC and DC Grounding

Approved Grounds

An approved ground is the closest acceptable medium for grounding the building entrance protector, the entrance cable shield, or single-point ground of the system.

If more than one type of approved ground is available on the premises, bond the grounds together as specified in Section 250-81 of the National Electrical Code, or the applicable electrical code in the country where the equipment is installed.

Protective Grounds

Grounded Building Steel — The metal frame of the building where it is grounded by one of the following: acceptable metallic water pipe, concrete encased ground, or a ground ring.

Acceptable Water Pipe — Underground water pipe, at least 1/2 inch (1.3 cm) in diameter, needs to be in direct contact with the earth for at least 10 feet (3 meters). The pipe must be electrically continuous (or made electrically continuous by bonding around insulated joints, plastic pipe, or plastic water meters), to the point where the protector ground wire is connected.

A metallic underground water pipe must be supplemented by the metal frame of the building, a concrete encased ground, or a ground ring.

If these grounds are not available, the water pipe ground can be supplemented by one of the following types of grounds:

- Other local metal underground systems or structures — Local underground structures such as tanks and piping systems
- Rod and pipe electrodes — A 5/8 inch (1.6 cm) solid rod or 3/4 inch (1.9 cm) conduit or pipe electrode driven to a minimum depth of 8 feet (2.5 meters)
- Plate electrodes — Must have a minimum of 2 square feet (0.18 square meters) of metallic surface exposed to the exterior soil

Concrete Encased Ground — An electrode encased by at least 2 in. (5 cm) of concrete and located within and near the bottom of a concrete foundation or footing in direct contact with the earth. The electrode must be at least 20 feet (6 meters) of one or more steel reinforcing bars or rods 1/2 inch (1.3 cm) in diameter, or at least 20 feet (6 meters) of bare, solid copper, 4 AWG (26 mm²) wire.

Ground Ring — A buried ground that encircles a building or structure at a depth of at least 2.5 feet (0.8 meter) below the earth's surface. The ground ring must be at least 20 feet (6 meters) of 2AWG (35 mm²), bare, copper wire.

Approved Floor Grounds



WARNING:

If the approved ground or approved floor ground can only be accessed inside a dedicated power equipment room, then connections to this ground should be made by a licensed electrician.

Approved floor grounds are those grounds on each floor of a high-rise building suitable for connection to the ground terminal in the riser closet and to the cabinet equipment single-point ground terminal. Approved floor grounds may include the following:

- Building steel
- The grounding conductor for the secondary side of the power transformer feeding the floor
- Metallic water pipes
- Power feed metallic conduit supplying panel boards on the floor
- A point specifically provided in the building design for grounding



NOTE:

Electrically connect all protective grounds together to form a single grounding electrode system.

Coupled Bonding Conductor

When using Coupled Bonding Conductor (CBC) grounding in an AC- powered cabinet, maintain a minimum 1 ft. (0.3 m) spacing between the CBC and other power and ground leads.

In AC-powered systems, locate the system single-point ground terminal block on the AC load or AC protector cabinet.

Single-Carrier Cabinet Power Systems

Each Single-Carrier Cabinet has 1 AC or 1 DC power supply that distributes DC-power and AC ringing voltage to the circuit pack slots in the cabinet.

AC Power Supply (1217A)

In an AC-powered cabinet, a single, plug-in, multi-output AC power supply is in the power supply slot. A power cord, with a 3-prong plug on one end and an appliance connector on the other end, connects the supply to a dedicated AC power source.

The 1217A is a global power unit for Single-Carrier Cabinets. It has a wide input voltage operating range of 90 to 264 VAC and a 50/60 Hz autoranging input, multi-output power supply that provides regulated DC output. The 1217A also has a selectable 20/25 Hz AC ringer.

The inputs to the power supply can be (depending on list version):

- 120 VAC, 60-Hz, 15-Amp to 20-Amp; 3 wires in the power cord: 1 hot wire, 1 neutral wire, and 1 ground wire
- 220 VAC or 240 VAC, 50-Hz, 10-Amp; 3 wires in the power cord: 1 hot wire, 1 neutral wire, and 1 ground wire

The AC power supply produces the following DC outputs: +5 VDC, -5 VDC, -48 VDC, +12 VDC, and a battery-charging voltage. The DC outputs distribute power on the cabinet backplane to the circuit pack slots. Additionally, the -48 VDC output current capacity has been increased from 6.85 amps to 8.25 amps. A 50 amp load inrush requirement has been added to the -48 VDC output

A holdover circuit in the power supply allows a system to operate normally during AC power interruptions. If AC input power fails, reserve batteries supply power to the memory and processor circuit packs and fans for 2 minutes. All port circuit packs are inactive during this time. The power supply contains a battery charger to charge the holdover batteries.

DC Power Supply (676C)

In a DC-powered Single-Carrier Cabinet, a single, plug-in multi-output DC power supply is in the power supply slots.

The 676C DC power supply has a wide input voltage operating range of -42 to -60 VDC at up to 22A. The 676C produces the following outputs: +5.1 VDC at 0 to 55A, -5.1 VDC at 0 to 5.5A, +12 VDC at 0 to 2A (surge to 2.8A for 350 ms), -48 VDC at 0 to 8.25A. The outputs distribute power on the cabinet backplane to the slots for the circuit packs. The AC ringing voltage output value and frequency depend on the country of use. The power supply has circuit breakers and EMI filtering.

DC Power Distribution Unit (J58890CG)

The J58890CG is used with Single-Carrier Cabinets. Individual DC output connectors can power up to 4 Single-Carrier Cabinets. Each output connector is separately fused at 25 A (fuses are inside the unit). The input to the DC distribution unit is from the DC power cabinet.

The J58890CG is required when the distance between the DC power cabinet and the cabinet stack is greater than 30 feet (9 m).

Enhanced DC Rectifier Cabinet (J58890R)

The J58890R is used with Single-Carrier Cabinets. Each rectifier assembly in the DC rectifier cabinet can supply up to 50 A of DC current. A minimum of two rectifiers install in each DC cabinet to supply a total of 100 A. A third rectifier assembly is used as a backup only.

Each Single-Carrier Cabinet can draw up to 15 A. Up to 3 DC cabinets can be stacked to supply power to single-carrier cabinets stacks.

Each output connector is separately fused at 25 A (fuses are inside each DC rectifier assembly).



NOTE:

A J58890CG DC Power Distribution Unit is required if the distance between the DC cabinet and the cabinet stack is greater than 30 feet (9 m).

Compact Modular Cabinet (CMC)**AC Power Supply (650A)**

In the Compact Modular Cabinet, a power cord, with a 3-prong plug on one end and an appliance connector on the other end, connects the supply to a dedicated AC power source. The power supply is a global power factor corrected AC/DC converter providing multiple DC outputs and AC ring outputs. It is auto ranging 85 to 264 VAC, 47 to 63 Hz, at 330 Watts, 4.5 A (100-120 VAC) or 2.3 A (200-240 VAC) at 500 VA.

The inputs to the power supply can be:

- 120 VAC, 50-Hz to 60-Hz, 6-Amp; 3 wires in the power cord: 1 hot wire, 1 neutral wire, and 1 ground wire
- 220 VAC or 240 VAC, 50-Hz to 60-Hz, 3-Amp; 3 wires in the power cord: 1 hot wire, 1 neutral wire, and 1 ground wire

The AC power supply produces the following outputs: +5 VDC, -5 VDC, and -48 VDC. The outputs distribute power on the cabinet backplane to the circuit pack slots. The AC ringing voltage output value and frequency depend on the country of use. The 650A also supplies power for neon message-waiting lamps (150 VDC). The power supply has EMI filtering.

Compact Modular Cabinet (CMC)**Uninterruptible Power Supply (UPS)**

The UPS provides surge protection for all connected cabinets.

1. Connect the UPS to an electrical outlet capable of handling the power requirements of all cabinets. To calculate the number of amps drawn, use the following formulas.
 - a. 100-200 VAC, multiply 3.5 amps times the number of cabinets.
 - b. 200-240 VAC, multiply 1.8 amps times the number of cabinets.
2. Cabinet A (control carrier) is always connected to an *unswitched* or *always on* electrical outlet on the UPS.

Cabinet Cooling Fans

Compact Modular Cabinet (CMC) Fan Unit

Two variable-speed fans are at the bottom of the cabinet. They receive +8 to +14 VDC from the power supply. An air filter, which can be removed and cleaned or replaced, is located above the fans. Air flows from the outside, into the bottom of the cabinet, around the circuit packs, and out through the top of the cabinet.

If the cabinet temperature reaches 158° F (70° C), the temperature sensor in the power supply shuts the system down and invokes the emergency transfer.

Multi-Carrier Cabinet Fans

A fan unit consisting of 6 fans, mounts near the center of the cabinet. The 3 front fans blow up and the 3 rear fans blow down. A removable air filter is provided above and below each fan unit. Four sensors monitor the cabinet temperature; 3 sensors are inside the cabinet top and 1 sensor is inside the cabinet bottom. One of the top sensors affects the speed of the front fans and the bottom sensor affects the speed of the rear fans. A speed control and thermal alarm circuit in each fan monitors the sensors. When a sensor indicates a change in cabinet temperature, the circuit in a fan changes that fan's speed accordingly.

A power cable from the Power Distribution Unit connects -48 VDC to each fan, +5 VDC to the speed control and thermal alarm circuit in each fan, and temperature sensor signals to the equivalent circuit in each fan. One pair of wires routes to each fan circuit. Alarm signals also route to the equivalent circuit in each fan. One pair of wires routes to each fan circuit.

A minor alarm is sent to the processor circuit pack in the PPN cabinet and the maintenance circuit pack in an EPN cabinet if any fan's speed drops below minimum. A minor alarm occurs if a fan has stopped due to loss of -48 VDC. A major alarm is sent by one of the cabinet top thermal sensors if the exhaust temperature reaches 149 °F (65°C).

Another cabinet top sensor senses if the exhaust temperature reaches 158 °F (70 °C). If so, the system shuts down and the Emergency Transfer is invoked.

Single-Carrier Cabinet Fan Unit

Four constant-speed fans at the top rear of the cabinet receive -48 VDC from the backplane. An air filter is located below the fan unit. Air flows down through the filter over the circuit packs. The filter is removable and is cleaned or replaced when necessary.

If the cabinet temperature reaches 158° F (70° C), the temperature sensor in the power supply causes the system to shut down and invokes the Emergency Transfer.

System Protection

Protections are established to keep the DEFINITY System active and on line. The following 4 types of system protection are provided:

- Overvoltage
- Sneak current
- Lightning
- Earthquake

Overvoltage Protection

Protection from hazardous voltages and currents is required for all off-premises (out-of-building) trunks, lines, and terminal installations. Both over-voltage protection (lightning, power induction, and so forth) and sneak current protection are required. The following devices protect the system from overvoltages:

- Analog trunks use the 507B Sneak Protector. Over-voltage protection is normally provided by the local telephone company.
- Analog voice and 2-wire DCP terminals can use 1 of the following (or equivalent) types of combined overvoltage and sneak current protection:
 - Carbon block with heat coil for UL code 4B1C
 - Gas tube with heat coil for UL code 4B1E-W
 - Solid state with heat coil for UL code 4C1S
- DCP and ISDN-BRI terminals use the solid state 4C3S-75 with heat coil protector, or equivalent.
- DS1/E1/T1 circuits require isolation from exposed facilities. A CSU (T1), LIU (E1), or other equipment provides this isolation.

Sneak Current Protection

Sneak current protection uses fuses to protect building wiring between the network interface and trunk circuits when exposed to extraneous power. The fuses also protect the circuit packs.

All incoming and outgoing trunks and off-premises station lines pass through the sneak fuses. 507B Sneak fuse panels install on the system side of the network interface.

Sneak current protectors must be either UL listed/CSA certified or must comply with local safety standards. Sneak current protectors must have a maximum rating of 350 mA and a minimum voltage rating of 600V, or as required by local regulations.

Lightning Protection

A Coupled Bonding Conductor (CBC) in the cabinet ground wiring protects the system from lightning. The CBC runs adjacent to wires in a cable and causes mutual coupling between itself and the wires. The mutual coupling reduces the voltage difference between ground and the DEFINITY ECS.

When using a CBC, be sure that it connects to telecommunication cable that is firmly connected to an approved ground. In multiple-story buildings, be sure to connect the CBC to an approved ground at each floor.

The CBC can be a 10 AWG ($5.3 \text{ mm}^2/2.6 \text{ mm}$) ground wire, a continuous cable sheath surrounding wires within a cable, or 6 unused pairs of wire within a cable, twisted and soldered together. The CBC connects from the cabinet single-point ground bar in an AC-powered cabinet or the ground discharge bar in a DC-powered cabinet to the terminal bar at the cross-connect field.

When there is an Auxiliary cabinet, a 6 AWG ($13.3 \text{ mm}^2/4.1 \text{ mm}$) wire connects the system cabinet single-point ground block to the Auxiliary cabinet ground block. The ground wire routes as closely as possible to the cables that connect the system cabinet to the Auxiliary cabinet.

If equipment is not present in the Auxiliary cabinet, plug the power supply for this equipment into 1 of the 2 convenience outlets on the rear of the Multi-Carrier Cabinet, to preserve ground integrity. The convenience outlet is fused at 5 Amps. A dedicated maintenance terminal plugs into the other convenience outlet.

Earthquake Protection

For earthquake or disaster bracing, the cabinets bolt to the floor. Other areas may require additional bracing. Contact your Avaya representative for earthquake requirements at the location of the system installation.

3 — Cabinets, Carriers, and Circuit Packs

This section describes the cabinets, carriers, and circuit packs, their functions, physical specifications, and interconnections in DEFINITY ECS R9. It also describes minimum cabinet and carrier configurations relative to interconnection and system-duplication options.

**NOTE:**

To determine required types and numbers of cabinets, carriers, circuit packs, or adjuncts before installation, contact your Avaya representative.

Cabinets

This section describes the auxiliary, Processor Port Network (PPN), Expansion Port Network (EPN), and AC-power cabinets.

A Multi-Carrier Cabinet (MCC) can be used as a PPN cabinet and/or an EPN cabinet. Doors on the front and rear of the MCC protect the internal equipment and allow easy access to the circuit packs. Each cabinet contains casters. Leveling feet keep the cabinet from rolling. Each corner of a cabinet can bolt to the floor, if required. See [Figure 31 on page 78](#).

The DEFINITY csi model uses the Compact Modular Cabinet (CMC).

The DEFINITY si model uses the Single-Carrier Cabinet (SCC) or the MCC.

The DEFINITY r model uses the MCC for the PPN and uses either the MCC or the SCC for the EPNs.

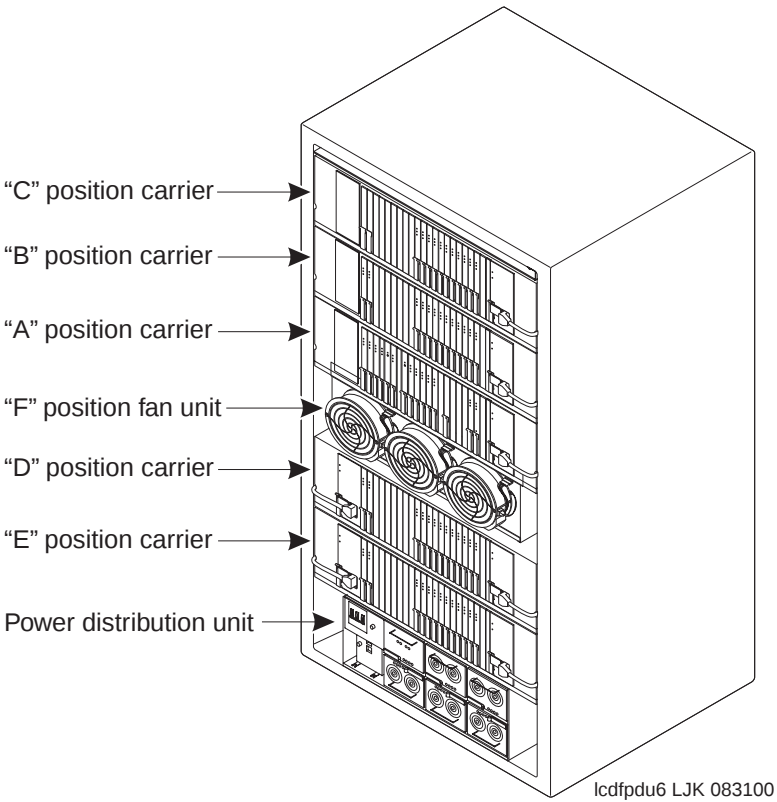


Figure 31. Typical MCC Layout

AUX Connector Capacity

The AUX (auxiliary) connector is on the rear of the control carrier. Up to 3 attendant consoles or telephone adjuncts can be powered by the AUX connector in the A position in the MCC and the SCC cabinets. Only 1 attendant console connects to the R9csi cabinets.

Up to 7 emergency transfer panels can be powered by the AUX connector in the A position in DEFINITY cabinets. Only 1 emergency transfer panel connects to csi cabinets.

Auxiliary Cabinet (J58886N)

The Auxiliary Cabinet contains the hardware to install optional equipment. The cabinet allows carrier, rack (width: 23 in.; 58.4 cm), and panel types of mounting. An Auxiliary Cabinet contains the following:

- Fuse panel (J58889AB) distributes –48 VDC to fused cabinet circuits
- AC-power receptacle strip provides switched and non-switched 120 VAC receptacles
- DC connector block is required when the cabinet is powered by an external DC source, or an AC to DC power supply that converts AC-power provided by the AC power strip switched-outlet to the required DC-power

Processor Port Network Cabinet (J58890A)

A Processor Port Network (PPN) cabinet (see [Figure 32 on page 80](#)) contains the following carriers:

- Port carrier (J58890BB) — 1 to 4
- Control carrier (J58890AH) in R7si and later — 1
- Duplicated control carrier (J58890AJ) R7si and later — 1 in high or critical reliability configurations
- Processor carrier (J58890AP) in R7r and later — 1 in all systems, 2 in high reliability and critical reliability systems
- Switch Node (SN) (J58890SA) in R7r and later with a Center Stage Switch (CSS) — 1 in standard and high reliability systems or 2 in critical reliability systems
- In a R7r and later with ATM, the ATM interface card would be placed in a port carrier.

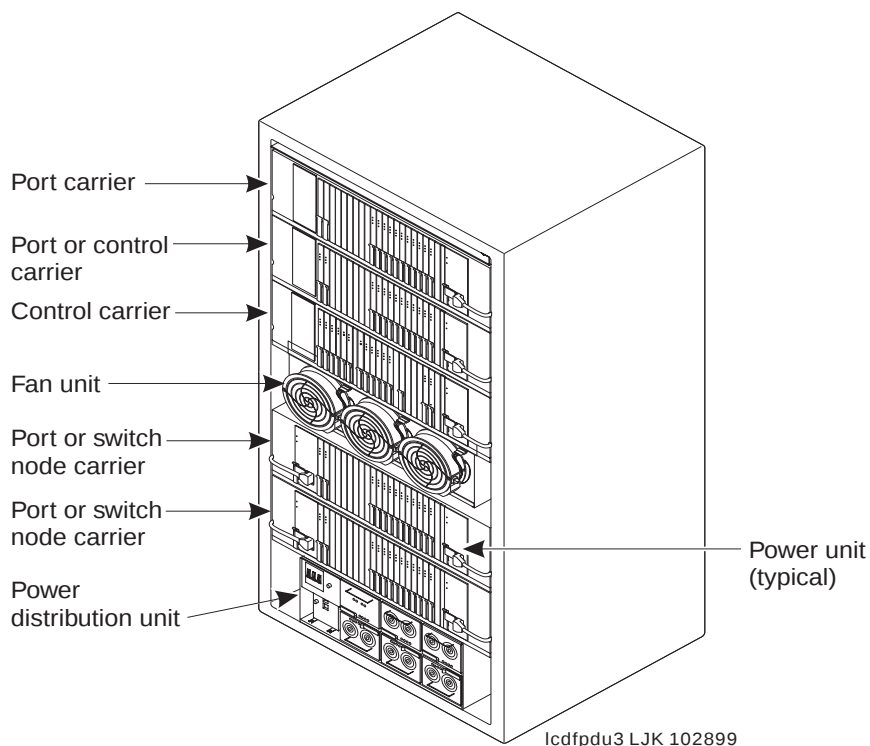


Figure 32. Typical Multi-Carrier PPN Cabinet (J58890A)

Expansion Port Network Cabinet (J58890A)

An Expansion Port Network (EPN) cabinet (Figure 33) contains the following carriers:

- Port carrier (J58890BB) — 1 to 4
- Expansion control carrier (J58890AF) — 1
- SN Carrier (J58890SA) in CSS-connected R7r and later systems — 0, 1, or 2 when required

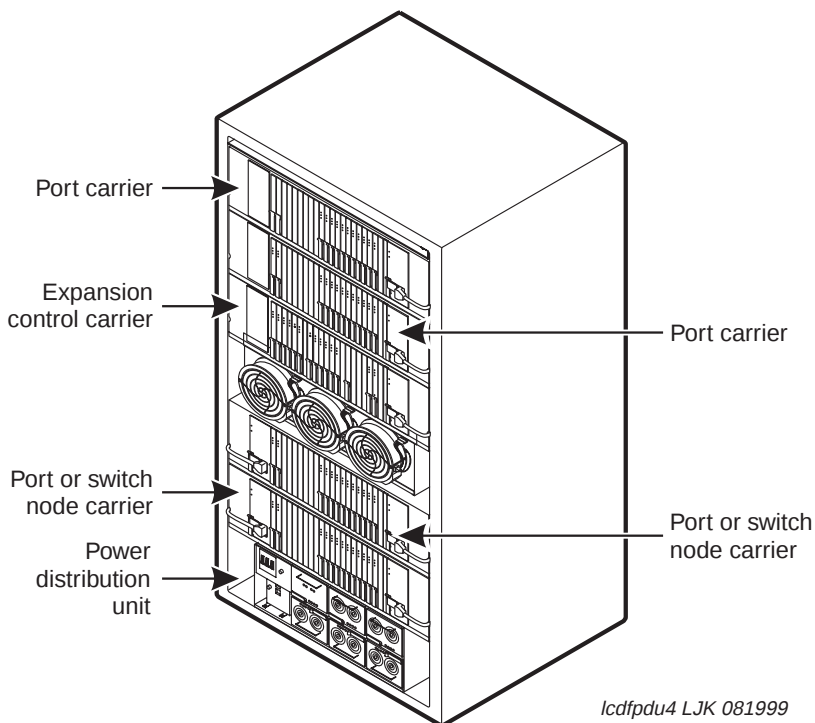


Figure 33. Typical Multi-Carrier EPN Cabinet (J58890A)

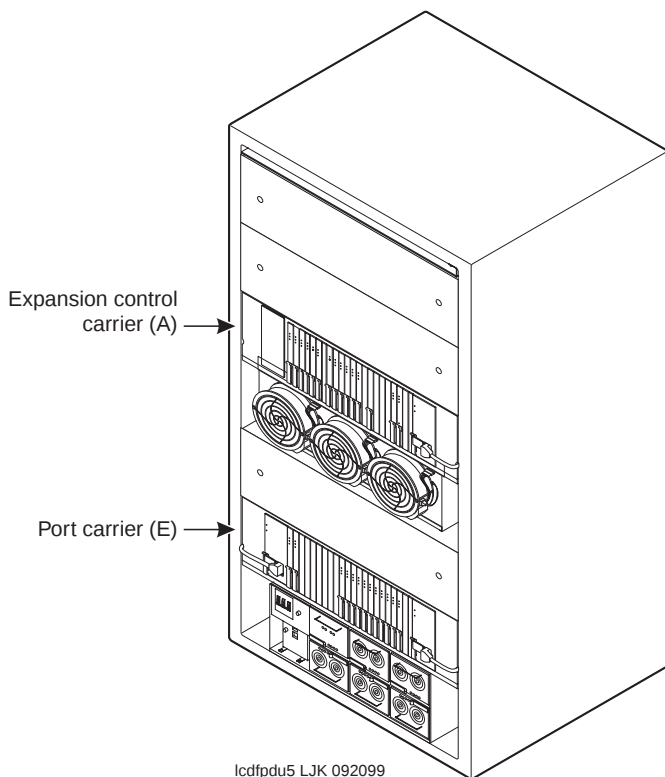


Figure 34. Dual EPN in an R7r or Later Multi-Carrier Cabinet

The above figure is for the configuration of a minimal Dual Expansion Port Network cabinet for the r model. The A, B, and C carriers are intended for the first port network in the cabinet. The D and E carriers are intended for the second port network in the cabinet. The first carrier of a second Port Network in the cabinet must reside in carrier E. The E carrier must be used when there is only one carrier in the second EPN in the cabinet. When a cabinet has two Port Networks, carrier E must be used and populated first and carrier D added and populated second.

Carriers in MCCs

The following types of carriers can install in MCCs:

- **J58890AH Control Carrier (si model)** located only in the R7si or later PPN cabinet. Contains SPE circuit packs to perform call processing, maintenance, and administration. These carriers also contain port circuit pack slots.
- **Duplicated Control Carrier (si model) (J58890AJ)** (optional), in R7si or later PPN only. Contains duplicate SPE circuit packs to perform call processing, maintenance, and administration identical to the Control Carrier. The Duplicated Control Carriers also contain port circuit pack slots.
- **Processor Carrier (r model) (J58890AP)**, only in the R7r or later PPN cabinets. Contains SPE circuit packs to perform call processing, maintenance, and administration. These carriers do not contain port circuit pack slots. Two J58890AP carriers are in the PPN for high and critical reliability (duplicate processor) systems.
- **J58890BB Port Carrier** (optional), located in the PPN and EPN cabinets. Contains port, service, and tone/clock circuit packs.
- **Expansion Control Carrier (J58890AF)**, only in the EPN cabinets. Contains extra port circuit packs, tone-clock, maintenance interface, and EI circuit packs.
- **Switch Node Carrier (SN) (J58890SA)** (optional), in R7r or later, in the PPN cabinet and/or EPN cabinets. Contains SNI circuit packs composing the CSS.

Carrier Circuit-Pack Slots

There are 3 types of circuit pack slots in the carriers: Control, Port, and Service.

NOTE:

The purple-colored and white-colored circuit packs and slots are being replaced by circuit packs and slots labeled with gray and white rectangles, respectively. A label with a solid gray rectangle indicates a port slot/circuit pack. A label with an outlined white rectangle indicates a control slot/circuit pack.

- Port: colored purple or labeled with a gray rectangle and can accept any purple or gray-labeled circuit pack
- Control: colored white or labeled with an outlined white rectangle and can accept only a circuit pack assigned to that slot
- Service: colored purple or labeled with a gray rectangle; is a special type of circuit pack that does not have an I/O connector

Each port slot attaches to a 50-pin (25-pair) connector on the carrier's rear panel. A cable attaches to each connector and routes to the cross-connect field. Each slot containing a fiber optic interface circuit pack (EI or SNI) uses a fiber optic transceiver on the carrier's rear panel.

A current limiter board (CFY1B) plugs into the backplane of the control carrier located in the A position only. The board supplies emergency transfer logic, current-limited power, 5 VDC to trip the main circuit breaker in an over-temperature condition, and the ringing transfer relay. Terminators on the backplane terminate each end of the processor expansion bus.

The following apparatus blank faceplates (with widths) cover unused circuit pack slots in the carriers to maintain proper air flow:

- Z100A1 (0.75 inches/1.9 cm)
- Z100C (0.5 inches/1.27 cm)
- Z100D (0.25 inches/0.64 cm)

NOTE:

Throughout this section, the power units and circuit packs shown in the front views of the carriers are representative examples only. Actual, installed hardware may vary from that shown.

NOTE:

In the following illustrations, a balanced ring generator (BRG) is shown below the power unit slot in certain carriers. This means the power unit slot can include a 50 Hz BRG when optioned for France.

J58890AH Control Carrier (si model)

A representative J58890AH control carrier is shown below.

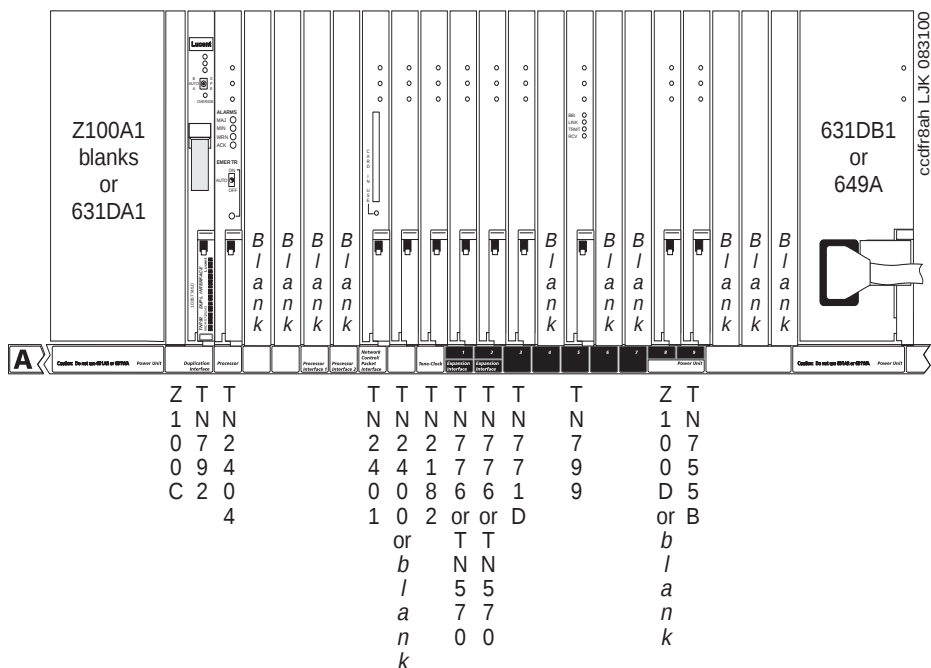


Figure 35. J58890AH Control Carrier (si model)

This carrier has dedicated white-colored circuit pack slots that always contain specific control circuit packs. Dual-color slots may contain any port circuit pack or the designated white circuit packs (such as an EI or power unit). AC or DC power units supply power to the carrier. [Table 15](#) describes the connectors on the rear of the control carrier.

**NOTE:**

The TN776 is not shipped in the R7si and later systems. It can remain in the system if packet endpoints and the C-LAN (TN799) are not used.

Table 15. Control-Carrier Connectors

Connector	Function
1 to 9 (A1 to A9)	25-pair connectors provide interfaces between port circuit packs and the cross-connect field or fiber transceiver
AUX (Auxiliary)	Interface for alarms, attendant console power, emergency power transfer panels, and an internal modem (for remote maintenance)
Processor interface (standard reliability only)	Connects directly to the PI circuit pack. Provides a BX.25 protocol interface for communication between the circuit pack and external DCE equipment.
Data communications equipment	Connects the processor to CDR equipment, a system printer, or an external modem (for remote maintenance). This connector can be used with any reliability option.
Terminal	Connects a management terminal to the processor in standard reliability systems. In critical reliability systems, connects a terminal to the processor in its control carrier.
Duplication option terminal	Used in high and critical reliability systems to connect an administration terminal to the active processor from the duplication interface slot position
P1	Provides position indicator of the carrier, power to fans, and access to alarm and control circuits
P2	Provides control signals to the carrier

The Duplicated Control Carrier (J58890AJ) has dedicated white circuit pack slots that always contain specific control circuit packs. It can also be populated with port circuit packs or dual-colored slots that may be populated with port circuit packs or designated white circuit packs (such as an expansion Interface or power unit).

AC or DC power units located at each end of the Duplicated Control Carrier supply power to the carrier. See [Figure 36](#) for a representative example. See [Table 16 on page 88](#) for the Duplicated Control Carrier rear connector descriptions.



 NOTE:

The TN776 is not shipped in the R7si and later systems. It can remain in the system if packet endpoints and the C-LAN (TN799) are not used.

Table 16. J58890AJ Duplicated Control Carrier (si model) Connectors

Connector	Function
1 to 9 (B1 to B9)	25-pair connectors provide interfaces between port circuit packs and the cross-connect field or fiber transceiver
Terminal	Connects a management terminal to the processor in its Duplicated Control Carrier
P1	Provides position indicator of the carrier and access to alarm and control circuits

J58890AP Processor Carrier (r model)

The Processor Carrier contains only dedicated slots for control circuit packs composing the Switch Processing Element (SPE). It does *not* contain port circuit pack slots. See [Figure 37](#) for a representative example.

AC or DC power units located at each end of the Processor Carrier supply the power to the carrier. The Processor Carrier always contains 4 memory circuit packs and 1 packet interface circuit pack. See [Table 17 on page 90](#) for the Processor Carrier rear connector descriptions.

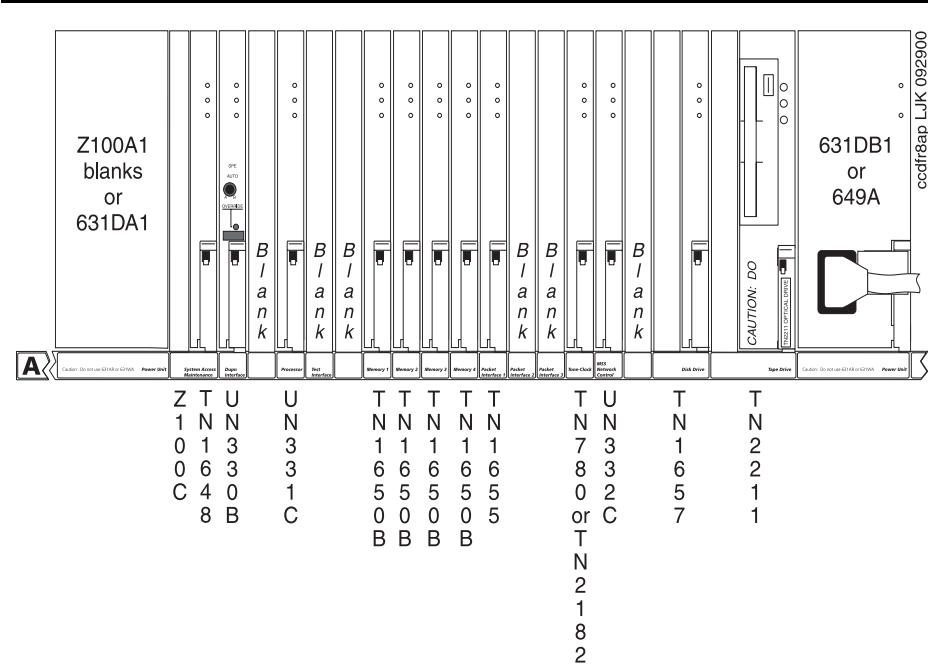


Figure 37. Processor Carrier (r model) (J58890AP) (Front)

Table 17. J58890AP Processor Carrier (r model) Connectors

Connector	Function
Clock (stratum-3)	Provides an interface to a stratum-3 clock for digital frame timing. This is not a time-of-day clock
AUX (Auxiliary)	Provides an interface for customer alarms, attendant console power, emergency power-transfer panels, and an internal-modem interface for remote maintenance
Terminal, active	Connects a management terminal to the system access and maintenance (SYSAM) circuit pack in the active Processor Carrier
Terminal, standby	Used only in Duplicated Processors to connect a management terminal to the standby processor carrier
P1	Provides position indicator of the carrier and access to alarm and control circuits
P2	Provides control signals to the carrier

J58890BB Port Carrier

A Port Carrier contains the following circuit packs:

- Port slot locations 1 to 20 for the port circuit packs. A dedicated slot contains an optional tone-clock circuit pack used for Port Carriers in the B position of an EPN cabinet in critical reliability systems. Slot 2 contains an optional EI or ATM Interface circuit pack
- Power unit service slots in which power unit circuit packs or maintenance circuit packs can install
- AC or DC power units located at each end of the carrier

See [Figure 38 on page 92](#) for a representative example. See [Table 18](#) for the Port Carrier rear connector descriptions.

Table 18. J58890BB Port Carrier Connectors

Connector	Function
1 to 20	Ports interfacing between circuit pack slots and the cross-connect field or fiber transceiver
P1	Provides position indicator of the carrier and access to alarm and control circuits

Cabinets, Carriers, and Circuit Packs
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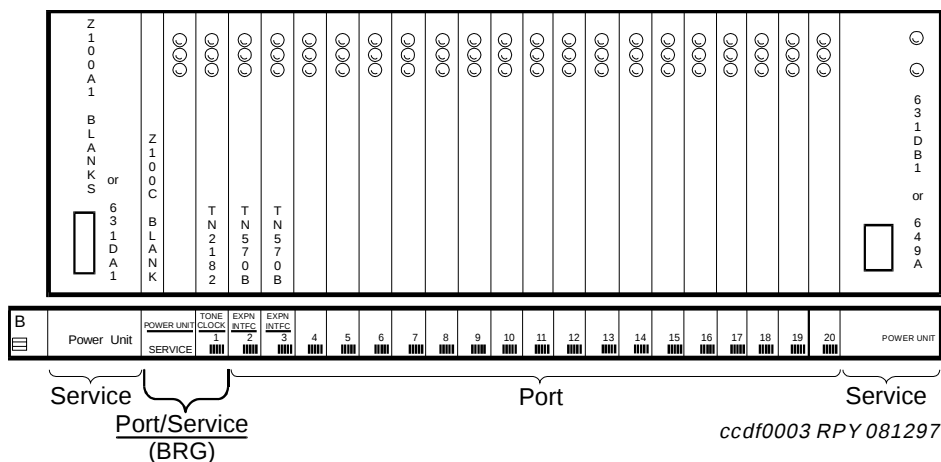


Figure 38. J58890BB Port Carrier (Front)

J58890AF Expansion Control Carrier

The Expansion Control Carrier contains an EI or ATM Interface circuit pack in port slots 1 and 2. It is used in a fiber optic cabling path to another cabinet or the CSS in the same cabinet. These slots may contain optional port circuit packs. See [Figure 39](#) for a representative example.

The Expansion Control Carrier also contains port slots 3 to 19 and the AC or DC power units. The maintenance and tone-clock circuit packs are also shown. An optional neon power unit can be in slots 18 and 19. See [Table 19 on page 94](#) for the Expansion Control Carrier rear connector descriptions.

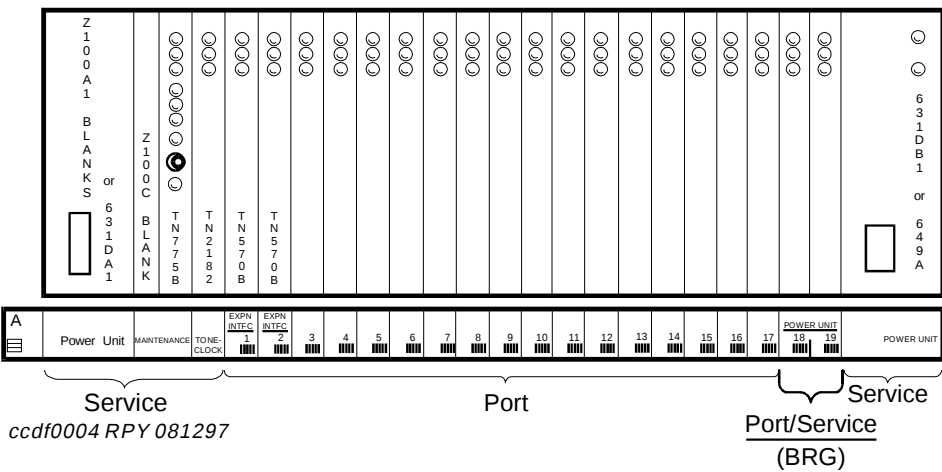


Figure 39. Expansion Control Carrier (J58890AF) (Front)

Table 19. Expansion Control Carrier (J58890AF) Connectors

Connector	Function
1 and 2 (A1 and A2)	Provides a fiber-optic cable interface to an expansion interface (EI) circuit pack in slot 1 ¹ or a copper cable interface for a DS1 Converter
1 to 19 (A1 to A19)	Provides interfaces between port circuit packs and the cross-connect field
AUX	Provides interfaces for customer alarms, attendant console power, and emergency power transfer panels
TERMINAL	Connects a management terminal to the maintenance circuit pack in an expansion control carrier
P1	Provides position indicator of the carrier and access to alarm and control circuits
P2	Connects ringing voltage from the ring generator to the carrier and produces control signals

¹. In systems using ATM-PNC, the fiber connectors for the OC-3/STM-1 interfaces to the ATM switches are located on the faceplates of the TN2305/TN2306 circuit packs.

J58890SA Switch Node Carrier (SN)

The Switch Node Carrier (SN) (J58890SA) is used in R8r and later only. See [Figure 40](#) for a representative example. The SN can contain one or two switch node clocks, up to 16 Switch Node Interface (SNI) circuit packs, 1 or 2 DS1 converter circuit packs, one EI circuit pack, and 2 AC or DC power units.

The AC or DC power units are located at each end of the SN. The SN can be used when connecting 3 or more EPNs. See [Table 20 on page 96](#) for the SN rear connector descriptions.

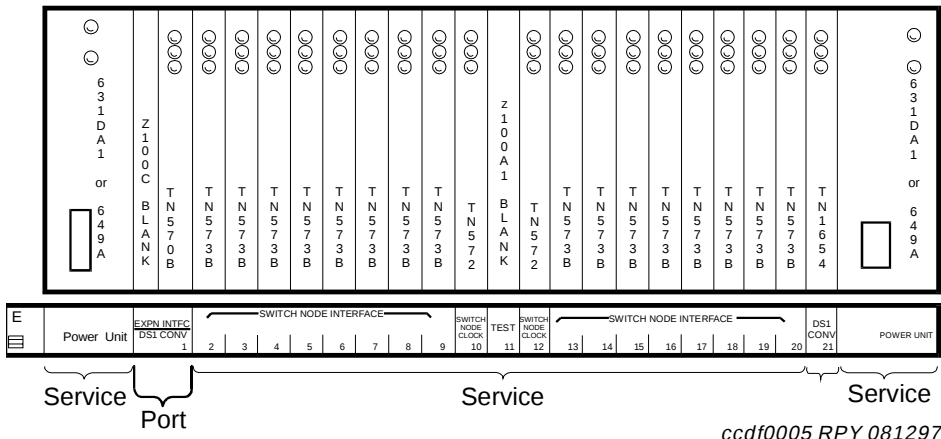


Figure 40. Switch Node Carrier (J58890SA) (Front)

Table 20. Switch Node Carrier (J58890SA) Connectors

Connector	Function
1 (E1)	EI connector for the cable between the EI circuit pack in slot 1 and the Switch Node Interface (SNI) circuit pack in slot 2 for a duplicated PPN only. Also used for a DS1 Converter circuit pack in slot 1.
2-9 and 13-20 (E2-E19 and E13-E20)	SN ports that are fiber optic cabling interfaces to the SNI circuit packs and other circuit packs connected to SN ports or circuit packs in EPNs
21 (E21)	Interface to connect the DS1 Converter circuit pack to the cross-connect field and an SNI circuit pack
P1	Provides the position indicator of the SN carrier and provides access to alarm and control circuits

Single-Carrier Cabinets

This section describes the following types of Single-Carrier Cabinet (SCC):

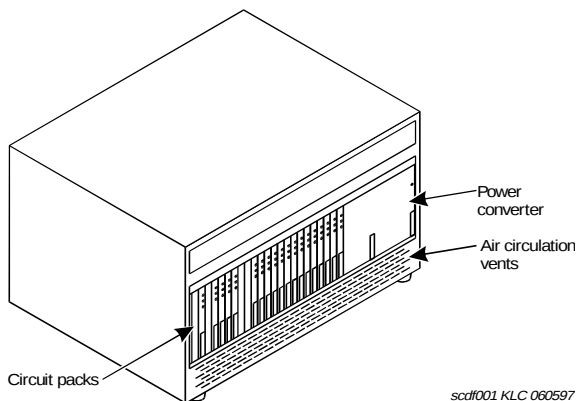
- Basic Control Cabinet (si model) (J58890L)
- Duplicated Control Cabinet (J58890M)
- Expansion Control Cabinet (J58890N)
- Port Cabinet (J58890H)
- Compact Modular Cabinet (csi model) (J58890T)
- DC power distribution cabinet

Figure 41 shows a typical SCC. Each SCC has vertical slots that hold circuit packs. A blank faceplate covers each unused slot.



NOTE:

Throughout this section, the power units shown in the front views of the carriers are examples only.



sccf0001 KLC 060597

Figure 41. Typical SCC

A maximum of 4 SCCs can stack on top of each other. The cabinet positions are labeled A through D. The position of the basic control cabinet or expansion control cabinet is always labeled A. Additional port cabinet positions are labeled B, C, and D, sequentially. The Duplicated Control Cabinet is labeled B. See [Figure 42](#).

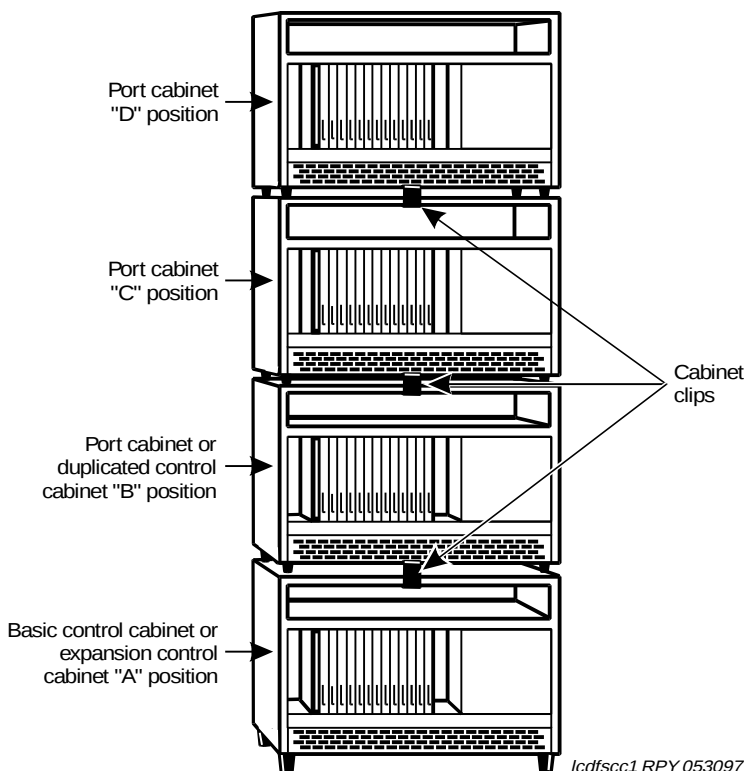


Figure 42. Typical SCC Stack

Each stack of SCCs requires 1 basic- or Expansion-Control Cabinet at the bottom of the stack. The maximum number of cabinet stacks (port networks) in an si system is 3.

Cabinet clips connect the cabinets together. At the rear of the cabinets, a ground plate connects between cabinets for ground integrity. [Chapter 2, "Site Requirements"](#), describes the power and ground requirements for SCCs.

Carrier Circuit Pack Slots

There are 3 primary types of circuit pack slots in the carriers:

NOTE:

The purple-colored and white-colored circuit packs and slots are being replaced by circuit packs and slots labeled with gray and white rectangles, respectively. A label with a solid gray rectangle indicates a port slot/circuit pack. A label with an outlined white rectangle indicates a control slot/circuit pack.

- Port: colored purple or labeled with a gray rectangle and can accept any purple or gray-labeled circuit pack
- Control: colored white or labeled with an outlined white rectangle and can accept only a circuit pack assigned to that slot
- Service: colored purple or labeled with a gray rectangle; is a special type of circuit pack that does not have an I/O connector

Each port slot in a port carrier, an expansion control carrier, and a control carrier in R7si or later attaches to a 25-pair connector on the carrier's rear panel. A cable attaches to each connector and routes to the cross-connect field.

Blank faceplates cover empty carrier slots, as follows:

- 158J (4 in/9.2 cm) covers the area left of slot 1 in port cabinets
- 158P (0.75 in/1.9 cm) covers any unused slot.
- 158N (0.50 in/1.27 cm) is used with the DEFINITY LAN gateway in DEFINITY AUDIX R3 and CallVisor ASAI installations.
- 158G (0.25 in/0.63 cm) is used with the TN755B or TN2202.

NOTE:

In the following illustrations, a balanced ring generator (BRG) is shown below the power unit slot in certain carriers. This means the power unit slot can include a 50 Hz BRG when optioned for France.

Carriers in SCCs

J58890L Basic Control Cabinet (si model)

The Basic Control Cabinet is in the PPN only. It contains ports, a control complex to perform call processing, and an interface to an optional Duplicated Control Cabinet. It also interfaces to the optional STRATUM 3 Clock. See [Figure 43](#) for an example.

The Basic Control Cabinet has dedicated white circuit pack slots that house specific control circuit packs. Also see [Table 21 on page 101](#). Dual-colored slots may contain any port circuit pack or the designated white circuit packs (such as an expansion interface or power unit). AC or DC power units supply power to the carrier.

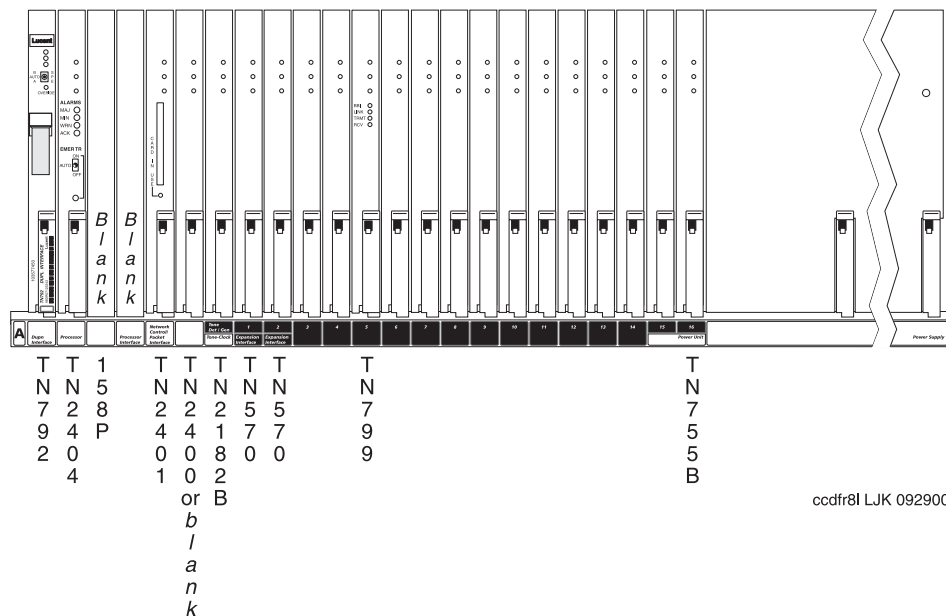


Figure 43. Basic Control Cabinet (si model) (J58890L) (Front)

Table 21. Basic Control Cabinet (si model) (J58890L) Connectors

Connector	Function
1 to 16 (A1 to A16)	25-pair connectors connect port circuit packs to the cross-connect field or a fiber transceiver.
AUX (auxiliary)	Provides interfaces for customer alarms, attendant console power, emergency power-transfer panels, and an internal modem (for remote maintenance)
PI (processor interface)	Provides a BX.25 protocol interface for communication between the circuit pack and external DCE equipment. This connection is only used with the standard reliability option.
DCE	Connects the processor to CDR equipment, a system printer, or an external modem (for remote maintenance). This connector can be used with any reliability option.
TERM (terminal)	Connects an administration terminal to the processor circuit pack in standard reliability systems. The TERM connector always connects to the processor in its own carrier.
DOT (duplication option terminal)	Used in high reliability and critical reliability systems to connect an administration terminal to the active processor via the duplication interface slot. The DOT connector can be used to connect to the processor in another carrier.

J58890M Duplicated Control Cabinet

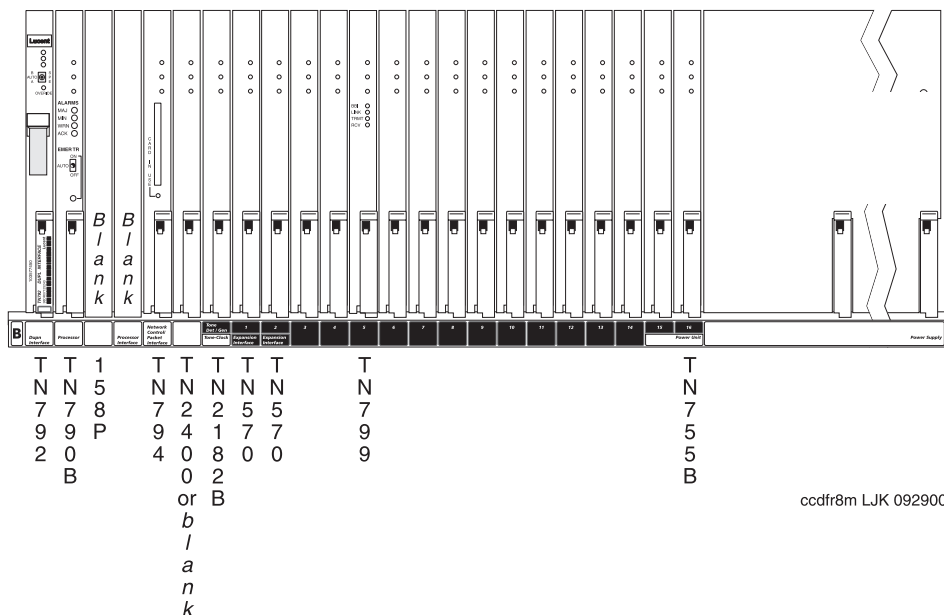
The Duplicated Control Cabinet is optional and is only in the PPN in R7si or later. See [Figure 44 on page 102](#) for a representative example. This cabinet contains ports, a duplicated control complex, and an interface to a designated expansion control cabinet.

The Duplicated Control Cabinet has dedicated white circuit pack slots for designated control circuit packs. The port circuit pack slots can contain any port circuit packs.

An AC or DC power supply, at the right side of the cabinet, supplies power to the cabinet. The cabinet contains a duplication interface circuit pack in slot DUPN INTFC. See [Table 22 on page 102](#) for the Duplicated Control Cabinet rear connector descriptions.

Cabinets, Carriers, and Circuit Packs
Carriers in SCCs

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ccdf8m LJK 092900

Figure 44. Duplicated Control Cabinet (J58890M) (Front)

Table 22. Duplicated Control Cabinet (J58890M) Connectors

Connector	Function
01 to 16 (A01 to A16)	25-pair connectors provide interfaces between port circuit packs and the cross-connect field or a cable-access panel (if provided)
TERM (Terminal)	Connects an administration terminal to the processor circuit pack in the Duplicated Control Cabinet if the duplication interface circuit pack fails in the control carrier

J58890N Expansion Control Cabinet

The Expansion Control Cabinet contains ports, a tone-clock, an interface to a port cabinet, and a maintenance interface. It is only in an EPN. See [Figure 45](#) for a representative example.

The Expansion control Cabinet is the first in an EPN stack of SCCs. It has optional port circuit packs in port slots 2 to 17. The AC or DC power supply, located at the right side of the cabinet, supplies power. See [Table 23 on page 104](#) for the Expansion Control Cabinet rear connector descriptions.

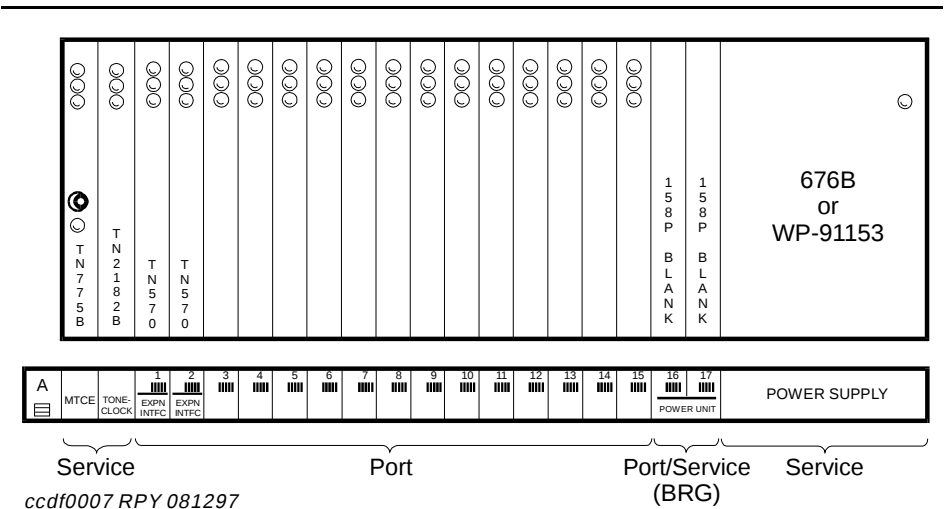


Figure 45. Expansion Control Cabinet (J58890N) (Front)

Table 23. Expansion Control Cabinet (J58890N) Connectors

Connector	Function
1 (A1)	Fiber optic cable interface between an expansion interface (EI) circuit pack in slot 1 ¹ and an EI circuit pack in another PN.
2 to 17 (A2 to A17)	Ports providing interfaces between circuit packs and the cross-connect field or fiber transceiver
AUX (auxiliary)	Provides interface for customer alarms, attendant console power, and emergency power transfer panels
TERM (terminal)	Connects an administration terminal to the maintenance circuit pack

¹. In systems using ATM-PNC, the fiber connectors for the OC-3/STM-1 interfaces to the ATM switches are located on the faceplates of the TN2305/TN2306 circuit packs.

J58890H Port Cabinet

The Port Cabinet is located in the PPN and in EPNs. It contains ports and an interface to an Expansion Control Cabinet. The Port Cabinet has optional port circuit packs in port slots 1 to 18. In a critical-reliability system, these can include a tone-clock circuit pack in slot 1 and expansion interface circuit packs in slots 2 and 3. A neon power unit can be installed in slots 17 and 18. See [Figure 46](#) for a representative example.

The AC or DC power supply, located at the right side of the cabinet, supplies power to the cabinet. See [Table 24 on page 106](#) for the Port Cabinet rear connector descriptions.

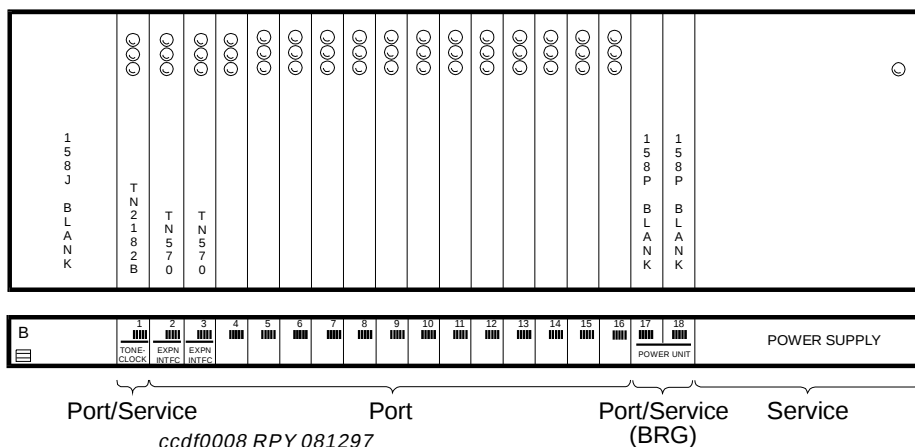


Figure 46. Port Cabinet (J58890H) (Front)

Table 24. Port Cabinet (J58890H) Connectors

Connector	Function
2 to 3 (B2 to B3)	EI port that provides an interface for the fiber optic cable between the EI circuit pack in slot 2 ¹ or 3 and another port network (PN)
1 to 18 (B1 to B18)	Interface ports between circuit packs and the cross-connect field

- ¹. In systems using ATM-PNC, the fiber connectors for the OC-3/STM-1 interfaces to the ATM switches are located on the faceplates of the TN2305/TN2306 circuit packs.

J58890T Compact Modular Cabinet (csi model)

The Compact Modular Cabinet is an economical, small-footprint alternative to a Single-Carrier Cabinet. It can mount on a wall or on the floor, and uses an AC-only power supply. The control carrier contains 2 control slots: the processor has to be in slot 1 and the tone-clock in slot 2. Slots 3 to 10 can contain optional port and service circuit packs. See the figure below.

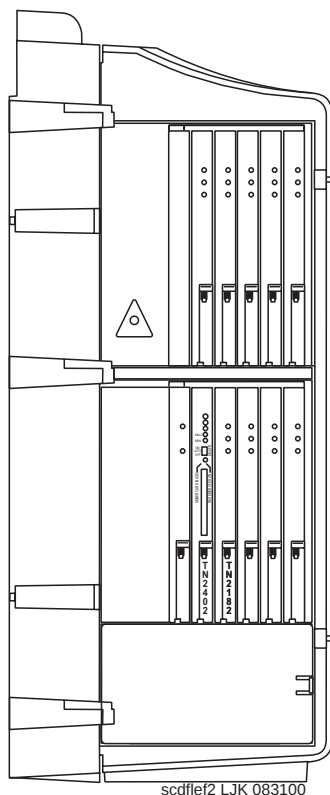


Figure 47. J58890T Compact Modular Cabinet (csi model) (Left Side)

The connectors on the right side of the cabinet are shown in [Figure 48](#). 1 to 10 25-pair connectors interface between port circuit packs and the cross-connect field or a cable access panel.

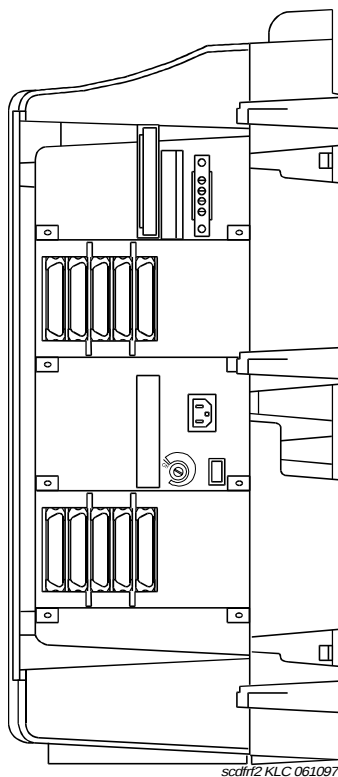
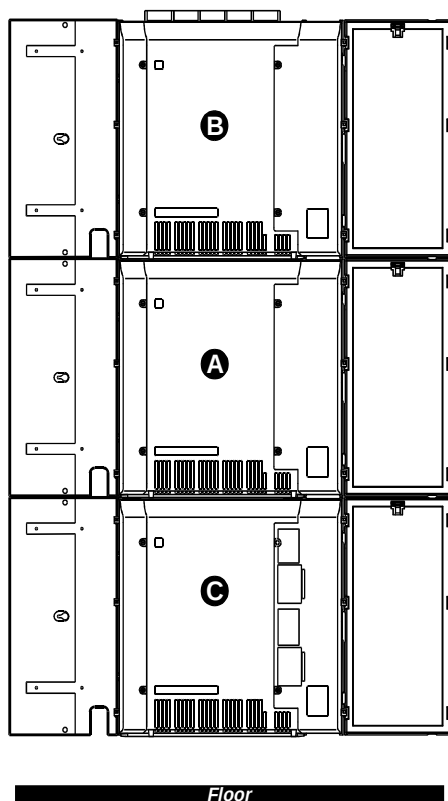


Figure 48. CMC ([J58890T](#)) (Right Side)

Up to three Compact Modular Cabinets can be combined in a single installation. Port and service circuit packs fill all ten slots in the second and third cabinets. The processor cabinet (A) installs in the middle position, the second cabinet (B) installs on the top, and the third cabinet (C) installs on the bottom. Cabinet A must have the processor pack in slot 1 and the tone clock in slot 2. Cabinets B and C can have any packs in slots 1 and 2. See [Figure 49](#).



indf3cmc KLC 110497

Figure 49. Typical [Compact Modular Cabinet \(csi model\)](#) Installation (Front)

Minimum Cabinet Configurations

Minimum cabinet configurations in MCCs and in stacks of Single-Carrier Cabinets serve as the foundations on which to build cabinets in direct-connect systems and Center Stage Switch (CSS)-connected systems.



NOTE:

The CMC cannot be duplicated but may be connected to other CMC cabinets.

The following are the minimum required circuit packs:

- Tone-clock
- Expansion interface (EI)
- Expansion port network (EPN) maintenance

The following criteria describe a minimum cabinet configuration:

- Cabinet interconnection options (direct-connect and CSS-connected)
- System duplication options (standard reliability, high reliability, and critical reliability)
- Traffic engineering to determine the number of port networks

Table 25, Table 26 on page 112 and Table 27 on page 113 list the minimum required carriers and circuit packs in PPN and EPN cabinets or cabinet stacks.

Table 25. Minimum Requirements for PPN Cabinet

Duplication Option	Connection Option	Control Carriers	Switch Node Carriers	Tone Clocks
Standard reliability	direct or ATM	1	0	1
	CSS	1	0 or 1 ¹	1
High reliability	direct or ATM	2	0	2
	CSS	2	0 or 1 ¹	2
Critical reliability (Not available with Category B)	direct or ATM	2	0	2
	CSS	2	0 or 2 ¹	2
ATM Network Duplication (Not available with Category B)	ATM	1	0	2

1. The 1st SN is located in the PPN (normal) or EPN. The 2nd and 3rd are located in an EPN to support up to 44 PNs.

Table 26. Minimum Requirements for an EPN Cabinet

Duplication Option	Connection Option	Expansion Control Carriers	Switch Node Carriers	Tone-Clocks	ATM or Expansion Interfaces In EPN
Standard reliability	direct or ATM	1	0	1	Equals number of PNs
	CSS	1	0 or 1 ¹	1	1
High Reliability	direct or ATM	1	0	1	Equals number of PNs
	CSS	1	0 or 1 ¹	1	1
Critical reliability (Not available with Category B)	direct or ATM	1	0	2	Twice number of PNs
	CSS	1	0 or 2 ¹	2	2
ATM Network Duplication (Not available with Category B)	ATM	1	0	2	2

1. The 1st SN is located in the PPN (normal) or EPN. The 2nd and 3rd are located in an EPN to support up to 44 PNs. Up to 3 EPNs can be directly-connected.

**Table 27. Minimum Requirements for a Two-PN Multi-Carrier Cabinet EPN
(R7r and later)**

Duplication Option	Connection Option	Expansion Control Carriers	Switch Node Carriers	Tone-Clocks	ATM or Expansion Interfaces
Standard reliability	direct or ATM	1	0	2	4
	CSS	1	0	2	2
High reliability	direct or ATM	1	0	2	4
	CSS	1	0	2	2
Critical reliability (Not available with Category B)	direct or ATM	1	0	4	8
	CSS	1	0	4	4
ATM Network Duplication (Not available with Category B)	ATM	1	0	4	4

Standard Reliability Systems

The standard reliability configuration is available in all systems, but it is the only one that is available for the DEFINITY ECS csi. It has no duplicated hardware, and includes:

- One control carrier
- One tone-clock circuit pack per PN
- Port networks interconnected by single fiber pairs

Optional carriers in the MCCs are port carriers that can be added as required. In R7r or later, an SN carrier can be added to Position *E* as required. Optional port carriers are determined by traffic engineering.

High Reliability Systems

High reliability systems require:

- Duplicate control carriers in the PPN cabinet
- Duplicate PPN tone-clock circuit packs, one in each Control Carrier.
- One tone-clock circuit pack per EPN
- Port networks interconnected by single fiber pairs
 - The PPN requires duplicate connectivity to the switch node
 - The switch node requires duplicate switch node clocks. The switch node carrier is provided in the PPN cabinet for a CSS-connected DEFINITY ECS r.
 - For ATM inter-PN connectivity, the PPN requires two links to the ATM switch (Not available with Category B).

Critical Reliability Systems (Not available with Category B)

Critical reliability provides full duplication of the SPE, inter-PN connectivity, and Tone-Clocks. These systems require:

- Duplicate control Carriers in the PPN cabinet
- Duplicate tone-clock circuit packs in the PPN cabinet and EPN cabinets
- Port networks interconnected by duplicated cables
 - Direct connect systems use duplicate inter-PN connectivity for each PN (EI and fiber)
 - Switch connect systems duplicate the CSS and duplicate PN-to-SN connectivity (one PN fiber to each of the Switch Node Carriers in the duplicated SN)
 - For a R7r or later ATM inter-PN connectivity the ATM links to the ATM switch or switches are duplicated. The ATM switches may or may not be duplicated. This depends on the ATM switch that is being used.
- Duplicate Switch Node Carriers in the CSS
- Packet R7 and later systems will require the TN771 Maintenance/Test circuit pack.



NOTE:

Critical reliability systems require the duplication of carriers in PPN and EPN cabinets and cabinet stacks.

ATM Network Duplication (Not available with Category B)

DEFINITY ECS R8r and later ATM Network Duplication systems will require the full duplication of the inter-PN connectivity and the Tone-Clocks. These systems require:

- Duplicate Tone-Clocks in each Expansion Port Network (EPN)
 - Both the Expansion Control Carrier and the Port Carrier are required in each EPN, with a Tone-Clock and an ATM interface residing in each of the two carriers. The MCC and SCC stack are compatible EPNs. The CMC EPN is not supported.
 - If the PPN has only one SPE complex located in the A carrier of the MCC cabinet, the recommendation is for the ATM interfaces to be placed in slot 2 of both the B and C carriers. Another alternative would be to place the ATM interfaces in slots 2 and 3 of the B carrier. This will result in the loss of complete connectivity duplication (because of a common power failure group) and the full advantage that is attainable from the ATM Network Duplication.
- Duplicate inter-PN connectivity
 - The ATM links to the ATM switch will be duplicated for inter-PN connectivity
 - The ATM switch or switches may or may not be duplicated, depending on the ATM switch that is being used.
- A TN771 facility test pack is required in the PPN of an R8r and later system. In an ATM network duplication R8r and later system, the TN771 is required both in the PPN and in each EPN.
- Direct Connect systems are not supported.

Direct-Connect Cabinet Configurations

A direct-connect system configuration could connect cabinets directly to each other via fiber optic or copper pairs. There is no intervening switch or hub. A direct-connect system can contain up to 3 port networks, including 1 PPN and 2 EPNs (a port network can consist of a Single-Carrier Cabinet, a stack of Single-Carrier Cabinets, or a single Multi-Carrier Cabinet). The direct-connect system configuration is not applicable to a csi system, which uses only one port network.

Standard Reliability Systems

Table 28 lists the required EI circuit packs, tone-clock circuit packs, remaining port circuit pack slots, and service slots in a standard reliability direct-connect system. The system discussed in Table 28 is based on an MCC cabinet.

Table 28. Standard Reliability Direct-Connect System

Port Networks	Expansion Interfaces	Tone-Clocks	Remaining Port Slots	Service Slots (R8r/si and later)
1 PPN only	0	1	89 (si model) 80 (r model)	4 (depends on traffic)
2 (1 PPN and 1 EPN)	2	2	186 (si model) 176 (r model)	8 (depends on traffic)
3 (1 PPN and 2 EPNs)	6	3	281 (si model) 271 (r model)	12 (depends on traffic)

High Reliability Systems

High reliability is available on R8si/r and later. Table 29 lists the required EI circuit packs, tone-clock circuit packs, remaining port circuit pack slots, and service slots in a high reliability, direct-connect system. In the first cabinet, the EI circuit pack is not required in a single PN (PPN only) system because no connection to another cabinet is required. The system discussed in Table 29 is based on an MCC cabinet.

Table 29. High Reliability Direct-Connect System

Port Networks	Expansion Interfaces	Tone-Clocks	Remaining Port Slots	Service Slots
1 PPN only	0	2	78 (si model) 60 (r model)	3 (depends on traffic)
2 (1 PPN and 1 EPN)	2	3	175 (si model) 156 (r model)	7 (depends on traffic)
3 (1 PPN and 2 EPNs)	6	4	270 (si model) 251 (r model)	11 (depends on traffic)

Critical Reliability Systems (R8si/r and later) (Not available with Category B)

Critical reliability is available on R8si/r and later. [Table 30](#) lists the required EI circuit packs, tone-clock circuit packs, remaining port circuit pack slots, and service slots in critical reliability, direct-connect systems.

No EI circuit packs are required for systems with only a PPN because no connection is required to another cabinet. The system discussed in [Table 30](#) is based on an MCC cabinet.

Table 30. Critical Reliability Direct-Connect System

Port Networks	Expansion Interfaces	Tone-Clocks	Remaining Port Slots	Service Slots
1 PPN only	0	2	78 (si model) 60 (r model)	3
1 PPN and 1 EPN	4	4	172 (si model) 154 (r model)	7
1 PPN and 2 EPNs	12	6	262 (si model) 241 (r model)	11

Cabinet Configurations in CSS-Connected Systems

In this type of system, an Avaya Center Stage Switch serves as a network hub, reducing the complexity of the interconnections and making more port networks possible. CSS-connected systems support up to 44 PNs.

Standard Reliability Systems

[Table 31 on page 118](#) lists configurations for a low-traffic, standard-reliability CSS system with up to 3 Switch Node Carriers (SNCs) and up to 44 PNs. Standard reliability systems with 1 SNC can contain up to 2 DS1 converter circuit packs in the SNC.

In most cases, the maximum number of PNs has to be less than the theoretical number given in the tables to allow for additional connections between SNCs.

Cabinets, Carriers, and Circuit Packs

Cabinet Configurations in CSS-Connected Systems

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Table 31. Standard Reliability CSS-Connected Systems

Port Networks	Switch Node Carriers	Port Slots	Service Slots	Expansion Interfaces	Tone-Clocks	Unused Port Slots	Remaining Port Slots
3	1	258	9	3	3	4	254
4	1	357	13	4	4	5	352
5	1	456	17	5	5	6	450
6	1	555	21	6	6	7	548
7	1	654	25	7	7	8	646
8	1	753	29	8	8	9	744
9	1	852	33	9	9	10	842
10	1	951	37	10	10	11	940
11	1	1050	41	11	11	12	1038
12	1	1149	45	12	12	13	1136
13	1	1248	49	13	13	14	1234
14	1	1347	53	14	14	15	1332
15	1	1446	57	15	15	16	1430
16	1	1545	61	16	16	17	1528
17	2	1624	65	17	17	18	1606
18	2	1723	69	18	18	19	1704
19	2	1822	73	19	19	20	1802
20	2	1921	77	20	20	21	1900
21	2	2020	81	21	21	22	1998
22	2	2119	85	22	22	23	2096
23	2	2218	89	23	23	24	2194
24	2	2317	93	24	24	25	2292
25	2	2416	97	25	25	26	2390
26	2	2515	101	26	26	27	2488

Continued on next page

Table 31. Standard Reliability CSS-Connected Systems — Continued

Port Networks	Switch Node Carriers	Port Slots	Service Slots	Expansion Interfaces	Tone-Clocks	Unused Port Slots	Remaining Port Slots
27	2	2614	105	27	27	28	2586
28	2	2713	109	28	28	29	2684
29	2	2812	113	29	29	30	2782
30	2	2911	117	30	30	31	2880
31	3	2990	121	31	31	32	2958
32	3	3089	125	32	32	33	3056
33	3	3188	129	33	33	34	3154
34	3	3287	133	34	34	35	3252
35	3	3386	137	35	35	36	3350
36	3	3485	141	36	36	37	3448
37	3	3584	145	37	37	38	3546
38	3	3683	149	38	38	39	3644
39	3	3782	153	39	39	40	3742
40	3	3881	157	40	40	41	3840
41	3	3980	161	41	41	42	3938
42	3	4079	165	42	42	43	4036
43	3	4178	169	43	43	44	4134
44	3	4277	173	44	44	45	4232

 NOTE:

The information provided in [Table 31](#) also applies to ATM-connected systems, with two exceptions. The number of switch node carriers for all port networks in an ATM-connected system is 0, and the expansion interfaces become ATM interfaces. Because the ATM-connected system does not use switch node carriers, there may be additional slots available in the switch.

High Reliability Systems

Table 32 lists configurations for a low-traffic, high-reliability, CSS-connected system with up to 43 PNs. High reliability systems with 1 Switch Node Carrier can contain up to 2 DS1 converter circuit packs in the SNC.

In most cases, the maximum number of PNs has to be less than the theoretical number given in the tables to allow for additional connections between SNCs.

Table 32. High Reliability CSS-Connected Systems

Port Networks	Switch Node Carriers	Port Slots	Service Slots	Expansion Interfaces	Tone-Clocks	Unused Port Slots	Remaining Port Slots
3	1	218	10	4	4	5	213
4	1	317	14	5	5	6	311
5	1	416	18	6	6	7	409
6	1	515	22	7	7	8	507
7	1	614	26	8	8	9	605
8	1	713	30	9	9	10	703
9	1	812	34	10	10	11	801
10	1	911	38	11	11	12	899
11	1	1010	42	12	12	13	997
12	1	1109	46	13	13	14	1095
13	1	1208	50	14	14	15	1193
14	1	1307	54	15	15	16	1291
15	1	1406	58	16	16	17	1389
16	2	1485	62	17	17	18	1467
17	2	1584	66	18	18	19	1565
18	2	1683	70	19	19	20	1663
19	2	1782	74	20	20	21	1761
20	2	1881	78	21	21	22	1859

Continued on next page

Table 32. High Reliability CSS-Connected Systems — Continued

Port Networks	Switch Node Carriers	Port Slots	Service Slots	Expansion Interfaces	Tone-Clocks	Unused Port Slots	Remaining Port Slots
21	2	1980	82	22	22	23	1957
22	2	2079	86	23	23	24	2055
23	2	2178	90	24	24	25	2153
24	2	2277	94	25	25	26	2251
25	2	2376	98	26	26	27	2349
26	2	2475	102	27	27	28	2447
27	2	2574	106	28	28	29	2545
28	2	2673	110	29	29	30	2643
29	3	2772	114	30	30	31	2741
30	3	2871	118	31	31	32	2839
31	3	2970	122	32	32	33	2937
32	3	3069	126	33	33	34	3035
33	3	3168	130	34	34	35	3133
34	3	3267	134	35	35	36	3231
35	3	3366	138	36	36	37	3329
36	3	3465	142	37	37	38	3427
37	3	3564	146	38	38	39	3525
38	3	3663	150	39	39	40	3623
39	3	3762	154	40	40	41	3721
40	3	3861	158	41	41	42	3819
41	3	3960	162	42	42	43	3917
42	3	4059	164	43	43	44	4015
43	3	4158	168	44	44	45	4113

⇒ NOTE:

The information provided in [Table 32 on page 120](#) also applies to ATM-connected systems (not available with Category B), with two exceptions. The number of switch node carriers for all port networks in an ATM-connected system is 0, and the expansion interfaces become ATM interfaces. Because the ATM-connected system does not use switch node carriers, there may be additional slots available in the switch.

Critical Reliability Systems (Not available with Category B)

[Table 33](#) lists configurations for a low traffic, critical reliability CSS-connected system with up to 44 port networks (PNs). Critical reliability systems have a duplicated Switch Node Carrier (SNC). Up to 4 DS1 converter circuit packs can be installed, up to 2 per SNC. Critical reliability systems can contain up to 44 maintenance circuit packs.

In most cases, the maximum number of PNs has to be less than the theoretical number given in the table to allow for additional connections between SNCs.

Table 33. Critical Reliability CSS-Connected Systems

Port Networks	Switch Node Carriers	Port Slots	Service Slots	Expansion Interfaces	Tone-Clocks	Unused Port Slots	Remaining Port Slots
3	2	218	9	6	6	10	208
4	2	317	13	8	8	15	302
5	2	416	17	10	10	20	396
6	2	515	21	12	12	25	490
7	2	614	25	14	14	30	584
8	2	713	29	16	16	35	678
9	2	812	33	18	18	40	772
10	2	911	37	20	20	45	866
11	2	1010	41	22	22	50	960
12	2	1109	45	24	24	55	1054

Continued on next page

Table 33. Critical Reliability CSS-Connected Systems — Continued

Port Networks	Switch Node Carriers	Port Slots	Service Slots	Expansion Interfaces	Tone-Clocks	Unused Port Slots	Remaining Port Slots
13	2	1208	49	26	26	60	1148
14	2	1307	53	28	28	65	1242
15	2	1406	57	30	30	70	1336
16	2	1505	61	32	32	75	1430
17	4	1564	65	34	34	80	1484
18	4	1663	69	36	36	85	1578
19	4	1762	73	38	38	90	1672
20	4	1861	77	40	40	95	1766
21	4	1960	81	42	42	100	1860
22	4	2059	85	44	44	105	1954
23	4	2158	89	46	46	110	2048
24	4	2257	93	48	48	115	2142
25	4	2356	97	50	50	120	2236
26	4	2455	101	52	52	125	2330
27	4	2554	105	54	54	130	2424
28	4	2653	109	56	56	135	2518
29	4	2752	113	58	58	140	2612
30	4	2851	117	60	60	145	2706
31	6	2950	121	62	62	150	2800
32	6	3009	125	64	64	155	2854
33	6	3108	129	66	66	160	2948
34	6	3207	133	68	68	165	3042
35	6	3306	137	70	70	170	3136
36	6	3405	141	72	72	175	3230

Continued on next page

Table 33. Critical Reliability CSS-Connected Systems — Continued

Port Networks	Switch Node Carriers	Port Slots	Service Slots	Expansion Interfaces	Tone-Clocks	Unused Port Slots	Remaining Port Slots
37	6	3504	145	74	74	180	3324
38	6	3603	149	76	76	185	3418
39	6	3702	153	78	78	190	3512
40	6	3801	157	80	80	195	3606
41	6	3900	161	82	82	200	3700
42	6	3999	165	84	84	205	3794
43	6	4098	169	86	86	210	3888
44	6	4197	173	88	88	215	3982

 NOTE:

The information provided in [Table 33](#) also applies to ATM-connected systems, with two exceptions. The number of switch node carriers for all port networks in an ATM-connected system is 0, and the expansion interfaces become ATM interfaces. Because the ATM-connected system does not use switch node carriers, there may be additional slots available in the switch.

The ATM links to the ATM switch are duplicated for inter-PN connectivity. The ATM switches may or may not be duplicated, depending on the ATM switch that is being used. [Table 33](#) also applies to ATM network duplication.

Cabling to On- and Off-Premises Systems

Cabling from the system to on-premises and off-premises systems establishes communications paths between the system's line port circuits and trunk port circuits to external trunks, lines, and DTE equipment. The cabling from the system routes to the following:

- Through the network interface to off-premises trunks and lines going to the Central Office (CO) and remote equipment
- Premises (house) wiring (data lines) going to information outlets (modular jacks) used for DTE and on-premises station sets

Cross-connect fields are termination points for equipment cabling and distribution cabling. Connections are made between those termination points to establish communications paths throughout the system. Two major types of distribution frames are:

- The *cross-connect field* is the field on which terminations and cross-connections for CO trunks, equipment cabling, and distribution cabling are made.
- The *Intermediate Distribution Frame (IDF)* is any cross-connect field between the main cross-connect field and the endpoint workstations. The terminations and cross-connections are made for the distribution cabling from the cross-connect field, from other IDFs, and from the site wiring from information outlets.

Firmware Download

The firmware download feature makes it possible to download an image from a remote or local source into DEFINITY and use that image to reprogram the application code of a port circuit pack. This DEFINITY Release 9 feature makes updating firmware more cost effective because it enables customers to update the firmware using the web.

The firmware download feature also reduces the expense of servicing the DEFINITY port circuit packs because it eliminates the need for a technician to be involved when a board is returned. Previously, when a circuit pack required a firmware update, a technician was dispatched to the customer's site to obtain the board and then physically send it back to the factory for reprogramming. With firmware download capabilities, both the technician dispatch and the factory return are eliminated. The customer can self-administer the updates instead of scheduling on-site maintenance.

For Release 9, the UDS1 family of boards (TN464GP, TN2313AP, TN2464BP), the IP Media Processor board (TN2302AP), and the maintenance/test board (TN771DP) can be downloaded. The circuit packs that support the firmware download feature are compatible with earlier DEFINITY releases. However, earlier versions of the circuit packs do not support the firmware download feature.

**NOTE:**

The TN799C and DEFINITY R9 and later software are required to support the firmware download feature. Boards that can be updated using firmware download have a "P" at the end of the TN number.

Circuit Packs and Related Hardware

This section describes the circuit packs and related hardware in DEFINITY Systems. The circuit packs are listed by apparatus code in [Table 35 on page 130](#). After the table, the circuit packs and their functions are provided.

All circuit packs are approximately 8 in. (20 cm) by 13 in. (33 cm). The following connectors attach to 1 end of a circuit pack: 200-pin connector to a *TN*-labeled circuit pack and a 300-pin connector to a *UN*-labeled circuit pack.

Faceplates on the circuit packs are sized to fill the width of a slot, typically 0.75 inches (1.9 cm). Each circuit pack faceplate has a standard pattern of 3 LEDs that indicate the following conditions:

- Red indicates a fault condition
- Green indicates a test condition
- Yellow indicates a busy condition

A special grounding latch on each circuit pack protects it from electrostatic discharge during installation and removal.

**CAUTION:**

A wrist strap must be worn when handling any circuit pack. A ground jack is provided on each cabinet for this purpose.

Color Coding

Port circuit packs and slots are now gray rather than purple. During the transition between the old and new schemes, gray and purple circuit packs are interchangeable. Control circuit packs and slots are white.

Types of Circuit Packs

NOTE:

The purple-colored and white-colored circuit packs and slots are being replaced by circuit packs and slots labeled with gray and white rectangles, respectively. A label with a solid gray rectangle indicates a port slot/circuit pack. A label with an outlined white rectangle indicates a control slot/circuit pack.

- Port: colored purple or labeled with a gray rectangle and can accept any purple or gray-labeled circuit pack
- Control: colored white or labeled with an outlined white rectangle and can accept only a circuit pack assigned to that slot
- Service: colored purple or labeled with a gray rectangle; is a special type of circuit pack that does not have an I/O connector

Four types of circuit packs are installed in carriers:

1. *Port circuit packs* provide links between analog and digital lines, trunks, networks, external communications equipment, and the TDM bus and packet bus. These circuit packs install in any gray port slot.
2. *Control circuit packs* include processor, memory, network control, disk control, tape control, protocol interfaces, duplication, and maintenance. These circuit packs install in dedicated white slots in the control carrier and do not operate in any other slots.
3. *Service circuit packs* produce and detect tones, synthesize speech, classify calls, record announcements, and allow system access for administration and troubleshooting. These circuit packs install in any port slot.
4. *Power converter circuit packs* supply DC voltages to port, control, and service circuit packs. These circuit packs install in dedicated white slots only.

Port Circuit Packs

The components common to all port circuit packs are:

- Bus buffers
- Sanity and control interface (Random Access Memory (RAM))
- Microprocessor with external RAM
- Network processing elements (NPEs) or switch conferencing for Time Division Multiplexing (TDM) in concentration highway (SCOTCH NPE)

Bus Buffers

The bus buffers are the digital interface between the TDM bus wires on the backplane and the circuitry on the circuit pack. They receive or transmit on either of the two 8-bit TDM buses.

SAKI

The sanity and control interface (SAKI) is the circuit pack interface to the TDM bus. It receives control channel information from the bus and sends the information to the microprocessor. Conversely, the microprocessor sends control channel information to the SAKI, which sends it to the TDM bus.

The SAKI also controls status indicator LEDs on the circuit pack, initiates start-up procedures when power is turned on, checks the circuit pack's microprocessor for sanity, and re-initializes the microprocessor in case of problems. If a problem is detected, the SAKI takes the defective circuit pack out of service either on command from the Switch Processing Element (SPE) or when the SAKI determines that interference is present in control time slots on the circuit pack.

Microprocessor with External RAM

The microprocessor performs all low-level functions such as scanning for changes and relay operations. In general, the microprocessor carries out commands received from the SPE and reports status changes to the SPE. Some port circuit packs contain more than 1 microprocessor. The external RAM stores control channel information and port-related information.

Network Processing Elements (NPEs)

The NPEs, or a high-density SCOTCH, perform conference and gain-adjustment functions. An NPE (under control from the microprocessor) can connect a port circuit to any TDM bus time slot. Each port circuit pack has from 1 to 6 NPEs or a SCOTCH NPE.

International Consolidation (I-CON)

TN791, TN2793/TN2793B, TN2214B, TN2215, and TN2464/TN2464BP circuit packs are for export outside of the United States and Canada. The circuit packs are functionally identical to the TN746B, TN793/TN793B, TN2224B, TN2183, and TN464GP circuit packs, respectively.

International Consolidation circuit packs work in Offer Category A systems outside of the US and Canada, and in Offer Category B (DEFINITY BCS or GuestWorks) systems anywhere. When an International Consolidation circuit pack is inserted into a Category A system with the **Location** field set to **1** (US and Canada), the system fails to recognize the circuit pack and generates a major alarm (error code **276**).

Table 34. I-CON Circuit Packs

US and Canada Category A	International Category A or B, US and Canada Category B only	Description
TN746B	TN791	16 port analog line
TN793/TN793B	TN2793/TN2793B	24 port analog line
TN2224B	TN2214B	24 port digital line
TN2183	TN2215	16 port analog line (Australia, China, and Western Europe only)
TN464GP (US and Canada Category A only)	TN2464BP	DS1 with echo cancellation

Circuit Packs in DEFINITY

[Table 35 on page 130](#) lists the circuit packs by apparatus code. After the table, circuit pack functions are detailed.

[Table 46 on page 193](#) lists the available adjuncts. After the table, information briefly describes the adjunct functions.

Table 35. Circuit Packs and Circuit Modules

Apparatus Code	Name	Type
631DA1 AC Power Unit (Multi-Carrier Cabinet)	AC Power Unit (MCC) (+5V, 60A)	Power
631DB1	AC Power Unit (MCC) (-48V/-5V, 8A)	Power
644A1	(Replaced by 649A in R7 and later systems) DC Power Unit (MCC) (+5V, 60A)	Power
645B1	(Replaced by 649A in R7 and later systems) DC Power Unit (MCC) (-48V, 8A)	Power
649A	DC Power Unit (MCC) (-5, +5, -48V) (in a port carrier, a single 649A replaces both the 644A1 and 645B1 power units)	Power
650A	AC Power Unit (CMC)	Power
1217A	AC Power Supply for Single-Carrier Cabinets	Power
676C	DC Power Supply (Single Carrier Cabinet)	Power
982LS	Current Limiter for si only (PPN)	Power
CFY1B	Current Limiter for r only	Power
ED-1E546	DEFINITY AUDIX R3 (Circuit-Pack Assembly) (being replaced by ED-1E568)	Application
ED-1E546	CallVisor ASAI/DEFINITY LAN Gateway R1 (Circuit-Pack Assembly) (being replaced by J58890MA-1)	Application
ED-1E568	DEFINITY AUDIX R4 (Circuit Pack Assembly) (replaces ED-1E546)	Application

Continued on next page

Table 35. Circuit Packs and Circuit Modules — Continued

Apparatus Code	Name	Type
J58890MA-1	Multi Application Platform DEFINITY (Circuit Pack Assembly) List 2 for Call Visor, ASAI, LAN Gateway R2 List 10 for IP Trunk List 20 for CV ASAI, CentreVu Computer Telephony, BCMS Vu List 30 for IP Solutions	Application
NAA1	Fiber Optic Cable Adapter for R7 or later (CMC)	
TN417	Auxiliary Trunk (replaced by TN763D)	Trunk
TN419B	Tone-Clock (Italy, Australia and the United Kingdom, replaced by TN2182B)	Control
TN420B/ C	Tone Detector (replaced by TN2182B or TN744D)	Service
TN429B	DIOD Trunk (Japan)	Trunk
TN429C	CO Trunk (with CAMA)	Trunk
TN429D	DIOD/CO Trunk (with CAMA and US/Japan ICLID)	Trunk
TN433	Speech Synthesizer (Italian)	Service
TN436B	Direct Inward Dialing Trunk (Australia)	Trunk
TN437	Tie Trunk (Australia, replaced by TN760D)	Trunk
TN438B	Central Office Trunk (Australia)	Trunk
TN439	Tie Trunk (Australia and Japan)	Trunk
TN447	Central Office Trunk (United Kingdom, replaced by TN2147C)	Trunk
TN457	Speech Synthesizer, British English	Service
TN458	Tie Trunk for the United Kingdom (replaced by TN760D)	Trunk
TN459B	Direct Inward Dialing Trunk for the United Kingdom	Trunk

Continued on next page

Table 35. Circuit Packs and Circuit Modules — Continued

Apparatus Code	Name	Type
TN464C/D/E/F	DS1 Interface (T1 (24-Channel) or E1 (32-Channel))	Trunk
TN464GP	DS1 Interface with Echo Cancellation and Firmware Download Capability	Trunk
TN465B/C	Central Office Trunk (Multi-Country, 16 kHz PPM)	Trunk
TN467	Analog Line for the United Kingdom and Australia (replaced by TN2183)	Line
TN468B	Analog Line for the United Kingdom and Australia (replaced by TN2183) (16 ports)	Line
TN479	Analog Line (16 ports)	Line
TN497	Tie Trunk (Italy, TGU/TGE/TGI)	Trunk
TN553	Packet Data Line	Line
TN556B/C/D	ISDN Line (12-BRI-S-NT)	Line
TN566B	Multi-Function Board (See ED-1E546)	Application
TN567	Multi-Function Board (See ED-1E546)	Application
TN568	DEFINITY AUDIX 4.0 Voice Mail System (see ED-1E568)	Application
TN570B/C	Expansion Interface	Network
TN572	Switch-Node Clock for the r model only	Control
TN573B	Switch-Node Interface for the r model only	Control
TN574	DS1 Converter (replaced by TN1654) (r model V2 and later)	Port
TN577	Packet Gateway (r model only)	Port
TN722B	DS1 Tie Trunk (replaced by TN767B/C/D/E) (24 ports)	Trunk
TN725B	Speech Synthesizer, United States English	Service
TN726B	Data Line (8 ports)	Line
TN735	MET Line (4 ports)	Line
TN742	Analog Line (8 ports) (replaced by TN746B)	Line

Continued on next page

Table 35. Circuit Packs and Circuit Modules — Continued

Apparatus Code	Name	Type
TN744B/C/D	Call Classifier Tone Detector, Multi-Country	Service
TN746B	Analog Line (US and Canada Offer A Only) (16 ports)	Line
TN747B	Central Office Trunk(8)	Trunk
TN748B/C/D	Tone Detector (replaced by TN2182B)	Service
TN750B/C	Announcement	Service
TN753B	Direct Inward Dialing Trunk (8 ports)	Trunk
TN754B/C	Digital Line (8-4w DCP)	Line
TN755B	Neon Power Unit (all models except csi)	Power
TN756	Tone Detector/Generator (XE) (replaced by TN2182B)	Service
TN758	Pooled Modem (2 ports)	Port
TN760D/E	Tie Trunk (4 ports)	Trunk
TN762B	Hybrid Line (8 ports)	Line
TN763B/C/D	Auxiliary Trunk (4 ports)	Trunk
TN765	Processor Interface (replaced by TN2401 and TN799/TN799B/TN799C) for si only	Control
TN767B/C/D/E	DS1 Interface (T1, 24 Channel)	Trunk
TN768	Tone-Clock (replaced by TN2182B)	Control
TN769	Analog Line (8 ports) (Neon)	Line
TN771DP	Maintenance/Test Board with Firmware Download Capability	Service
TN772	Duplication Interface (R6 LAN si bus and earlier)	Control
TN775B/C	Maintenance (EPN)	Service
TN776	Expansion Interface (si only)	Network
TN777B	Network Control (R6 and earlier) (replaced by TN2401 for R9 and by TN794 for R7 and R8) for si only	Control

Continued on next page

Table 35. Circuit Packs and Circuit Modules — Continued

Apparatus Code	Name	Type
TN778	Packet Control (R6 and some earlier) for si only (replaced by TN794)	Control
TN780	Tone Clock (all models except csi, Stratum 3)	Control
TN786B	Processor (G3V4si and earlier)	Service
TN787F/G/H/J/K	Multimedia Interface	Service
TN788B	Voice Conditioner (Multimedia)	Service
TN789B	Radio Controller	Port
TN790	Processor (R6 si and some earlier)	Control
TN790B	Processor (R7 and R8 si; replaced by TN2404 for R9si)	Control
TN791	Analog Guest Line (16 Port, International Offers or US and Canada Category B only)	Line
TN792	Duplication Interface (for TN2404 Processor Circuit Packs in R9si only; for TN790B in R7 and R8 si only)	Control
TN793/TN793B	24-Port 2-Wire Analog Line (R8.2 and later) (TN793B has Caller ID)	Line
TN794	Network Control/Packet Interface for si only (R7 and R8) (replaced by TN2401 for R9)	Control
TN794/TN2400	Sandwich Assembly Board for R7si and R8si upgrades when the Control Cabinet is being reused	Control
TN795	Processor (DEFINITY ONE)	Control
TN797	Analog CO Trunk and Line (Combo 8 port similar to TN747B)	Line
TN798B	Processor for R6 through R8 csi (replaced by TN2402 for R9csi)	Control
TN799/TN799B/ TN799C	Control LAN (C-LAN) Interface (TN799C is the Firmware Download Source for R9)	Network

Continued on next page

Table 35. Circuit Packs and Circuit Modules — Continued

Apparatus Code	Name	Type
TN801 MAPD (LAN Gateway Interface)	MAPD for LAN Gateway Interface for CTI, CallVisor, PC/LAN (see J58890MA)	Application
TN802/TN802B MAPD	IP Interface Assembly for IP Solutions, including IP Trunking and IP Softphones (see J58890MA)	Application
TN803	MAPD for CTI, CentreVu CT, BCMS Vu, Ursa Minor Centaurus (see J58890MA)	Application
TN1648B	System Access and Maintenance (SYSAM) for r only	Control
TN1650B	Memory (32MB) for r only	Control
TN1654	DS1 Converter, T1 (24-Channel) and E1 (32-Channel)	Trunk
TN1655	Packet Interface (r model V1 and later)	Control
TN1656	Tape Drive (R8r and earlier) (replaced by TN2211 in R8 and later)	Control
TN1657	Disk Drive (r model V1 and later)	Control
TN2135	Analog Line for Italy (16 Port, replaced by TN2183))	Line
TN2136	Digital Line (2-Wire DCP 8 ports, replaced by TN2181 and TN2224/Tn2214)	Line
TN2138	Central Office Trunk (Italy, Loop Start)	Trunk
TN2139	Direct Inward Dialing Trunk (Italy)	Trunk
TN2140B	Tie Trunk (Hungary and Italy, 4 wire E&M)	Port
TN2144	Analog Line (The Netherlands, replaced by TN2183) (16 port)	Line
TN2146	Direct Inward Dialing trunk (Belgium and The Netherlands)	Trunk
TN2147C	Central Office Trunk (without PPM, replaces TN447)	Trunk
TN2149	Analog Line for Belgium (replaced by TN2183) (16 port)	Line
TN2169	Alarm Board (See ED-1E546)	Service

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Table 35. Circuit Packs and Circuit Modules — Continued

Apparatus Code	Name	Type
TN2170	Ethernet Alarm Board (See ED-1E546)	Service
TN2180	Analog Line for Spain and Germany (replaced by TN2183)	Line
TN2181	Digital Line (16-ports DCP-2-Wire)	Line
TN2182B	Tone-Clock (Tone Detector, Tone Generator and Call Classifier (replaces TN419B, TN748B/C/D, TN756 and TN768 (superset of TN744D)	Control
TN2183	Analog line, Multi Country with DSLAC (replaces TN467, TN460, TN2144, TN2146)	Line
TN2184	DIOD Trunk (Germany)	Trunk
TN2185B	ISDN (4-Wire S/T-TE Interface, 8 ports)	Line/Trunk
TN2198	ISDN Line (4-Wire BRI-U-NT, 8 ports)	Line
TN2199	Central Office Trunk (Russia)	Trunk
TN2202	50 Hz Balanced Ring Generator (France) (MCC)	Power
TN2207	DS1 Interface (T1 (24-Channel) and E1 (32 Channel) with DS1 Adjunct Interface)	Trunk
TN2208	Multi-Function Board (see ED-1E546, CallVisor ASAI/DEFINITY LAN Gateway R1 (Circuit-Pack Assembly))	Multi-function
TN2209	Tie Trunk (Russia)	Trunk
TN2210	Tone Generator (1780 Hz)	Service
TN2211	Optical Drive (R8, replaces TN1656)	Control
TN2214B	Digital Line (24-Port, 2-Wire DCP, International Offers or US and Canada Category B only)	Line
TN2215/TN2183	Analog line (16-Port Programmable impedance, International Offers or US and Canada Category B only)	Line
TN2224B	Digital Line (24-Port, 2-Wire DCP)	Line

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Table 35. Circuit Packs and Circuit Modules — Continued

Apparatus Code	Name	Type
TN2238	ATM Interface (Multi-Mode Fiber, Port Network Connectivity, replaced by TN2305 in R7)	Trunk or Application
TN2242	Digital Trunk (Japan - 2MB TTC)	Trunk
TN2301	Logic Switch (for R6r or later, Survivable Remote EPN)	Service
TN2302AP	IP Media Processor Circuit Pack with Firmware Download Capability	Port
TN2305	DEFINITY ATM Interface (Multi-Mode fiber, Port Network Connectivity, CES Trunk)	Trunk or Application
TN2306	DEFINITY ATM Interface (Single-Mode Fiber, Port Network Connectivity, CES Trunk))	Trunk or Application
TN2308	Direct Inward Dialing (Brazil)	Trunk
TN2313AP	DS1 Interface with Firmware Download Capability, US (24-Channel) and International (32-Channel)	Trunk
TN2400	Net/Pkt Backplane Connection (See TN794/TN2400)	Control
TN2401	Net/Pkt Interface Circuit Pack (replaces the TN794 for R9)	Control
TN2402	Processor Circuit Pack (R9csi)	Control
TN2404	Processor Circuit Pack (R9si)	Control
TN2464BP	DS1 Interface with Echo Cancellation, 1 (24-Channel) /E1 (32-Channel) (International Offers or US and Canada Category B only), and Firmware Download Capability	Trunk
TN2793/ TN2793B	24-Port, 2-Wire Analog Line with Caller ID (International Offers or US and Canada Category B only, with US CLID) (only the TN2793B has Caller ID)	Line
TN-CCSC-1	PRI to DASS Converter	Service
TN-CCSC-2	PRI to DPNSS Converter	Service

Continued on next page

Table 35. Circuit Packs and Circuit Modules — Continued

Apparatus Code	Name	Type
TN-C7	PRI to SS7 Converter	Service
TN-CIN	CIN Voice Multiplexer	Service
UN330B	Duplication Interface (r model V1 and later)	Control
UN331C	Processor (r model V1 and later)	Control
UN332B	MSS Network Control (R7r and earlier)	Control
UN332C	MSS Network Control (used with the TN2211 Optical Drive) (R8r or later)	Control

631DA1 AC Power Unit (Multi-Carrier Cabinet)

The 631DA1 accepts 120 VAC 60 Hz and produces the +5 VDC at 60 A available on the carrier backplanes.

If the AC input power fails, the unit converts 144 VDC from the optional batteries in the AC power distribution unit to +5 VDC. A circuit in the battery charger detects the highest equivalent AC or DC input voltage and switches in the correct input voltage.

631DB1 AC Power Unit (MCC)

The 631D B1 accepts 120 VAC 60 Hz and produces -48 VDC at 8 A and -5 VDC at 6 A available on the carrier backplanes. The -48 VDC also supplies power to the cabinet fans.

If the AC input power fails, the unit converts 144 VDC from the optional batteries in the AC power distribution unit to -48 VDC and -5 VDC. A circuit in the optional battery charger detects the highest equivalent AC or DC input voltage and switches in the correct input voltage.

644A1 DC Power Unit (MCC)

The 644A1 converts a -48-VDC input to a +5 VDC output at 60 A. The +5 VDC is distributed on the carrier backplanes to circuit pack slots in the carriers.

645B1 DC Power Unit (MCC)

The 645 B1 converts a -48 VDC input to outputs of -48 VDC at 8 A and -5 VDC at 6 A. The -48 VDC and -5 VDC are distributed on the carrier backplanes to circuit pack slots in the carriers.

649A DC Power Unit (MCC)

The 649A power converter converts a -48 VDC input into outputs of -48 VDC at 10 A, +5 VDC, and -5 VDC at 6 A. The outputs are distributed to circuit pack slots in the carriers. Only one 649A converter is required per carrier except for SN carriers. SN carriers require 2 converters; 1 on each end. The use of the 649A also allows an increase in the number of terminals supported per carrier.

The 649A is not compatible with the 644A or the 645B power converters and is used in R7 or later systems.

650A AC Power Unit (CMC)

The 650 A is a global power-factor-corrected AC/DC converter providing multiple DC outputs and AC ring outputs. The unit is autoranging and accepts 85-264 VAC, 47-63 Hz AC input, and provides 330 Watts total output. The unit provides multiple DC outputs as follows:

- +5.1 VDC, 28 A
- -5.1 VDC, 1.0 A
- -48 VDC, 4.5 A
- +8 to +14 VDC, 1.6 A (fan speed control)
- -150/-115 VDC, 200 mA (neon bus)

The power unit has 3 switch-selectable ring outputs:

- 85 VAC RMS, 80 mA, 20 Hz, centered about -48 VDC, 180 mA
- 72 VAC RMS, 8 to 80 mA, 25 Hz, centered about -48 VDC, 180 mA
- Two 28 VAC RMS (56 V eff), 220 mA, 50 Hz biased about -48 VDC and 0 VDC, 70 mA balanced

The fan speed is controlled by the +8 to +14 VDC (+12 VDC nominal). The output voltage is a function of the ambient inlet air temperature at the bottom of the power supply. The fan output voltage is +14 VDC if the FANALM signal is active.

1217A AC Power Supply for Single-Carrier Cabinets

The 1217A power supply provides additional protection to your equipment in the event of an overload. Overloads trigger a power-supply alarm, but the system's cooling fans continue to run, and the power supply continues to function. The new power supply replaces the WP-51193 L3 and L4-25. It is fully backward compatible.

The 1217A is a power factor-corrected, 50/60-Hz, autoranging (90-264 VAC) input, multi-output power supply providing regulated DC output and switch-selectable 20/25-Hz AC Ringer output voltages. It meets the harmonic distortion requirements of IEC1000-3-2 (PFC), the immunity requirements of IEC 1000-4, and the safety requirements of IEC 950, as well as current UL and CSA requirements.

The 1217A mounts in the power supply slot of the carrier. A power cord with a 3-prong plug on one end connects the supply to a dedicated, AC power source.

676C DC Power Supply (Single Carrier Cabinet)

A -48 VDC source supplies power to the DC power supply at up to 25 A. The 676C produces the following DC outputs: +5 VDC, -5 VDC, -48 VDC, and +12 VDC. The DC outputs are distributed on the cabinet backplane to the slots for the circuit packs. The AC ringing voltage output value and frequency depend on the country of use. The power supply has circuit breakers and Electromagnetic Interference (EMI) filtering.

982LS Current Limiter for R7si or later (PPN)

The 982LS connects to the rear of the processor circuit pack slot only in the PPN in R7si or later. The 982LS provides current-limited accessory 48 VDC, emergency transfer logic, current-limited 5 VDC to trip main circuit breaker if high temperature is detected, and duplicated 48 VDC to fans in the PPN cabinet.

CFY1B Current Limiter for R7r or later

The CFY1B is only in: R7r or later PPNs, MCC EPNs, and single-carrier cabinet EPNs. The unit connects to the rear of the maintenance circuit pack slot and provides current-limited accessory 48 VDC, emergency transfer logic, current-limited 5 VDC to trip the main circuit breaker if high temperature is detected, and duplicated 48 VDC to fans in the EPN cabinet.

ED-1E546 DEFINITY AUDIX R3 **(Circuit-Pack Assembly) (being replaced by** **ED-1E568)**

The DEFINITY AUDIX R3 system allows a person to record and exchange voice messages over the telephone when direct communication is inconvenient or unnecessary. The unit installs in 5 adjacent slots in a carrier and contains up to 16 ports.

The TN566/B Alarm and TN567 multifunction circuit pack holds the CPU, controllers, memory devices, and signal processors. TN566B circuit pack operates with the TN2169 alarm circuit pack to provide monitoring for system power and environmental status, -48 VDC to +12 VDC power conversion for the disk drive and tape drive, and remote terminal access. The TN2170 alarm circuit pack provides a connection to an external LAN in addition to all of the functions provided by the TN2169.

The 160 Mbyte or 600 Mbyte tape drive data cassette recorder distributes software onto a disk, stores periodic backups of data, installs software releases, and removes core dumps and other maintenance information. A 148, 248, 456, 800 Mbyte, or 1 Gbyte disk drive stores customer data, boots the system, and logs system error information. Depending on the disk drive sizes, the unit can handle from 300 to 2000 local and remotely administered subscribers.

Refer to the *DEFINITY AUDIX System, System Description*, 585-300-205, for more information.

ED-1E546 CallVisor ASAI/DEFINITY LAN **Gateway R1 (Circuit-Pack Assembly) (being** **replaced by J58890MA-1)**

ED-1E546 transports ASAI links between a DEFINITY LAN Gateway R1 system and an Ethernet LAN. This unit installs in 5 adjacent slots in a carrier; preferably, the 5 rightmost slots. It is available for all systems except R6 or later csi.

The TN2208 Multi-function circuit pack holds the CPU, controller, and memory devices. The TN2208 operates with the TN2170 Alarm with Ethernet Interface circuit pack to provide monitoring for system power and environmental status, -48 VDC to +12 VDC power conversion for the disk drive and tape drive, and remote terminal access.

The mass storage/cabling combination provides an interface to a 160-Mb tape drive, a 456-Mb disk drive, and associated I/O cables. All application-specific labeling is provided, as required.

ED-1E568 DEFINITY AUDIX R4 (Circuit-Pack Assembly)

The ED-1E568 circuit-pack assembly replaces the ED-1E546.

J58890MA-1 Multi Application Platform DEFINITY (Circuit-Pack Assembly)

The J58890MA-1 is a variation of the MAPD platform that transports ASAI links between a DEFINITY LAN gateway R2 system and an Ethernet LAN. The J58890MA-1 circuit-pack assembly uses the TN801B MAPD (LAN Gateway Interface), a circuit pack built from industry-standard PC processors, interfaces, buses, and ISA/PCI expansion boards. The unit takes up 3 adjacent slots unless placed in slots 6 and 7 — then it uses only those two slots (in the CMC). J58890MA-1 supports all releases after R6.3.1. J58890MA-1 List 2 is used to support CallVisor and ASAI, while List 10 supports IP Trunking. Ursa Minor is supported by J58890MA-1 List 20 and IP solutions is supported by J58890MA-1 List 30.

NAA1 Fiber Optic Cable Adaptor for R7 or later (CMC)

The NAA1 adapter reroutes fiber-optic cable from the front of an ATM circuit pack to the rear of an R7 or later csi Compact Modular Cabinet. While it looks like a circuit pack, it is electrically and optically passive.

TN417 Auxiliary Trunk (replaced by [TN763D](#))

The TN763D auxiliary trunk circuit pack replaces the TN417.

TN419B Tone-Clock for Italy, Australia, and the United Kingdom (replaced by [TN2182B](#))

The TN419B is replaced by the TN2182 tone clock - tone detector and call classifier circuit pack.

**TN420B/C Tone Detector (replaced by
TN2182B or TN744D)**

The TN2182 tone clock-tone detector and call classifier or the TN744D call classifier-detector circuit pack replace the TN420B/C.

**TN429B/C/D DIOD and/or Central Office
Trunk**

TN429B circuit pack provide 8 ports for direct inward/outward dialing (DIOD) trunks. Each port provides a 2-wire interface to the central office (CO) public exchange for incoming and outgoing calls. This circuit pack is required for the Japan ANI feature where the calling number passes through to the DEFINITY System. An in-band detector/converter may be required. Contact your Avaya representative.

TN429C circuit packs provide 8 ports for direct inward/outward dialing (DIOD) trunks. Each port provides a 2-wire interface to the central office (CO) public exchange for incoming and outgoing calls. The TN744D or TN2182B work with TN429C to provide tone generation and tone detection. Upon seizing out, dial tone from the CO passes through the TN429C to a tone detector. The TN429C provides the required CO disconnect functions as well as the interface to CAME/E911.

TN429D (ICLID incoming call line identification) provides 8 ports for direct inward/outward dialing (DIOD) trunks. Each port provides a 2-wire interface to the central office (CO) public exchange for incoming and outgoing calls. The CO provides caller names and numbers to the TN429D, which displays them on DEFINITY digital telephones (DCP and BRI) equipped with a 32- or 40-character alphanumeric display, and with System 25/MERLIN 7315H and 7317H terminals supported by DEFINITY. This feature is supported in the United States (name and number) and Japan (number only) and countries that comply with either requirements.

TN433 Speech Synthesizer, Italian

The TN433 provides 4 ports that retrieve fixed messages for leave word calling, Automatic wakeup, and visually impaired attendant console features. Examples of the messages are: good morning, time-of-day, and extension number. Each of the ports has touch-tone detection. The TN433 has administrable μ -Law and A-Law companding.

TN436B Direct Inward Dialing Trunk for Australia

The TN436B provides 8 ports for Direct Inward Dialing (DID) independently connected to a public network. Each port is an interface between a 2-wire analog line from a CO and the 4-wire TDM network in the system. The TN436B has administrable timers.

TN437 Tie Trunk for Australia (replaced by TN760D)

The TN437 is replaced by the [TN760D](#) tie trunk circuit pack.

TN438B Central Office Trunk for Australia

The TN438B provides 8 ports for loop-start CO trunks. Each port has tip and ring signal leads. The TN438B can detect 12 kHz and 50 Hz periodic metering pulses from the CO. Additional features include call still held timing and automatic guard fault detection circuitry.

TN439 Tie Trunk for Australia and Japan

The TN439 provides 4 ports for 2-wire tie trunks with loop disconnect signaling. The TN439 has administrable A-Law and μ -Law companding and administrable timers.

TN447 Central Office Trunk for the United Kingdom (replaced by TN2147C)

The [TN2147C](#) central office trunk circuit pack replaces the TN447.

TN457 Speech Synthesizer, British English

The TN457 provides 4 ports that retrieve fixed United Kingdom-accent spoken messages for leave word calling, automatic wakeup, and visually impaired attendant console features. Examples of messages are: good morning, time-of-day, and extension number. Each of the ports has touch-tone detection. The TN457 has administrable A-Law and μ -Law companding.

TN458 Tie Trunk for the United Kingdom (replaced by [TN760D](#))

The TN458 is replaced by the [TN760D](#) tie trunk circuit pack.

TN459B Direct Inward Dialing Trunk for the United Kingdom

The TN459B provides 8 ports for immediate-start or wink-start direct inward dialing (DID) trunks. Each port has tip and ring signal leads. Each port is an interface between a 2-wire analog line from a CO and the 4-wire TDM network in the system. The TN459B has administrable timers and a backward busy circuit that complies with signaling requirements.

TN464C/D/E/F/GP DS1 Interface, T1 (24-Channel) or E1 (32-Channel)

All TN464 circuit packs provide:

- Board-level, administrable A-Law or μ -Law companding
- CRC-4 generation and checking (E1 only)
- Stratum 3 clock capability
- ISDN-PRI T1 or E1 connectivity
- Line-out (LO) and line-in (LI) signal leads (unpolarized, balanced pairs).
- Support for CO, TIE, DID, and off-premises station (OPS) port types that use robbed-bit signaling protocol, proprietary bit-oriented signaling (BOS) 24th channel signaling protocol, or DMI-BOS 24th channel signaling protocol
- Support for Russian incoming ANI (R7 or later)

TN464C and later circuit packs can be used as universal, digital, signal level-1 boards in wideband ISDN-PRI applications.

TN464E and later circuit packs provide test-jack access to the DS1 or E1 line and support the 120A Integrated Channel Service Unit (CSU) module.

TN464F (US and Canada Offer A Only) circuit packs use the enhanced maintenance capabilities of the integrated channel service unit (ICSU). These circuit packs can communicate with CONVERSANT[®]. See [TN2185B](#).

For DEFINITY Release 9, the TN464F is replaced by the TN464GP. The TN464F does not support the firmware download feature.

TN464GP Firmware Download Target with

Echo Cancellation circuit pack is the new Universal DS-1 (UDS1) circuit pack available for all DEFINITY platforms with Release 9. It replaces the TN464F for new R9 systems being shipped. The TN464GP is essentially the same as the TN464F UDS1 circuit pack except that it has echo cancellation circuitry and firmware download capability. To enable the echo cancellation capability, the customer must purchase an Echo Cancellation Software Right-to-Use feature in addition to the hardware.

The echo cancellation capability of the TN464GP is selectable per channel. The TN464GP automatically turns off echo cancellation when it detects a 2100-Hz phase-reversed tone put out by high-speed modems (56 Kbaud), but not when it detects a 2100-Hz straight tone generated by low-speed modems (9.6 Kbaud). Echo cancellation improves a low-speed data call.

The TN464GP is intended for DEFINITY customers who are likely to encounter echo over circuits connected to the public network. The occurrence of echo is likely if the DEFINITY is configured for ATM, IP, or other complex services and interfaces to local service providers who do not routinely install echo cancellation equipment in all their circuits. A common source of echo is "hybrid" circuits, where conversions between 2-wire analog and 4-wire digital circuits take place. The TN464GP cancels echo with delays of up to 96 ms.

The TN464GP can be updated using the firmware download feature, which requires use of the TN799C C-LAN interface.

TN465B/C Central Office Trunk, Multi-Country

TN465B/C circuit packs support 8 analog CO trunk ports, loop-start trunk signaling, 12-kHz and 16-kHz periodic pulse metering (PPM) detection and counting, and administrable timers.

TN465B circuit packs provide battery reversed signaling.

TN465C circuit packs provide multi-country selectable signaling. For more information, contact your Avaya representative.

TN467 Analog Line for the United Kingdom and Australia (replaced by [TN2183](#))

The TN467 is replaced by the [TN2183](#) analog line circuit pack.

TN468B Analog Line for the United Kingdom and Australia (replaced by [TN2183](#))

The TN468B is replaced by the [TN2183](#) analog line circuit pack.

TN479 Analog Line

The TN479 has 16 ports and supports 3 ringer loads and 3 simultaneous ringing ports. Only 1 telephone can have an LED message-waiting indicator (neon message-waiting indicators are not supported). The TN479 supports μ -Law companding.

The TN479 supports the terminals listed below.

Table 36. Terminals and wiring configurations supported by the TN479

Terminal	Wire Size (metric area/diameter)	Maximum Range
500-Type	24 AWG (0.2 mm ² /0.5 mm)	3,000 ft. (914 m)
2500-Type	24 AWG (0.2 mm ² /0.5 mm)	3,000 ft. (914 m)
7100-Series	24 AWG (0.2 mm ² /0.5 mm)	3,000 ft. (914 m)
7101A-Series	not supported	not supported
7103A-Series	not supported	not supported
8100-Series	24 AWG (0.2 mm ² /0.5 mm)	2,500 (762 m)
9100-Series	24 AWG (0.2 mm ² /0.5 mm)	2,500 (762 m)

TN497 Tie Trunk for Italy

The TN497 has 4 ports for 2-wire tie trunks with loop disconnect signaling. Each port can be administered for A-Law and μ -Law companding, timers, Translate Giunzione Unscnte (TGU) (outgoing tie), Translate Giunzione Entrante (TGE) (incoming tie), and Translate Giunzione Interno (TGI) (internal tie).

TN553 Packet Data Line

The TN553 has 12 ports that can connect through a cross-connect field to a TN726B circuit pack and provides software-administrable connections between the Switch Processing Element (SPE) and system access ports. Inside the system, the TN553 connects to the packet bus and converts mode-2 protocol to mode-3 protocol connecting the TN726B to the TDM bus for asynchronous Electronic Industries Association (EIA) connections to adjuncts.

TN556B/C/D ISDN-BRI 4-Wire S/T-NT Interface

The TN556 has 12 ports connecting to ISDN-BRI terminals. Each port on a TN556 has TXT, TXR, PXT, and PXR signal leads. Up to 8 ports can be used for Adjunct Switch Application Interface (ASAI) links. Each port operates at 192 kbps per second and has 2 B-channels and 1 D-channel (not used to carry data).

The TN556 has a range of up to 1900 feet (579 m) maximum from the system to the telephone using 24 AWG (0.20 mm²/0.51 mm) wire, and uses standard ANSI T1.605 protocol. The TN556 also has multipoint support; 24 terminals can be connected, where each terminal uses 1 B-channel and shares the D-channel. In multi-support applications, 2 telephones, or 1 telephone and 1 data terminal, or 2 data terminals can connect to each port.

The TN556 circuit pack supports A-Law or μ -Law companding. The TN556 also functions as a trunk, connecting to a TE interface (example: a TN2185B in another DEFINITY ECS). It can be used for lines and trunks simultaneously (on the same circuit pack).

TN556C is required for ISDN BRI service under R6.2 or later csi.

TN556D circuit packs provide end-to-end outpulse signaling when the circuit pack is in tie-trunk mode with a [TN2185B](#).

TN566B Multi-Function Board (see [ED-1E546](#))

A component of [ED-1E546](#), the [DEFINITY AUDIX R3 \(Circuit-Pack Assembly\)](#) (being replaced by [ED-1E568](#)). The TN566B monitors system power and environmental status, -48 VDC to +12 VDC power conversion for the disk drive and tape drive, and remote terminal access.

TN567 Multi-Function Board (see [ED-1E546](#))

A component of [ED-1E546](#), the [DEFINITY AUDIX R3 \(Circuit-Pack Assembly\)](#) (being replaced by [ED-1E568](#)). TN567 multifunction circuit packs contain a CPU, controllers, memory devices, and signal processors.

TN568 DEFINITY AUDIX 4.0 Voice Mail System (see [ED-1E568](#))

A component of the [ED-1E568](#), the TN568 is a processor circuit pack that supports voice mail using an embedded 386EX processor. DEFINITY AUDIX systems can be interconnected to create large voice-mail networks that support up to 100,000 subscribers and store up to 100 hours of messages. Each circuit pack has 8 ports available for calls when networking is enabled. Without networking, 12 ports are available.

The TN568 takes up two adjacent slots, except in slot 6 of a CMC.

The circuit pack includes a writable magneto-optical disk drive for backing up and upgrading system software and a hard disk for storing messages. There is an RS-232 connection for a maintenance and administration terminal, an Ethernet port (for the Message Manager PC desktop application), an Amphenol connection to the switch, and an RS-232 port for an external, remote-maintenance modem.

DEFINITY ECS recognizes the TN568 as a TN746B, TN754 or a TN2181 in R6 or earlier systems, depending on the emulation mode that is used.

TN570B/C Expansion Interface

The TN570 Expansion Interface (EI) is used in R7si/r or later systems. This circuit pack is an interface between the TDM bus and packet bus, and fiber optic links interconnecting cabinets. It is used in a Port Network (PN) between a PN and another PN in a direct-connect system, and between a PN and an SNI in a switch node carrier in a CSS-connected system.

The TN570 provides control channel applications and time-slot interchanging between the PPN and EPNs. It is used when ISDN-BRI and/or ASAI is connected in an EPN, and is always used in R7r or later.

The TN570 carries circuit-switched data, packet-switched data, network control, timing control, and DS1 control. This circuit pack also communicates with the TN775B maintenance circuit pack in an EPN to send the EPN environmental and alarm status to the SPE.

The TN570 is replaced by the TN2305 or TN2306 when an ATM switch replaces the Center Stage Switch.

TN570C circuit packs are used in SREPN (Survivable Remote Expansion Port Network), R7 or later si.

TN572 Switch-Node Clock for the r model only

The TN572 distributes the timing signals that synchronize the SN carrier. The TN572 also receives maintenance data.

TN573B Switch-Node Interface for the r model only

The TN573B Switch Node Interface (SNI) routes circuit, packet, and control messages. The TN573B is an interface installed in a SN carrier in a CSS that terminates a fiber optic link from a SNI in an SN carrier to an SNI in another SN carrier, an EI in a PPN, and an EI in an EPN. One TN573B is used per PN and supports the TN574 DS1 converter circuit pack.

The TN573B and higher provides an interface to the single-mode fiber optic transceiver and supports the TN1654 and TN574 DS1 converter circuit pack.

TN574 DS1 Converter (replaced by [TN1654](#)) for r only

The TN574 is replaced by the [TN1654](#).

TN577 Packet Gateway for r only

The TN577 packet gateway (PGATE) provides 4 RS-423 physical ports for X.25 protocol interfaces between the system and adjuncts. In this application, PGATE functions as the data communications interface unit providing protocol conversion between the X.25 protocol and the mode 3 protocol carried across the LAN Bus.

The X.25 protocol (Levels 1 and 2) is terminated and the data reformatted into the ISDN packet mode protocol for transport across the LAN bus. Supported adjuncts include AUDIX, CMS, and Message Server Adjunct (MSA).

The TN577 also supports the Distributed Communications System (DCS) environment by providing X.25 signaling through 1 of the RS-423 physical ports, or back through the system using the TDM Bus to the appropriate DS1 or tie trunk circuit pack.

TN722B DS1 Tie Trunk (replaced by TN767B/C/D/E)

This circuit pack is replaced by the TN767 DS1 Interface circuit pack.

TN725B Speech Synthesizer, United States English

The TN725B has 4 ports that send voice message information to telephones to activate leave word calling, automatic wakeup, voice message retrieval, and Do Not Disturb features. The ports can detect tones.

TN726B Data Line

The TN726B has 8 serial asynchronous EIA ports with modem interfaces connected through asynchronous data units (ADUs) to EIA ports (such as RS-232) on DTE. The TN726B uses Mode 2 or Mode 3 data transfer protocol. The DTE can be adjuncts and peripheral equipment such as data terminals, printers, host computers, personal computers (PCs), graphics and facsimile systems, and call detail acquisition and processing systems (CDAPs).

With software-administered system access ports, a TN726B connects through a cross-connect field to a TN553 packet data line circuit pack. The TN553 then converts mode 2 protocol to mode 3 protocol transferring the TN726B from the packet bus to the TDM bus for EIA connections.

Each port on a TN726B has TXT (terminal, transmit, and tip), TXR (terminal, transmit, and ring), PXT (port, transmit, and tip), and PXR (port, transmit, and ring) signal leads.

TN735 MET Line

The TN735 has 4 ports that connect to multi-button electronic telephone (MET) sets. Each port has tip and ring (analog voice) and BT, BR, LT and LR (digital signals to control terminals) signal leads.

TN742 Analog Line (replaced by TN746B)

The TN742 is replaced by the TN746B analog line circuit pack.

TN744B/C/D Call Classifier Tone Detector, Multi-Country

TN744B has 8 tone detectors used in vector prompting, outgoing call management (OCM), and call prompting applications in the United States and Canada. The TN744B detects special intercept tones used in network intercept tone detection in OCM. The TN744B also detects tones when a CO answers a call. The TN744B does not classify data calls. Instead, a tone detector circuit pack classifies the calls. If the TN744B does not classify the call within 60 seconds, it is removed from the call and timed far-end supervision classifies the call.

The TN744B provides tone generation and detection for R2-MFC DID signaling used in non-United States installations. The TN744 also allows gain or loss to be applied to pulse code modulation (PCM) signals received from the bus and supports A-Law and μ -Law companding. The TN744B detects 2025 Hz, 2100 Hz, or 2225 Hz modem answerback tones and provides normal broadband and wide broadband dial tone detection. For MFC, the TN744B vintage 7 or greater call classifier is required.

TN744B/C circuit pack has 8 ports of tone detection on the TDM bus. The TN744B/C does not support call progress tone generation or clocking

The TN744B/C processor supports digital signal processing of PCM signals on each port to detect tones and other signals. Generation of signaling tones is also supported for applications such as R2-MFC, Spain MF, and Russia MF. Gain (or loss) and conferencing can be applied to PCM signals received from the TDM bus. Additional support includes DTMF detectors to collect address digits during dialing, and A-Law and μ -Law companding.

TN744D circuit pack has 8 ports of tone detection on the TDM bus. The TN744D does not support call progress tone generation or clocking.

The TN744D supports all of the functions of the TN744C plus additional call classifier options for various countries. The TN744D processor supports digital signal processing of PCM signals on each port to detect, recognize, and classify tones and other signals. Generation of signaling tones is also supported for applications such as R2-MFC, Spain MF, and Russia MF. Gain (or loss) and conferencing can be applied to PCM signals received from the TDM bus. Additional support includes DTMF detectors to collect address digits during dialing, and A-Law and μ -Law companding.

In normal operation, a port on the TN744D may serve as an incoming register for Russia MFR (multi-frequency shuttle register signaling). Use the TN744D Vintage1 with the TN429C analog line central office trunk for CAMA/E911.

TN746B Analog Line

(US and Canada Offer A Only)

The TN746B has 16 ports. Each port supports 1 telephone. LED message waiting indicators are not supported off premises. Auxiliary equipment — such as fax machines, answering machines, modems, and amplifier handsets — is supported.

The TN746B supports on-premises (in-building) wiring with either touch-tone or rotary dialing and with or without the LED and neon message waiting indicators. The TN746B supports off-premises wiring (out-of-building only with certified protection equipment) with either DTMF or rotary dialing, but LED or neon message waiting indicators are not supported off-premises.

The TN746B, along with a TN755B neon power unit per carrier or per single-carrier cabinet, supports telephones equipped with neon message waiting indicators (on-premises use only). The TN746B supports 3 ringer loads, only 1 telephone can have an LED or neon message waiting indicator.

The TN746B supports μ -Law companding but not administrable timers. TN746C and later supports A-Law and μ -Law companding and administrable timers. The TN746B supports queue warning level lights associated with the DDC and UCD features, recorded announcements associated with the Intercept Treatment feature, and PagePac paging system for the Loudspeaker Paging feature. Additional support is provided for external alerting devices associated with the TAAS feature, neon message waiting indicators, and modems. Secondary lightning protection is provided on the TN746B only. The TN746B supports up to 8 simultaneous ports ringing.

Combined conversion of Modem Pooling requires a port on a TN754B and a port on a TN742, TN746B or TN769 Analog circuit pack for each combined resource that is to be supported.

The TN746B is compatible with the terminal configurations shown in the table below.

Table 37. Terminals and wiring configurations supported by the TN746B Circuit Pack

Terminal	Wire Size	Maximum Range
500-Type	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
2500-Type	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
7100-Series	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
7101A-Series	24 AWG (0.2 mm ² /0.5 mm)	15,200 ft. (4,633 m)
7103A-Series	24 AWG (0.2 mm ² /0.5 mm)	15,200 ft. (4,633 m)
8100-Series	24 AWG (0.2 mm ² /0.5 mm)	12,000 ft. (3,657m)
9100-Series	24 AWG (0.2 mm ² /0.5 mm)	12,000 ft. (3,657m)

TN747B Central Office Trunk

The TN747B has 8 ports for loop-start or ground-start CO, foreign exchange (FX), and wide area telecommunications service (WATS) trunks. Each port has tip and ring signal leads. A port can connect to a PagePac paging system. The TN747B supports the abandoned call search feature in automatic call distribution (ACD) applications (if the CO has this feature). Vintage 12 or greater of the TN747B also provides battery reversed signaling.

TN748B/C/D Tone Detector (replaced by TN2182B)

The TN748B/C/D is replaced by the TN2182B tone clock - tone detector and call classifier and the TN744C call classifier circuit pack.

TN750B/C Announcement

The TN750 and TN750B record and store announcements to be played back on demand as part of a calling feature. The TN750 has sampling rates of 16, 32, or 64 kbps. The TN750 records announcement times of up to 2 minutes 8 seconds at 64 kbps, 4 minutes 16 seconds at 32 kbps, and 8 minutes and 32 seconds at 16 kbps.

TN750B can record messages from on- or off-premises telephones and can store up to 128 recorded announcements of 8 maximum minutes total. The TN750B has 16 channels and each can play any announcement. Up to 25 call connections can listen to each channel. This means a total simultaneous call capacity of 400 calls in R7 or later si. 256 callers can connect to each channel in R7r or later.

TN750C Announcement circuit pack records and stores announcements that can be played back on demand as part of a calling feature. Equipping 10 circuit packs in a system provides a total capacity of 42.6 minutes (at 32 kbps) and 160 ports. In other words, 160 announcements can play simultaneously. The 16 kbps compression rate (adequate for VDN of origin announcements) provides a total capacity of 85.3 minutes. Use of multiple circuit packs allows a more efficient method of providing many kinds of announcements and provides improved management of integrated announcements.

TN753B Direct Inward Dialing Trunk

The TN753B has 8 ports used for immediate-start and wink-start direct inward dialing (DID) trunks. Each port has tip and ring signal leads. For the Czech Republic of Slovakia and the Commonwealth of Independent States, vintage 17 (or greater) is required. The TN753B supports A-Law and μ -Law companding with vintage 17 (or greater).

The TN753B is required to support Brazil Block Collect Call.

TN754B/C 4-Wire DCP Digital Line

The TN754B has 8 asynchronous, 4-wire DCP ports that can connect to 7400-series and 8400-series digital telephones, attendant consoles, or data modules. The TN754B has administrable A-Law and μ -Law companding. The TN754B supports the 8400-series terminal/Data Module types and 7400-series terminals.

Table 38. Maximum Range of 7400-series and 8400-series

Supported Equipment	Distance Limits	Wire
7400 Data Modules	5000 feet (1524 m)	24 AWG (0.2 mm ² /0.5 mm)
7400 Data Modules	4000 feet (1219m)	26 AWG
7400-series Telephones	3500 feet (1067m)	24 AWG (0.2 mm ² /0.5 mm)
7400-series Telephones	2200 feet (670m)	26 AWG
8400-series Data Modules	3500 feet (1067 m)	24 AWG (0.2 mm ² /0.5 mm)
8400-series Telephones	3500 feet (1067m)	24 AWG (0.2 mm ² /0.5 mm)

The TN754B does not support group paging.

The TN754C provides greater call handling capacity for high traffic applications and supports the group paging feature.

Combined conversion of Modem Pooling requires a port on a TN754B and a port on a TN742, TN746B or TN769 Analog circuit pack for each combined resource that is to be supported.

TN755B Neon Power Unit for all Models except csi

The TN755B produces 150 VDC to operate neon message waiting lights on terminals connected to TN746B analog line circuit packs.

A TN755B neon power unit is required for each carrier where neon message waiting indicators are connected.

This circuit pack and the neon message waiting function are not available on systems using the TN2202 ring generator circuit pack for France balanced-ringing.

TN756 Tone Detector/Generator (replaced by TN2182B)

The TN756 is replaced by the TN2182 tone clock-tone detector and call classifier circuit pack.

TN758 Pooled Modem

The TN758 has 2 conversion resources ports (such as a trunk data module) for switched connections between digital data endpoints (data modules) and analog data endpoints (modems). A TN758 Circuit pack is required for each 2 conversion resources provided with the integrated type of modem pool. The TN758 supports μ -Law companding only.

TN760D/E Tie Trunk

TN760D has 4 ports used for Type 1 or Type 5 four-wire E & M lead signaling tie trunks, that can be automatic, immediate-start, wink-start, and delay-dial. Each port on a TN760D has T, R, T1, R1, E, and M signal leads. The TN760D provides release link trunks required for the CAS feature and has administrable A-Law and μ -Law companding.

Option switches on each TN760D port can select connections to Type 1 E & M standard unprotected format, Type 1 E & M compatible unprotected format, Type 1 E & M compatible protected format, and Type 5 simplex format.

For Belgium, Czech Republic of Slovakia, the Commonwealth of Independent States, and the Netherlands, use vintage 11 or greater.

TN760E circuit packs support outgoing, Multilevel Precedence and Preemption (MLPP).

TN762B Hybrid Line

The TN762B has 8 ports connecting to multi-appearance hybrid analog and digital telephones. It can connect to 7300-series telephones, an MDC-9000 (cordless telephone), and an MDW-9000 (cordless telephone with separate base station and charging stations).

Each port on a TN762B has VT and VR (analog voice), CT, CR, P-, and P+ (digital signals that control terminals) signal leads.

TN763B/C/D Auxiliary Trunk

The TN763 has 4 ports. Each port has T, R, SZ, SZ1, S, and S1 signal leads. The circuit pack is used for on-premises applications such as music-on- hold, loudspeaker paging, code calling, and recorded telephone dictation access.

TN763C supports external recorded announcement equipment.

TN763D is administrable to select A-Law or μ -Law companding.

TN765 Processor Interface (replaced by TN2401 and [TN799/TN799B/TN799C](#))

The TN2401 and [TN799/TN799B/TN799C](#) replace this circuit pack, though existing circuit packs will work with DEFINITY ECS R9.

TN767B/C/D/E DS1 Interface, T1 (24 Channel)

All TN767 circuit packs provide a DSX1 level physical interface to the DS1 facility and require a TN464C or greater DS1 interface. The TN767 has unpolarized line out (LO) and line in (LI) signal lead pairs.

TN767B and later suffix circuit packs support DS1 rate digital facility connectivity. The circuit packs support CO, Tie, DID, and off-premises stations (OPS) port types using the robbed-bit signaling protocol. These circuit packs also support ISDN-PRI connectivity in R7 or later. For these applications, the signaling *D* channel can connect from the TN767B to the TN765 processor interface by a permanent switched call over the TDM bus.

TN767E and later is required to communicate with CONVERSANT and for the enhanced maintenance capabilities of the 120A enhanced integrated channel service unit (ICSU) feature.

DS1 tests include loopback tests at the DS1 board edge or the 120A (if used), bit error rate (BER) loopback tests at the far-end CSU, and BER 1-way DS1 facility tests. Other tests include loopback testing specifically designed to locate DS1 facility faults.

TN768 Tone-Clock (replaced by TN2182B)

The TN768 is replaced by the TN2182B Tone Clock - tone detector and call classifier circuit pack. It is not necessary to replace the TN768 with the TN2182B in an upgrade. The TN768 is an acceptable Tone-Clock for R7 and R8.

TN769 Analog Line

The TN769 has 8 ports, each with tip and ring signal leads. The TN769 supports

- On- or off-premises wiring (with certified protection equipment) with either touch-tone or rotary dialing and with or without LED or neon message waiting indicators
- 3 ringer loads, such as 3 telephones with 1 ringer load each
- Up to 4 simultaneous ports ringing
- Queue warning level lights associated with the DDC and UCD features
- Recorded announcements of the intercept treatment feature
- Dictation machines of the recorded telephone dictation access feature
- PagePac paging system for the loudspeaker paging feature
- External alerting devices of the trunk answer any station (TAAS) feature
- Modems

The TN769 does not support off premises message waiting indicators.

The TN769 provides secondary lightning protection, and supports μ -Law companding.

Each carrier with neon message indicators requires the TN769, along with a TN755B neon power unit to support neon message waiting indicators. Only 1 telephone can have an LED or neon message waiting indicator.

Combined conversion of Modem Pooling requires a port on a TN754B and a port on a TN742, TN746B or TN769 Analog circuit pack for each combined resource that is to be supported.

Table 39. Terminals and wiring configurations supported by the TN769 Circuit Pack

Terminal	Wire Size	Maximum Range
500-Type	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
2500-Type	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
7102-Series	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
7101A-Series	24 AWG (0.2 mm ² /0.5 mm)	15,200 ft. (4,633 m)
7103A-Series	24 AWG (0.2 mm ² /0.5 mm)	15,200 ft. (4,633 m)
8100-Series	24 AWG (0.2 mm ² /0.5 mm)	10,000 (3,048 m)
9100-Series	24 AWG (0.2 mm ² /0.5 mm)	10,000 (3,048 m)

TN771DP Maintenance/Test (all except R6 and later csi)

The TN771DP performs maintenance functions. These functions include packet bus reconfiguration that allows diagnosis and correction of recoverable packet bus failures before the link access procedure on the D-channel (LAPD) links fail. LAPD is a link-layer protocol on the ISDN-BRI and ISDN-PRI data link layer (level 2). LAPD provides data transfer between 2 devices and error and flow control on multiple logical links. It recovers packet bus failures involving up to 3 malfunctioning leads (1 or 2 data or parity leads and 1 control lead) by swapping spare leads with the malfunctioning leads.

Other maintenance functions include ISDN-PRI testing that originates and terminates loopback tests on ISDN facilities. It provides bit and block error rate information indicating ISDN facility quality.

A TN771DP is required in all si- and r-model standard reliability PPNs and critical reliability EPNs. The TN771DP is also required in all standard reliability PPNs when packet endpoints (BRI and/or ASAI) are supported, and in all critical reliability systems when packet endpoints are supported.

The TN771DP can be updated using the firmware download feature, which requires use of the TN799C C-LAN interface.

TN772 Duplication Interface (R6 and earlier)

for si only

The TN772 selects the active Switch Processing Element (SPE) (control complex) in high reliability and critical reliability R6 and some earlier systems. The TN772 also coordinates the interchange of SPEs.

The TN772 controls the memory shadowing function with the duplication option, terminates the environmental sensors, and controls the integrated battery supply and charging circuits. The TN772 is also responsible for selecting the active SPE, selecting the active tone-clock circuit pack, and providing an administration terminal interface in place of the processor. A second TN772 circuit pack resides in the duplicated control carrier/cabinet and requires a cable connection to the Duplication Interface circuit pack in the basic control carrier/cabinet.

TN775B/C EPN Maintenance Board

The TN775B/C boards are used in maintenance and monitor power failure signals in an EPN cabinet in R7si/r or later. These circuit packs also monitor the clock, monitor and control the power supplies and battery charger, and monitor air flow and high temperature sensors. These circuit packs provide 2 serial links to communicate with Expansion Interface (EI) circuit packs, and provide an RS-232 interface for connection to an administration terminal. Each circuit pack contains a 3-position switch to control emergency power transfer.

The TN775C contains a new DC to DC power converter and is used in maintenance to monitor the R7 or later processor in a Survivable Remote Expansion Port Network (SREPN) configuration.

TN776 Expansion Interface for R6 or earlier si

The TN776 installs in the expansion interface slot in a control carrier, duplicated control carrier, expansion control carrier, or port carrier. The TN776 connects to the TDM bus in 1 PN and is an interface between that PN and the TDM bus extending to another PN. The TN776 packages the TDM control channel with Link Access Procedure on the D-Channel (LAPD) for transmission over the fiber link between cabinets. The TN776 provides the time-slot interchange between cabinets.

A system with ASAI/BRI or with PRI signaling from the packet bus (PACCON) requires a TN570B/C EI circuit pack in place of a TN776 circuit pack.

Starting with R7 all new si model switches will ship with the TN570.

TN777B Network Control (R6 and earlier) (replaced by TN2401 for R9 and by TN794 for R7 and R8) for si only

The TN777B is replaced by the TN2401 for R9. The TN777B is replaced by the TN794 Network Control/Packet Interface for R7 and R8.

TN778 Packet Control (R6 and earlier) (replaced by TN794) for si only

The TN778 is replaced by the TN794 Network Control/Packet Interface.

TN780 Tone-Clock for All Models Except csi

The TN780 connects to and monitors an optional external Stratum 3 clock for digital frame timing. It also couples the clock output to local clocks. The TN780 supplies master timing to the system and produces the following tones: call progress, touch tones, answer-back, and trunk transmission test. It has 2 MHz, 160 kHz, and 8 kHz clocks. This circuit pack can transmit the system clock and tones on either TDM bus A, TDM bus B, or both.

The TN780 is administrable to produce 5 tone plans (for countries outside the United States) other than the United States tone plan. Six tones can be customized in each plan. The TN780 supports μ -Law or A-Law companding.

TN786B Processor for R4 and earlier

The TN786B contains a CPU, 4 Mb of RAM, and 7 Mb of ROM, as well as a maintenance tape processor (MTP) with 32 Kb of RAM and 64 Kb of ROM. The TN786B does not have a tape interface. The TN786B maintenance processor provides:

- Power management
- Control for system alarms and LEDs
- Transfers in duplicated systems
- Serial IO capability

TN787F/G/H/J/K Multimedia Interface

The TN787 multimedia interface circuit pack is used in conjunction with the TN788B multimedia voice conditioner circuit pack to provide service circuit functionality for the Multimedia Call Handling (MMCH) feature. This feature provides both voice and multimedia data service between multimedia complexes (endpoints). Up to 6 endpoints can conference to a single multimedia call occurrence.

TN787F/G provides a TDM bus interface and a DS1 adjunct cable interface. The TN787F/G routes the H.221 multimedia information to the DS1 interface to free more TDM bus timeslots. This allows the system to carry more audio, video, and data bit streams between multimedia complexes (endpoints).

TN787J introduces multiple PN support.

TN788B Multimedia Voice Conditioner

The TN788B Multimedia Voice Conditioner circuit pack is used in conjunction with the TN787F/G multimedia interface circuit pack to provide service circuit functionality for the MMCH feature. This feature provides both voice and multimedia data service between multimedia complexes (endpoints).

NOTE:

The TN788B vintage is μ -Law only. The TN788B vintage 2 or later is A-Law and μ -Law.

The TN788B is the audio processor for the Px64 multimedia conference bridge. The TN788B contains 8 digital signal processors; 4 for encoding and 4 for decoding. Each encoder/decoder pair is assigned to a Px64 endpoint to process its audio channel. Connection to and from the endpoint's audio is by way of a TN787F/G multimedia interface port. This connection is through the TDM bus timeslots.

Each of the 8 digital signal processors communicate with the main on-board processor through 8 individual Dual Port Random Access Memory (DPRAMs). No Read Only Memory (ROM) is available on this circuit pack; the DPRAM is used for program download.

TN789B Radio Controller

The TN789B circuit pack is an interface between a DEFINITY system and 2 Wireless Fixed Base (WFB) radio units for the DEFINITY wireless business system R1-PWT. The TN789B contains a main processor to handle data line circuit (DLC) and upper medium access (MAC) layers of firmware. The TN789B also contains 2 lower MAC processors; 1 for each radio interface. Each radio interface is referred to as an I2 interface.

The I2 link is the connection between the Radio Controller (RC) and the WFB. The RC supports up to two I2 links, each link consisting of 4 pairs of twisted-pair cable: the transmit pair, the receive pair, and the local power pair. The transmit pair transfers WFB control and frame information from the RC to the WFB. The receive pair transfers status and frame information from the WFB to the RC. If the RC cannot provide power to the WFB, a third pair (to the WFB) can supply local power. When possible, the transmit pair and the receive pair provide phantom power from the RC to the WFB.

Each circuit pack includes a standard TDM bus interface from a system, 2 radio interfaces to 2 separate radio units, and 2 synchronization ports. In addition, 2 RS-232 interfaces provide for a debug terminal and for setting up the wireless terminal. Provides an interface to Wizard II base stations (DWBS).

TN790 Processor (R6 and earlier) Also used for "VS"

The TN790 processor circuit pack is a circuit pack level replacement for the TN786B/CPP1 combination. The TN790 does not support a mezzanine board for memory expansion (no CPP1 circuit pack is used). The TN790 provides a performance increase over the TN786B/CPP1 combination.

The Reduced Instruction Set Computer (RISC) processor platform runs at 40 MHz and includes all of the functions of the TN786B processor circuit pack as well as providing an operating system base more common with R7r or later. Diagnostics for the TN790 are enhanced over earlier systems. The TN790 is compatible with the processor interface circuit pack (TN765), the PACCON circuit pack (TN778), the NETCON circuit pack (TN777B), and the duplication interface circuit pack (TN772).

The TN790 is available in R6 and some earlier systems. The TN790 provides 16 MBytes of Flash PROM (programmable read only memory). The PROM is compatible with the NETCON Flash cards and is programmed using the +12 VDC supplied by the NETCON circuit pack.

The TN790 is factory-populated with a minimum of 16 MBytes of Dynamic Random Access Memory (DRAM).



NOTE:

Existing Release 5 TN790 circuit packs with 8 or 12 MBytes of DRAM must be upgraded to 16 MBytes of DRAM for R7 or later.

The DRAM can be *seen* remotely by field technicians to determine the memory configurations at each site. The amount of DRAM can increase depending on customer requirements. Contact your Avaya representative.

The TN790 contains an on-board modem with a maximum speed of 9.6 kbps and complies with V.32 (9.6 kbps communication) and V.42 (error detection and correction) protocols. The TN790 can support an external modem that can take the place of the CDR port since CDR connections can be provided by other methods. An external modem and an asynchronous data unit (ADU) or data module may be required to support a system printer or CDR device.

TN790B (R7 or R8 si only)

The TN2404 replaces the TN790B for R9. The TN790B is very similar to the TN790. The circuit pack is designed to handle errors that are associated with the EM-BUS and is required for the use of the C-LAN (TN799) and NetPkt (TN794) circuit packs in R7 and later.

TN791 16-Port Analog Guest Line (International Offers or US and Canada Offer B only)

The TN791 has 16 ports. Each port supports 1 telephone, such as 500 (rotary dial) and 2500 terminals (DTMF dial). LED and neon message waiting indicators are supported (a separate power supply is required for neon message indicators).

The TN791 supports on-premises (in-building) wiring with either touch-tone or rotary dialing and with or without the LED and neon message waiting indicators.

The TN791 supports 3 ringer loads, only 1 telephone can have an LED or neon message waiting indicator. The TN791 allows a maximum of 8 simultaneous ports ringing.

TN791 supports A-Law and μ -law companding and administrable timers. Secondary lightning protection is provided. The TN791 supports up to 8 simultaneous ports ringing.

The TN791 is compatible with the terminal configurations shown in the table below.

Table 40. Terminals and wiring configurations supported by the TN791 Circuit Pack

Terminal	Wire Size	Maximum Range
500-Type	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
2500-Type	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
6200-Type	24 AWG (0.2 mm ² /0.5 mm)	12,000 ft. (3,657m)
7100-Series	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
7101A-Series	24 AWG (0.2 mm ² /0.5 mm)	15,200 ft. (4,633 m)
7103A-Series	24 AWG (0.2 mm ² /0.5 mm)	15,200 ft. (4,633 m)
8100-Series	24 AWG (0.2 mm ² /0.5 mm)	12,000 ft. (3,657m)
9100-Series	24 AWG (0.2 mm ² /0.5 mm)	12,000 ft. (3,657m)

TN792 Duplication Interface for TN2404 (R9) and TN790B (R7 and R8) Processor Circuit Packs for si only

In high- and critical-reliability R7 or later si systems, duplication interfaces copy the contents of memory from the primary Switch Processing Element (SPE) to a standby SPE, so that the latter can take over immediately when the former fails. The TN792 uses the Enhanced M-Bus of the TN2404 (R9) or TN790B (R7 and R8) processor for this memory shadowing function. The Enhanced M-bus supports 32-bit addressing and data access (vs. 16-bit for the M-bus), so it transfers data faster and shadows a larger area of memory than the older bus. The M-bus is still supported, however, for legacy applications. The TN2404 is required for R9si duplicated systems. The TN790B is required for all R7 and R8 si duplicated systems.

You need two TN792 circuit packs, one for the primary control carrier and one for the standby. You can replace TN772 duplication interfaces with TN792s, but you must replace them in pairs. A TN772 cannot communicate with a TN792.

A new duplex optical cable connects the TN792 circuit packs. This cable eliminates the additional electromagnetic emissions that would otherwise result from the doubled data rate on the bus. The optical cable interface to the new DUPINT is on the front faceplate of the circuit pack.

The TN792 is compatible with existing duplication cables.

TN793/TN793B 24-Port 2-Wire Analog Line with Caller ID

**NOTE:**

Only the TN793B has Caller ID capability.

The TN793/TN793B is a dual coded, analog line 24-port, that performs all the functions of the TN746B, 16-port analog line circuit pack. Each port supports 1 telephone, such as 500 (rotary dial) and 2500 terminals (DTMF dial). Use Vintage 6 or greater for the TN793. Use Vintage 1 or greater for the TN793B.

The TN793/TN793B supports on-premises (in-building) wiring with either touch-tone or rotary dialing and with or without the LED and neon Message Waiting Indicators. The TN793/TN793B supports off-premises wiring (out-of-building only with certified protection equipment) with either DTMF or rotary dialing, but LED or neon message waiting indicators are not supported off-premises.

The TN793/TN793B, along with a TN755B neon power unit per carrier or per single-carrier cabinet, supports telephones equipped with neon message waiting indicators (on-premises use only). The TN793/TN793B supports 3 ringer loads, only 1 telephone can have an LED or neon message waiting indicator. The TN793/TN793B allows a maximum of 12 simultaneous ports ringing.

The TN793/TN793B supports A-Law and μ -law companding and administrable timers. The TN793 supports queue warning level lights associated with the DDC and UCD features, recorded announcements associated with the Intercept Treatment feature, and PagePac paging system for the Loudspeaker Paging feature. Additional support is provided for external alerting devices associated with the TAAS feature, neon message waiting indicators, and modems. The TN793/TN793B also supports secondary lightning protection.

The TN793B is compatible with the terminal configurations shown in the table below.

Table 41. Terminals and wiring configurations supported by the TN793

Terminal	Wire Size	Maximum Range
500-Type	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft (6,096 m)
2500-Type	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft (6,096 m)
6200-Type	24 AWG (0.2 mm ² /0.5 mm)	12,000 ft. (3,657m)
7100-Series	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
8100-Series	24 AWG (0.2 mm ² /0.5 mm)	12,000 ft. (3,657m)
9100-Series	24 AWG (0.2 mm ² /0.5 mm)	12,000 ft. (3,657m)

TN794 Network Control/Packet Interface for si only

In R9si systems, the TN2401 Net/Pkt interface circuit pack replaces the TN794. The TN2401 provides the functionality of the TN777B (NETCON), the TN778 (PACCON), and, if BX.25 connectivity is not required, the TN765 (PI).

In R8si systems, the TN794 provides LAPD connections over the TDM bus, as currently provided by the Processor Interface (TN765). In R8si systems, the TN794 replaces the NETCON ([TN777B](#)) and PACCON. The TN777B is replaced by the TN794 Network Control/Packet Interface (for R7 and later). It is not backward compatible with earlier releases. The TN794 inserts into the NETCON slot and may require a [TN2400 Net/Pkt Backplane Connection \(R6si and older field upgrades when reusing the existing Control Cabinet only\)](#). A modified TN790B processor circuit pack and a TN792 DUPINT circuit pack are required for duplicated systems.

TN794/TN2400 Sandwich Board Assembly (R7 and R8)

The TN794/TN2400 Sandwich Board Assembly (comcode 848254942) is required for upgrades to R7si that reuse the existing control carrier backplane. The board bridges the packet bus to the TN794 NetPkt circuit pack. The TN794/TN2400 Sandwich Board Assembly cannot be separated into two circuit packs.

Replaces the TN778 packet-control circuit pack in field-upgraded systems (in new-build systems, the TN2400's function is performed by a revised backplane). Used with the [TN794](#).

The TN790B Processor circuit pack and the TN792 DUPINT circuit pack are required for R7si duplicated systems

TN795 Processor (DEFINITY ONE)

The TN795 processor provides a system offering support for up to 40 voice stations with co-resident voice switching, voice and fax messaging and system applications that are running on a Microsoft Windows NT operating system. The communication between the firmware and the software is done by an Ethernet connection. An Intel processor Message Link or IML is the Ethernet control link between the Pentium processor and the MPC860 processor. This allows for the message based communication between the two processors.

The TN795 is the equivalent to 2 standard DEFINITY cards but has only one appearance on the backplane connector system. For the Tone/Clock angel firmware the TN2182 must be removed from the system, the TN795 must be in an even slot and the TN744 must be in the system.

There are other components that are "unique" to DEFINITY ONE. They include the Hard Disk (comcode 848320800), a multi-leg auxiliary or octopus cable (comcode 601929763), a software CD (J58890TN10L1), pcANYWHERE, a backup Flash Disk (408166783) and a PCMCIA Ethernet card (407961804).

**NOTE:**

The ComCodes are always subject to change.

TN797 US Analog Trunk or Line Circuit Pack

Provides a combination 8-port Analog Trunk and Line circuit pack for the US, Canada and countries that have the same analog standards. The TN797 provides you with the capability to administer any of the 8 ports of this circuit pack as a CO trunk (loop or ground start), a CAMA E911 trunk, a DID trunk (either wink or immediate start), or as an analog line (on or off-premises and/or with or without LED Message Waiting Indication. It does not support ICLID on the analog trunk to the CO, nor Caller ID on the line side to the telephone.

TN798B Processor for R6 through R8 csi only **(replaced by TN2402 for R9)**

The TN2402 replaces the TN798B for R9. The TN798B processor platform runs at 25 MHz and integrates many functions of the TN790 processor and the TN777B NETCON circuit packs onto a single circuit pack. These functions include a 32-bit RISC CPU complex and a maintenance processor complex providing serial communications and maintenance functions. In addition, the TN798B terminates ISDN LAPD signaling over the DEFINITY TDM bus from PRI and BRI trunk circuit packs.

The RISC CPU complex provides 4 to 32 MBytes of Flash PROM. The DRAM is provided via 1 SIMM. The TN798B contains 16 MBytes of DRAM. The flash is not interleaved.

The TN798B processor does not provide X.25 communications nor does it provide a duplication option. The TN798B does not contain an on-board modem. Instead, an external modem must be connected to the RS-232E port previously used for the internal modem.

TN799/TN799B/TN799C Control LAN (C-LAN) Interface

TN799/TN799B C-LAN Interface simplifies the connections between adjunct equipment and DEFINITY. It provides TCP/IP connectivity over Ethernet or PPP (Point to Point Protocol) connections to applications, such as CMS Call Center, INTUITY™, AUDIX®, and DCS. The TN799B is required to support the TN802B or TN2302AP IP Interface operating in MedPro mode for H.323 functionality. The TN799/TN799B is also required to support ATM interfaces and WAN PNC on DEFINITY R7 or later.

The TN799/TN799B does not support BX.25 connectivity on the R8 or later csi platform. On the other platforms, TN765 Processor Interface and TN577 Packet Gateway circuit packs provide BX.25 connectivity for existing customers as well as TCP/IP service.

The TN799B C-LAN pack provides connectionless UDP sockets for IP solutions support, variable length PING and Traceroute. The pack will also support 500 remote sockets, while current packs support 220.

The TN799 circuit pack is available with R7r, R7si and R7csi and the TN799B C-LAN circuit pack is available with R8r, R8si, and R8csi.

The TN799 supports the *traceroute* and *netstat* network testing commands starting in R8.

TN799C Firmware Download Source and

4K UDP Packets C-LAN acts as the firmware download interface to the UDS1 family of boards (TN464GP, TN2313AP, TN2464BP), the TN2302AP IP Media Processor board, and the TN771DP maintenance/test board.

TN801 MAPD (LAN Gateway Interface)

The TN801 is part of the DEFINITY Multi-Application Platform (MAPD). It allows direct integration of PC-based application into the DEFINITY switch. This circuit pack works as the interface for such solutions as CTI, CallVisor and PC/LAN. The TN801 provides DEFINITY packet bus and TDM bus interfacing, physical mounting for a CPU, external interfaces, and mapping of circuit switched connections between the DEFINITY TDM bus and the expansion circuit pack.

TN802/TN802B MAPD (IP Interface Assembly)

The TN802 Internet Protocol Interface circuit pack supports voice and fax calls from the DEFINITY ECS across a corporate intranet or the Internet. The IP trunking software runs on an embedded PC operating under Windows NT. The TN802B supports IP Solutions including IP Trunking and MedPro (H.323) with IP Softphones.

It is implemented using the TN802/TN802B IP Interface, which is a Windows NT server that resides on the IP Interface circuit pack inside the DEFINITY ECS. The TN802B IP Interface operates in two modes: IP Trunk, available with Release 7, and Media Processor (MedPro/H.323), available with Release 8. The TN802B is backwards compatible and defaults to IP Trunk mode. To use it in MedPro mode, you activate it through administration to use the H.323 trunking feature related to IP Softphones. For these Release 8 features, you also must install a new TN799B C-LAN circuit pack.

TN1648B System Access and Maintenance (SYSAM) for r only

The TN1648B is an SPE component used for maintenance. A processor in the TN1648B runs control routines that connect to maintenance software. The TN1648B has a 5-LED alarm panel and a toggle switch to manually inhibit automatic emergency transfer of PPN analog lines.

The TN1648B provides 2 RS-232 interfaces for connection to an administration terminal and, with duplication, connection to a standby maintenance terminal. The TN1648B also provides a tip and ring port with a built-in modem allowing a remote administration terminal to access the system.

The circuit pack allows connection to the management terminal and connection to and termination of 1 end of the processor bus. Other maintenance items include:

- PPN alarm monitors and outputs including auxiliary alarms for auxiliary equipment and environmental monitoring for over- temperature conditions
- Power supply sense and control for the carriers
- Emergency transfer control for catastrophic failure. The circuit consists of a 3-position toggle switch. The switch may be moved into the manual on position, manual off position, or automatic position.

- Non-volatile memory containing the time-of-day clock, the INitialization and ADministration System (INADS) telephone number, login password, and product identification
- Alarm panel information with major, minor, and warning LEDs, an ACKnowledge LED, and an emergency transfer LED

The TN1648B increases the internal and external modem speeds from 2400 bps to 9600 bps with error control implementation. Appropriate software administration is added to choose between external modem access to the maintenance port, and direct loop start trunk access. The former is used in countries that do not support the analog loop signaling protocol supplied by the internal modem.

For non-U.S. use, a cable from the TN1648B connects directly to an external modem. When the external modem is selected, the internal modem is disabled. The TN1648B is backward-compatible with the TN1648.

TN1650B Memory for r only

The TN1650B memory circuit pack contains 32 Mb of Dynamic Random Access Memory (DRAM) and error detection and correction circuitry to ensure information integrity. The TN1650B is used for system software, customer translations, and call processing maintenance. For r systems previous to R9, three TN1650B memory boards are required. For R9r systems, a fourth TN1650B memory board is required and resides in the slot marked "Memory 4" in the processor complex. All new R9 systems are shipped with four memory boards and a TN1657 disk drive V9 or later. All upgrades to R9 require a fourth memory board and a TN1657 disk drive V9 or later.

TN1654 DS1 Converter, T1 (24-Channel) and E1 (32-Channel)

The TN1654 DS1 converter circuit pack is a replacement for the TN574 DS1 converter circuit pack in R8r or later systems. The TN1654 converter complex installs in place of the conventional fiber and supports from 1 to 4 T1 or E1 facilities, providing a total of 92 T1 channels (or 120 E1 channels) in each direction between the PPN and the EPN. This capacity is enough for an EPN to easily support several hundred stations.

R8r or later architecture provides for EPNs that are remotely located from the PPN. EPNs within 5 miles (8 km) of the PPN may be coupled using multimode fiber optic cable or within 22 miles (35.4 km) using single-mode fiber optic cable. When the distance between the PPN and the EPN exceeds 5 miles (8 km) (multimode), or 22 miles (35.4 km), single-mode, or private right-of-way is not available, connect using a DS1 converter complex. A DS1 converter complex consists of a pair, 1 at each end, of DS1 converter circuit packs and the associated T1/E1 facilities.

A new set of Y-cables is required by the TN1654 to connect to a TN570B Expansion Interface circuit pack for system communication.

TN1655 Packet Interface for r only

The TN1655 provides the communication path between the SPE and the packet bus in the PPN. The packet bus connects to EI circuit packs in the PPN that communicate with EPNs and the CSS.

The TN1655 provides the link access procedure on the D-channel (LAPD) for up to 8,192 links at a sustained rate of 2Mbits per second. These are the digital multiplexed interface (DMI) mode-3 terminations of communication links across the packet bus that link to the processor circuit pack. Some data communication will use the X.25 data phase protocol at level 3.

The TN1655 provides termination for ISDN-BRI and ISDN-PRI signaling links, expansion archangel links connecting the processor to the expansion archangels on EI circuit packs in each PN, and center stage control network links connecting the processor with SNI circuit packs in the CSS.

The TN1655 supports firmware downloading. It also provides X.25 termination to the DCS links and adjuncts such as CDR and AUDIX.

TN1656 Tape Drive (R8r and earlier) **(replaced by TN2211 in R8 and later)**

The TN1656 contains a Small Computer System Interface (SCSI) tape drive that stores 3 Mb to 120 Mb of system software, including customer translations, bootstrap image, and any core dumps. For Release 9, this drive is being replaced by the TN2211 Optical Drive.

TN1657 Disk Drive

The TN1657 contains a 180 Mb small computer system interface (SCSI) disk drive. The TN1657 reduces the boot time of the system, stores translations, bootstrap image, and core dumps. Vintage 9 of the disk drive is required for R9G3r systems.

TN2135 Analog Line for Italy (replaced by TN2183)

The TN2135 is replaced by the TN2183 analog line circuit pack.

TN2136 2-Wire DCP Digital Line (replaced by TN2181)

The TN2136 is replaced by the TN2181 Digital Line circuit pack.

TN2138 Central Office Trunk for Italy

The TN2138 provides 8 analog loop start CO trunk ports. Each port has tip and ring signal leads. The TN2138 has 50 Hz, 12-kHz, and 16-kHz Periodic Pulse Metering (PPM).

TN2139 Direct Inward Dialing Trunk for Italy

The TN2139 provides 8 analog direct inward dialing (DID) trunk ports for analog DID signaling. Each port has tip and ring signal leads.

TN2140B Tie Trunk for Hungary and Italy

The TN2140B provides 4 ports for 4-wire E & M lead signaling tie trunks. The TN2140 provides continuous E & M signaling and discontinuous E & M signaling. Administrable A-Law and μ -Law companding and standard Type 1 and Type 5 signaling is provided. The TN2140B is required for Hungary.

TN2144 Analog Line for the Netherlands (replaced by TN2183)

The TN2144 is replaced by the TN2183 analog line circuit pack.

TN2146 Direct Inward Dialing Trunk for Belgium and the Netherlands

The TN2146 provides 8 analog DID trunk ports. Each port has tip and ring signal leads. The TN2146 uses 4 (1 for each pair of ports) Dual Subscriber Line Audio processing Circuits (DSLACs) administered to meet trunk transmission characteristics. The DSLACs can be set to either a resistive or complex balance impedance in the voice or AC talk path on the trunk interfaces. The DSLACs convert analog signals to digital signals and vice-versa to match the analog DID trunks to the system's digital TDM bus.

Companding can be set to either A-Law or μ -Law.

TN2147C Central Office Trunk, Multi-Country (replaces [TN447](#))

The TN2147 has 8 analog CO trunk ports. Each port has tip and ring signal leads. The TN2147 uses 4 (1 for each pair of ports) Dual Subscriber Line Audio processing Circuits (DSLACs) to be administered to meet a given transmission and impedance requirement. The DSLACs convert analog signals to digital signals and digital signals to analog signals to interface the analog CO trunks to the system's digital TDM bus.

The TN2147C provides multi-country signaling based on trunk type: loop-start, ground start, or battery reverse loop-start.

TN2149 Analog Line for Belgium (replaced by TN2183)

The TN2149 is replaced by the TN2183 analog line circuit pack.

TN2169 Alarm

The TN2169 alarm is a component of the DEFINITY AUDIX Circuit-Pack Assembly (ED-1E568). Like the [TN2170](#), the TN2169 alarm circuit pack monitors system power and environmental status, -48 VDC to +12 VDC power conversion for the disk drive and tape drive, and remote terminal access. Unlike the [TN2170](#), the TN2169 does not support an external Ethernet LAN connection.

TN2170 Alarm with Ethernet Interface

The TN2170 alarm is a component of the CallVisor ASAI/DEFINITY LAN Gateway Circuit-Pack Assembly (ED-1E546, which is being replaced by the J58890MA-1) and the DEFINITY AUDIX Circuit-Pack Assembly (ED-1E568). Like the [TN2169](#), the TN2170 monitors system power and environmental status, -48 VDC to +12 VDC power conversion for the disk drive and tape drive, and remote terminal access. In addition, the TN2170 supports an external Ethernet LAN connection.

TN2180 Analog Line for Spain and Germany (replaced by TN2183)

The TN2180 is replaced by the TN2183 analog line circuit pack.

TN2181 2-Wire DCP Digital Line

The TN2181 has 16 DCP ports that can connect to 2-wire terminals such as the 6400, 8400, and 9400 Series digital telephones and the 302C and 302D Attendant Console. The maximum range of the 8400 and 9400 Series terminals using 24 AWG (0.5 mm) wire is 3,500 feet (1067 m).

The TN2181 supports either A-Law or μ -Law companding (software selectable). The TN2181 also supports the 8400 Series data modules.

TN2182B Tone-Clock, Tone Detector, and Call Classifier (replaces [TN419B](#) and TN768)

The TN2182B tone-clock integrates the tone generator, tone detection-call classifier, system clock, and synchronization functions onto 1 circuit pack for all system reliability configurations. The TN2182B supports 8 ports for tone detection and allows gain or loss applied to PCM signals received from the bus. The TN2182B provides Stratum 4 enhanced clock accuracy, supports MFC signaling (such as Russia MF), supports Russia MFR (multi-frequency shuttle Register signaling) and supports A-Law and μ -Law companding.

The TN2182B provides continuous, cadenced and mixed tones, allows administrable setting of tone frequency and level, detects 2025 Hz, 2100 Hz, or 2225 Hz modem answerback tones, and provides normal and wide broadband dial tone detection.

In most configurations, the 2- or 3-circuit pack combination of tone generator, tone detector, and/or call classifier can be replaced with this 1 circuit pack, freeing 1 or 2 port slots.

The TN2182B Vintage 1 includes all the functionality found on the TN744D. Use the TN2182B Vintage 1 with the TN429C analog line central office trunk for CAMA/E911 and the TN429D DIOD central office trunk for ICLID.

The TN2182B replaces the TN768 in an upgrade to R9. The TN 768 is an acceptable Tone-Clock for R7 or R8. A TN2182 is required for the on-board tone detection or for additional tones to support CCRON, Russian ANI, and others.

TN2183 Analog Line, Multi-Country **(replaces [TN467](#), [TN468B](#))**

See TN2215/TN2183.

TN2184 DIOD Trunk for Germany

The TN2184 Direct Inward/Outward Dialing (DIOD) trunk contains 4 port circuits, each interfacing a 2-wire analog CO trunk with the TDM switching network of the system. Each port allows incoming and outgoing calls to include addressing information being received from the CO for incoming calls and addressing information being sent to the CO for outgoing calls. It detects Periodic Pulse Metering (PPM) signals for call charge accounting on outgoing calls.

The TN2184 combines the features of both a CO trunk and a DID trunk to provide both outgoing and incoming calls with addressing information in both directions.

TN2185B ISDN-BRI, 4-Wire S/T-TE Interface **(can be used as an alternative to [TN464F](#) or [TN2464](#))**

The TN2185B supports eight 4-wire ISDN BRI line S interfaces, each operating at 192 Kbps, with 2 B-channels (64 Kbps) and 1 D-channel (16 Kbps). The TN2185B interfaces to the DEFINITY LAN bus and the TDM bus to provide the TE side of the BRI interface.

The TN2185B is similar to the TN2198 except the TN2185B is a 4-wire S interface instead of a 2-wire U interface. Another difference is the function of the SCOTCH/NPE and SAKI are replaced by the network control element (NCE).

For each port, information communicates over two 64 Kbps bearer channels called B1 and B2, and over a 16 Kbps channel called the demand channel, or D channel. The D channel is used for signaling. Channels B1 and B2 can be circuit switched simultaneously, or either of them may be packet switched, but not both at once. The D channel is always packet switched. The circuit switched connections have a μ -Law or A-Law option (on a per-board basis) for voice operation and operate as 64 kbps clear channels when in the data mode. The packet switched channels support the LAPD protocol, however, the TN2185B does not terminate on LAPD protocol. The S interface does not support switching of both B channels together as a 128 Kb/s wideband channel.

The TN2185B has a long range up to 18,000 feet (5486 m) maximum from the system to the NT1 device. In a multiple terminal environment, the B channels are shared only on a per-call basis. For example, if the B2 channel is for data, then the B2 by 1 terminal excludes the others from having access to it. When a used device communicates over the D channel to access B1 or B2, that channel is owned until the call is taken down (no party on line). The D channel is always shared among the terminals. Replaces the TN-PRI/BRI PRI to BRI converter (ETSI-BRI) and can be used as an alternative to the TN464F or the TN2464.

The ability of outpulse in-band DTMF signals or end-to end signaling is supported by the TN2185B.

QSIG Call Completion is supported, however, QSIG Supplementary Services are not. ISDN-BRI trunks can be used as inter-PBX tie lines using the QSIG peer protocol.

TN2198 ISDN-BRI, 2-Wire U Interface

The TN2198 allows connection to the ANSI standard 2-wire U-Interface. The 2-wire interface from the TN2198 connects to an NT1 network interface. The 4-wire interface on the other side of the NT1 may connect to 1 or 2 telephones. The TN2198 does not provide a trunk-side interface as does the TN2185 circuit pack.

The TN2198 contains 12 ports that interface at the ISDN U reference point. For each port, information communicates over two 64 Kbps bearer channels called B1 and B2, and over a 16 Kbps channel called the demand channel, or D channel. The D channel is used for signaling. Channels B1 and B2 can be circuit switched simultaneously. The D channel is always packet switched. The TN2198 requires a packet control circuit pack. Each port supports 1 telephone, such as 500 (rotary dial) and 2500 terminals (DTMF dial).

The D channel supports the LAPD protocol and is consistent with the CCITT Q.920 Recommendations for D channel signaling.

In a multiple terminal environment, the B channels are shared only on a per-call basis. For example, if the B2 channel is used for data, then the use of B2 by 1 terminal excludes the others from having access to it. When a device communicates over the D channel to access B1 or B2, that channel is owned until the call is taken (no party on line). The D channel is always shared among the terminals. The TN2198 interfaces with the TDM bus and packet bus in the DEFINITY backplane and terminates with 12 ISDN basic access ports.

The TN2198 has a long range to 18,000 feet (5486 m) maximum from the system to the NT1 device and uses standard protocol ANSI T1.601. The TN2198 has a 160 Kbps line rate, consisting of 2 bearer channels at 64 Kbps channels each, the D channel at 16 Kbps, framing at 12 Kbps, and maintenance at 4 Kbps. The circuit pack uses demand channel (ringing, tone, and so forth), 16 Kbps channel, and supports up to 24 telephones or data modules per circuit pack.

The TN2198 is not offered as a BRI Tie Trunk.

TN2199 Central Office Trunk for Russia

The TN2199 is a 4-port, 3-wire, loop-start trunk circuit pack that can be used as a DID trunk, CO trunk (2-way, 1-way incoming, or 1-way outgoing CO). The TN2199 combines the functionality of the DID trunk and the 1-way outgoing CO trunk (DIOD trunk). This circuit pack is used with the call classifier circuit pack (TN744D or later) or the Tone-Clock/ tone detector (TN2182B or later) to accomplish MF shuttle signaling (similar to R2-MFC signaling). Supports incoming ANI.

TN2202 Ring Generator for France

The TN2202 ring generator circuit pack supplies 50 Hz ringing power. The TN2202 supplies balanced ringing, by a modified backplane, to terminals connecting to the TN2183 multi-country analog line circuit pack when administered for France analog transmission.

The TN2202 plugs into the power unit slot and is required for each carrier containing analog lines (1 in an single-carrier cabinet or 1 in each port carrier of a MCC). A 1-lead modification is required in each backplane using TN2202. This is true for all products made for France. The TN2202 produces 2 symmetrical voltages (typically 28V rms) with respect to ground, and takes -48 VDC, -5 VDC, and ground from the backplane and generates 2 x 28V rms with added -48 VDC.

TN2207 DS1 Interface, T1 (24-Channel) and E1 (32-Channel), for MMCH

The TN2207 circuit packs support digital signal level 1 (DS1) rate (24 channel) and E1 rate (32 channel) digital facility connectivity. All TN2207 suffixes support CO, Tie, DID, and off premises station (OPS) port types using the robbed-bit signaling protocol, the proprietary Bit-Oriented Signaling (BOS) 24th channel signaling protocol, and the DMI-BOS 24th channel signaling protocol. The circuit packs also support ISDN-PRI connectivity T1 or E1.

In DS1 (24 channel) mode, a DS1 interface is provided to the DS1 facility. The TN2207 circuit packs provide board-level administrable A-Law and μ -Law companding, CRC-4 generation and checking (E1 only), and Stratum 3 clock capability.

The TN2207 provides test jack access to the DS1 or E1 line and support the 120A integrated channel service unit (CSU).

All suffixes have line out (LO) and line in (LI) signal leads. The Line Out and Line In leads are unpolarized balanced pairs.

The TN2207 has additional hardware to support direct cabling to a TN787 MMI circuit pack.

TN2208 Multi-Function

The TN2208 Multi-Function circuit pack holds a PC-type CPU, controller, and memory devices. In the [CallVisor ASAI/DEFINITY LAN Gateway R1 \(Circuit-Pack Assembly\) \(being replaced by J58890MA-1\)](#), the TN2208 operates with the [TN2170 Alarm with Ethernet Interface](#) circuit pack to monitor system power and environmental status, -48 VDC to +12 VDC power conversion for the disk drive and tape drive, and remote terminal access.

TN2209 Tie Trunk for Russia

The TN2209 has 4 ports used for Type 1 or Type 5 four-wire E & M lead signaling tie trunks, that can be automatic, immediate-start, wink-start, and delay-dial. The TN2209 provides an interface between these four frequency signaling tie trunk lines and the DEFINITY TDM network. Based on a TN760D each port has modified E, and M signal leads for universal hardware compatibility. The TN2209 provides release link trunks required for the CAS feature and has administrable A-Law and μ -Law companding.

TN2210 Tone Generator

The TN2210 tone generator provides a 1780 Hz tone for an auxiliary trunk port on a TN763 or SN231. The external alarm interface provides a contact closure to connect to the TN492C remote interface circuit of the DEFINITY common control carrier. The tone is used by the AUTOPLEX system to support CO call associated continuity testing of trunk circuits between the CO and AUTOPLEX system. The circuit will provide an active alarm LED to indicate the circuit pack is in a fault condition.

TN2211 Optical Drive for r only

The TN2211 Optical Drive has replaced the TN1656 Tape Drive in DEFINITY ECS R8r and later systems. The drive provides removable storage for software upgrades, translation backups, announcement file backups, core dumps, etc., as did the TN1656 Tape Drive. The Optical Drive has several advantages over the TN1656 Tape Drive:

- Writing to the optical disk is considerably shorter than writing to tape. A full backup will take approximately 20 minutes, whereas the tape drive takes up to 95 minutes.
- Writing to the optical disk is more reliable due to:
 - block allocation (has several spare blocks available)
 - number of accesses to the media

The UN332C MSSNET must be used with the TN2211.

TN2214B 24-Port, 2-Wire DCP Digital Line (International Offers or US and Canada Offer B only)

The TN2214B has 24 DCP ports that can connect to 2 wire terminals such as the 6400, 8400, or 9400 Series digital telephones and the 302C Attendant Console.

The TN2214B supports either A-Law or μ -Law companding (software selectable).

The TN2214B supports the terminals listed below.

Table 42. Terminals and wiring configurations supported by the TN2214B

Terminal	Wire Size	Maximum Range
302C Attendant Console	24 AWG (0.2 mm ² /0.5 mm)	3,500 ft. (1,067 m)
6400-Series	24 AWG (0.2 mm ² /0.5 mm)	3,500 ft. (1,067 m)
8400-Series	24 AWG (0.2 mm ² /0.5 mm)	3,500 ft. (1,067 m)
9400-Series	24 AWG (0.2 mm ² /0.5 mm)	3,500 ft. (1,067 m)

For more information see [Table 51 on page 211](#) in [Chapter 4, "Technical Specifications"](#)

TN2215/TN2183 16-Port, Analog Line, Multi-Country (International Offers or US and Canada Offer B only) (TN2183 replaces TN467, TN468)

The TN2215/TN2183 provides 16 analog port interfaces. Each port supports 1 telephone, such as 500 (rotary dial) and 2500 terminals (DTMF dial) from a tip/ring pair. Each port also sends or receives signaling to and from a station; such as an analog telephone, answering machine, facsimile and loop-start CO port AUDIX. The TN2215/TN2183 provides rotary digit 1 recall, ground-key recall, and programmable flash timing. Additional support is provided for selectable ringing cadence, LED message waiting, and secondary lightning protection.

The TN2215/TN2183 supports on-premises (in-building) wiring with either touch-tone or rotary dialing and with or without the LED message waiting indicators. It supports off-premises wiring (out-of-building only with certified protection equipment) with either DTMF or rotary dialing, but LED message waiting indicators are not supported off-premises. Neon message waiting indicators are not supported.

A maximum of 6 to 8 simultaneous ports ringing is allowed depending on the ringing cadence selected. The TN2215/TN2183 supports A-Law and μ -Law companding and administrable timers.

The TN2215/TN2183 also supports balanced ringing (when configured for France with TN2202 ring generator circuit pack) and DTMF sending levels appropriate for CONVERSANT.

The TN2215/TN2183 is impedance and gain selectable for multiple countries. For more information, contact your Avaya representative.

The TN2215/TN2183 supports the following terminals:

Table 43. Terminals and wiring configurations supported by the TN2215/TN2183

Terminal	Wire Size	Maximum Range
500-Type	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
2500-Type	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
6200-Type	24 AWG (0.2 mm ² /0.5 mm)	12,000 ft. (3,657m)
7102A-Series	24 AWG (0.2 mm ² /0.5 mm)	3,100 ft. (945 m)
8100-Series	24 AWG (0.2 mm ² /0.5 mm)	12,000 ft. (3,657m)

For more information see [Table 51 on page 211](#) in [Chapter 4, "Technical Specifications"](#)

TN2224B 24-Port, 2-Wire DCP Digital Line

The TN2224B has 24 DCP ports that can connect to 2-wire terminals such as the 6400-, 8400-, or 9400-Series digital telephones and the 302C Attendant Console.

The TN2224B supports either A-Law or μ -Law companding (software selectable).

Table 44. Terminals and wiring configurations supported by the TN2224B

Terminal	Wire Size	Maximum Range
302C Attendant Console	24 AWG (0.2 mm ² /0.5 mm)	3,500 ft. (1,067) m)
6400-Series	24 AWG (0.2 mm ² /0.5 mm)	3,500 ft. (1,067) m)
8400-Series	24 AWG (0.2 mm ² /0.5 mm)	3,500 ft. (1,067) m)
9400-Series	24 AWG (0.2 mm ² /0.5 mm)	3,500 ft. (1,067) m)

For more information see [Table 51 on page 211](#) in [Chapter 4, "Technical Specifications"](#)

TN2238 ATM Trunk/Port-Network Interface for Multi-Mode Fiber (Not available with Category B) (replaced by TN2305)

The TN2238 is not supported with DEFINITY ECS R8 and later systems.

TN2238 ATM circuit packs replace [TN570B/C](#) Expansion Interface circuit packs when ATM is used for the Center-Stage Switch of a Port Network (R7r only), and they support ATM trunking and wide-area network (WAN) connectivity (for ATM Circuit Emulation Service, see [TN2305](#)). The TN2238 can be connected to an ATM-based Center-Stage Switch or an ATM network. It uses standard, multi-mode, 155.52-MHz, OC-3c fiber.

Up to 2 TN2238 ATM port-network expansion interfaces can be installed per carrier.

TN2242 Digital Trunk (Japan 2MB TTC)

The TN2242 supports versions of Channel Associated Signaling and ISDN-PRI signaling that are peculiar to the TTC private networking environment used in Japan. It supports the special line-coding and framing used on 2.048-Mbps Japanese trunks. The TN2242 connects DEFINITY with other vendor equipment and with other DEFINITY switches via the TDM device that is commonly used throughout Japan for this purpose.

TN2301 Logic Switch (R6 and later)

Provides service to the customer when the link to the main processor fails or is severed, or when the processor or Center Stage Switch fails. The TN2301 Survivable Remote Switch (SRS) circuit pack connects the SREPN links (fiber or T1/E1) to the appropriate PPN for call processing. It does this under control of the TN775C maintenance circuit pack which monitors the health of the expansion interface TN570B.

Not for ATM-PNC.

TN2302AP IP Media Processor Circuit Pack (Not available with Category B)

The TN2302AP IP Media Processor circuit pack replaces the TN802B. The TN2302AP requires one slot instead of the three slots required by the TN802B. The TN2302AP is more reliable and increases available bandwidth from 10 Mbit to 100 Mbit. The TN2302AP is the H.323 audio platform. It includes a 10/100 BaseT Ethernet interface.

The TN2302AP also provides VoIP (voice over internet protocol) audio access to DEFINITY ECS for local stations and for outside trunks. The TN2302AP can perform echo cancellation, silence suppression, fax relay service, and DTMF detection.

The TN2302AP provides audio processing for between 32 and 64 voice channels, depending on the CODECs in use. It supports hairpin connections and shuffling of calls between TDM connections and IP-IP direct connections. For DEFINITY Release 9, the TN2302AP can be updated using the firmware download feature, which requires use of the TN799C C-LAN interface.

TN2305 ATM-CES Trunk/Port-Network Interface for Multi-Mode Fiber (Not available with Category B)

The TN2305 provides an ATM-based replacement for the [TN570B/C](#) expansion interface. This interface uses OC-3c or STM-1 155-Mbps multimode fiber. The TN2305 supports both trunk and port-network connectivity. As a trunk, the TN2305 uses Circuit Emulation Service (CES) to emulate up to 8 ISDN-PRI trunks on an ATM facility. As a port-network expansion interface, the TN2305 connects port networks to an ATM switch that provides port network connectivity for an R7r or later network. The TN2305 provides echo cancellation.

The TN2305 does not support hybrid port-networks that use both ATM and CSS simultaneously. TN2305s must connect all port networks through the ATM switch. Direct connect EPNs are not supported.

TN2306 ATM-CES Trunk/Port-Network Interface for Single-Mode Fiber (Not available with Category B)

The TN2306 circuit pack has the same features as the [TN2305](#) but supports single-mode fiber.

The DEFINITY ECS may contain a Class 1 LASER device. The LASER device operates within the following parameters:

- Maximum Power Output: -8 dBm
- Wavelength: 1310 nm
- Mode Field Diameter: 8.8 microns

CLASS 1 LASER PRODUCT **IEC 825 1993**



CAUTION:

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

TN2308 Direct Inward Dialing Trunk for Brazil

The TN2308 uses 8 ports for immediate-start and wink-start direct inward dialing (DID) trunks. Each port has tip and ring signal leads.

DEFINITY requires the TN2308 to support Brazil Block Collect Call. TN2308's transmission characteristics comply with Brazilian telecom standards for PBXs.

TN2313AP DS1 Interface (US (24-Channel) or International (32-Channel))

The TN2313AP DS1 port board interfaces a DS1 trunk to the switch backplane via port slots that are standard for DEFINITY products. The TN2313AP is compatible with previous DS1 circuit packs, including the TN464F (V19 and below), the TN2464 (V19 and below), and the TN767E DS1, except that it does not provide for packet adjunct capabilities. The TN2313AP supports a variety of applications, including networking of DEFINITY switches, international trunk types, video conferencing, and wideband data transmission.

The TN2313AP DS1 interface can be configured for domestic (24-channel, 1.544 Mbps) or international (32-channel, 2.048 Mbps) use. The TN2313 can supply two 8-Khz reference signals to the switch backplane for optional use by the tone/clock board in synchronizing the system clock to the received line clock.

The TN2313AP can be updated using the firmware download feature, which requires use of the TN799C C-LAN interface.

TN2400 Net/Pkt Backplane Connection (R6si and older field upgrades when reusing the existing Control Cabinet only)

See TN794/TN2400 Sandwich Board Assembly.

TN2401 Net/Pkt Interface Circuit Pack (R9si)

In R9si systems, the TN2401 Net/Pkt interface circuit pack replaces the TN794. The TN2401 provides the functionality of the TN777B network control interface (NETCON), the TN778 packet interface (PACCON), and, if BX.25 connectivity is not required, the TN765 processor interface (PI). The TN2401 provides eight asynchronous data channels, whereas the NETCON TN777B provides only four channels. It goes into the control carrier slot that was used by the NETCON TN777B. The TN2401 does not include modems. The TN2401 is required for the si model to save translations to the new 5-volt ATA flash memory card.

TN2402 Processor Circuit Pack (R9csi)

The TN2402 processor platform runs at 25 MHz and integrates many functions of the TN790 processor and the TN777B NETCON circuit packs onto a single circuit pack. These functions include a 32-bit RISC CPU complex and a maintenance processor complex providing serial communications and maintenance functions. In addition, the TN2402 terminates ISDN LAPD signaling over the DEFINITY TDM bus from PRI and BRI trunk circuit packs.

The RISC CPU complex provides 4 to 32 MBytes of Flash PROM. The DRAM is provided via 1 SIMM. The TN2402 contains 32 MBytes of DRAM. The flash is not interleaved.

The TN2402 processor does not provide X.25 communications, nor does it provide a duplication option. The TN2402 does not contain an on-board modem. Instead, an external modem must be connected to the RS-232E port previously used for the internal modem.

The TN2402 is required for the csi model to save translations to the new 5-volt ATA flash memory card.

TN2404 Processor Circuit Pack (R9si)

In R9si systems, the TN2404 processor circuit pack replaces the TN790B. The TN2404 increases both the DRAM memory and the flash memory from 16 to 32 Mb. It is designed to handle errors associated with the EM-BUS and must be used with the C-LAN (TN799) and the Net/Pkt (TN2401) in R9si systems.

TN2464BP DS1 Interface with Echo Cancellation, T1/E1 (International Category A or B, US and Canada Category B only)

The TN2464BP DS1 circuit pack has echo cancellation circuitry and firmware download capability. It replaces the TN2464 DS1 interface for new R9 systems being shipped. The TN2464BP supports T1 (24-channel) and E1 (32-channel) digital facilities. In ISDN-PRI applications, the ISDN D-channel connects the [TN1655](#) packet interface (R8r or later) via the LAN bus. The TN2464BP has the same functionality as the TN464GP, which is for US and Canada offers only.

The TN2464BP circuit pack provides:

- Test jack access to the T1/E1 line
- Board-level administrable A-Law and μ -Law companding
- CRC-4 generation and checking (E1 only)
- Stratum 3 clock capability
- Support for the [120A Channel Service Unit Module](#)
- CO, TIE, DID, off-premises station (OPS) port types that use robbed-bit signaling protocol, proprietary bit-oriented signaling (BOS) 24th-channel signaling protocol, or DMI-BOS 24th-channel signaling protocol
- Unpolarized, balanced-pair, line-out (LO) and line-in (LI) signal leads.
- Support for Russian incoming ANI.
- Support for the enhanced maintenance capabilities of the enhanced integrated channel service unit (ICSU)
- Support for CONVERSANT®
- Channel-associated signaling protocols for many countries (for details, contact your Avaya representative)

The TN2464BP can be updated using the firmware download feature, which requires use of the TN799C C-LAN interface.

TN2793/TN2793B 24-Port, 2-Wire Analog Line with Caller ID (International Offers or US and Canada Offer B only)



NOTE:

Only the TN2793B has Caller ID capability. It supports Caller ID for R8.2 and later systems.

The TN2793/TN2793B is a dual coded, analog line 24-port, that performs all the functions of the TN746B, 16-port analog line circuit pack. Each port supports 1 telephone, such as 500 (rotary dial) and 2500 terminals (DTMF dial). Use Vintage 4 or greater for the TN2793. Use Vintage 1 or greater for the TN2793B.

The TN2793/TN2793B supports on-premises (in-building) wiring with either touch-tone or rotary dialing and with or without the LED and neon message waiting indicators. The TN2793/TN2793B supports off-premises wiring (out-of-building only with certified protection equipment) with either DTMF or rotary dialing, but LED or neon message waiting indicators are not supported off-premises.

The TN2793/TN2793B along with a TN755B neon power unit per carrier or per single-carrier cabinet, supports telephones equipped with neon message waiting indicators (on-premises use only). The TN2793/TN2793B supports 3 ringer loads, only 1 telephone can have an LED or neon message waiting indicator. The TN2793/TN2793B allows a maximum of 12 simultaneous ports ringing.

The TN2793/TN2793B supports A-Law and μ -law companding and administrable timers. The TN2793/TN2793B supports queue warning level lights associated with the DDC and UCD features, recorded announcements associated with the Intercept Treatment feature, and PagePac paging system for the Loudspeaker Paging feature. Additional support is provided for external alerting devices associated with the TAAS feature, neon message waiting indicators, and modems. The TN2793/TN2793B also supports secondary lightning protection.

Table 45. Terminals and wiring configurations supported by the TN2793/TN2793B

Terminal	Wire Size	Maximum Range
500-Type	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
2500-Type	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
6200-Type	24 AWG (0.2 mm ² /0.5 mm)	12,000 ft. (3,657m)
7102A-Series	24 AWG (0.2 mm ² /0.5 mm)	20,000 ft. (6,096 m)
8100-Series	24 AWG (0.2 mm ² /0.5 mm)	12,000 ft. (3,657m)

TN-CCSC-1 PRI to DASS Converter

The TNCCSC-1 circuit pack converts ISDN-PRI to a DASS interface. DASS is a 2-Mbps interface using a 75-Ohm coaxial transmission facility. One TNCCSC-1 circuit pack can support up to 2 TN464F DS1 Interface circuit packs. A Y cable and an 888B 75-Ohm coaxial adapter connect to the public network facility.

TN-CCSC-2 PRI to DPNSS Converter

The TNCCSC-2 circuit pack converts ISDN-PRI to a DPNSS interface. DPNSS is a 2-Mbps interface using a 75-Ohm coaxial transmission facility. One TNCCSC-2 circuit pack can support up to 2 TN464F DS1 interface circuit packs. A Y cable connects to the public network facility.

TN-CCSC-3 PRI to DPNSS Converter

The TN-CCSC-3 circuit pack is the same as the TN-CSSC-2 with a 120-Ohm twisted pair interface.

TN-C7 PRI to SS7 Converter

Provides a gateway interface between the TN464 and the public signaling network. Integrates DASS, DPNSS and SS7 into a single board type. The TN-C7 is intended to support international service provider Call Center customers. It is not designed for operation in the US or Canada.

TN-CIN Voice Multiplexer

Provides QSIG and private networking transparency on demand across a switched network.

UN330B Duplication Interface for r only

In high- and critical-reliability systems with 2 SPEs, 1 UN330B resides in each SPE and connects to the other UN330B. The UN330Bs provide control and communication paths between the SPEs to keep the standby SPE ready to assume control if the active SPE fails. The UN330Bs select active/ standby mode for the 2 SPEs, shadow (copy) the active SPE memory writes into the standby SPE memory, and support inter-SPE communications.

The duplication channel is a bi-directional high-speed path between the 2 SPEs. When memory shadowing is active, all shadowed memory writes on the active processor's bus are sent across the link and written into the standby processor's memory. Standby memory writes are not sent to the active processor.

UN331C Processor for r only

The UN331C controls the system and executes stored programs that perform call processing activity and maintenance. The UN331C is a RISC designed around a MIPS R3000A CPU operating at 33 MHz. It employs 32-bit address and data buses to obtain and execute instructions at a rate approaching 1 instruction per clock cycle. The 256 kbyte instruction cache with burst-mode refill and 256 kbyte data cache are key to the performance of the processor. A read/write buffer chip tailors the UN331C to the call processing environment.

Peripheral devices residing on the UN331C are positioned outside the CPU cache structure and interface to the CPU through the read/write buffers. These peripherals include 512 kbytes of ROM for the monitor, counters/timers, UARTs, control/status/error registers, and the logic that provides bus arbitration and the Bus Time-Out feature.

The UN331C interfaces to the 32-bit multiplexed address/data processor bus (PM-Bus) and the 32-bit processor expansion bus (PX-Bus). The PM-Bus is for all processor write operations and single-word (4-byte) read operations. Multiple-word or burst reads are performed using the PM-Bus to transfer the address to main memory, then the words of the burst are returned using both the PM-Bus and PX-Bus.

UN332B/C Mass Storage/Network Control for r only

The UN332 provides an interface between the UN331C processor and the small computer system interface (SCSI) bus for access to the mass storage system (MSS) such as a disk drive. The UN332 also provides TDM network control for the PPN, and terminates 1 end of the processor-multiplexed bus.

The UN332C allows the interface of the DEFINITY to the TN2211 optic disk drive. The circuit pack includes the SCSI Host Adapter, the ArchAngel and the Tone/Clock switching logic.

DEFINITY Adjuncts

The following table lists the adjuncts for R8 or later systems. After the table, detailed descriptions of each adjunct are provided.

Table 46. DEFINITY Adjuncts

Apparatus Code	Name	Type
105D	Isolating Data Interface	Adjunct
120A	Channel Service Unit Module	Adjunct
122A	Music-on-Hold Interface for France	Port
127A	E1 120 Ohm/75 Ohm Quad Balun Box	Adjunct
300A	Single-Mode Fiber Optic Transceiver	Network
315x/316x-Series	Channel Service Unit	Adjunct
400A	T1 Splitter for ATM Synchronization (being replaced by the 401A)	Adjunct
401A	T1 100 Ohm Synch Splitter for ATM (replacing the 400A)	Adjunct
402A	E1 120 Ohm (twisted pair) Synch Splitter for ATM Synchronization	Adjunct
403A	E1 75 Ohm (coax) Synch Splitter for ATM	Adjunct
700A	DS1 CPE Loopback Jack	Network

Continued on next page

Table 46. DEFINITY Adjuncts — Continued

9823A/B	Multi-Mode Fiber Transceiver	Network
BU3200A/B	Battery Interface Unit	Power
BTD08	Busy Tone Disconnect for Loop-Start, 2-Wire, Analog Trunks	Port
<i>Customer-Supplied</i>	ESPA-Compliant Radio-Paging Equipment	Adjunct
<i>Customer-Supplied</i>	External Alarm Equipment	Adjunct
<i>none</i>	DECT/ETSI-Compliant DEFINITY Wireless Business System for Non-US Markets	Adjunct
RM0850HA100	Rectifier Module	Power

105D Isolating Data Interface

The 105D Isolating Data Interface is an adapter that lets you connect adjunct devices and switches that use different data-cable interfaces. The 105D IDI connects one 25-pin RS-232 cable to one 37-pin RS-449 cable. Eight DIP switches let you configure the IDI for a direct connection (switches 0-3 UP, 4-9 DOWN) or a connection via a MUX or modem (switches 0-3 DOWN, 4-9 UP). DIP settings are printed on the IDI (see [Figure 50 on page 195](#)).

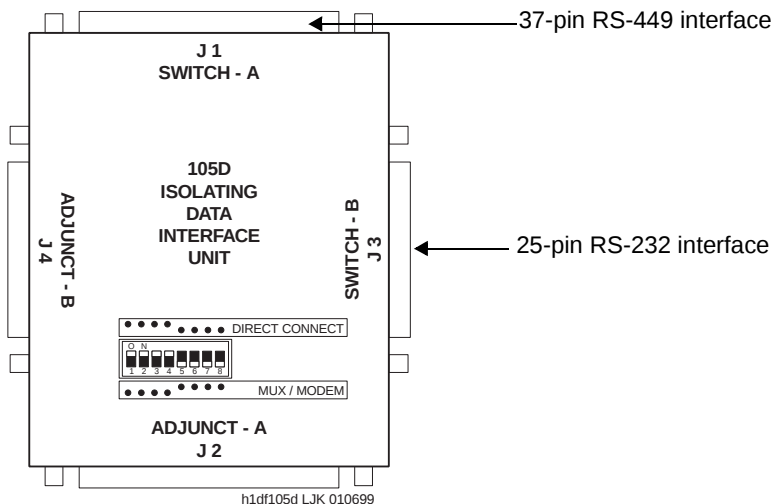


Figure 50. 105D Isolating Data Interface

120A Channel Service Unit Module

The 120A channel service unit (CSU) module connects to either a TN464E/F/GP, a TN2464/TN2464BP, a TN2313/TN2313AP, or a TN767D/E DS1 circuit pack on one end. The other end connects to the network interface smart jack. The 120A is powered from the +5 VDC port carrier power supply and uses a maximum of 1.2 Watts.

In combination with the DS1 circuit pack, it provides the essential functions of external CSUs. The TN464/767 and switch administration support all framing and line coding options.

The 120A is small, a little larger than a wallet, is easier to install than an external CSU, and does not require any option switch settings or DS1 cable.

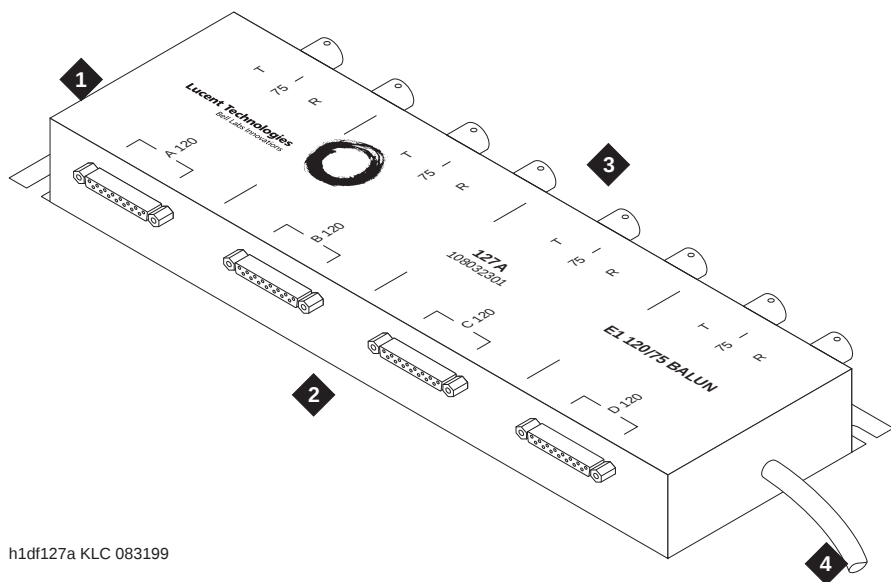
Vintage 2 of the 120A CSU module (the 120A2) provides enhancements to support the payload loopback function available when the ESF framing format is selected. This 700A loopback jack is controlled from the network side using the data link provided by the ESF framing format. This provides a loopback of data back to the network and operates as defined in AT&T TR54016-1989.

122A Music-on-Hold Interface for France

A highly reliable music source is provided by the wall-mounted 122A adjunct circuit pack. It provides the correct electrical transformation between a port of the TN2183 analog line circuit and a customer- provided music source. The 122A monitors the music source, and, if music is not present at the input, switches to a *Hold Tone* generated by the interface itself.

127A E1 120 Ohm/75 Ohm Quad Balun Box

The Balun box was designed primarily for the TN1654 DS1 converter. The 127A is capable of handling up to four E1 facilities. The Balun box is used in any application that requires impedance matching between 120 Ohm and 75 Ohm flavors of CEPT E1. In the case of the TN1654, the 127A was created to allow any 120 Ohm E1 balanced signal source to be converted to 75 Ohm un-balanced. It has the ability to selectively ground the shields of the 75 Ohm BNC connectors. Each balun in the Balun box is an impedance matching transformer, common mode filter and two shield ground selector switch.



h1df127a KLC 083199

Figure 51. 127A E1 120 Ohm/75 Ohm Quad Balun Box

300A Single-Mode Fiber Optic Transceiver

The 300A is a single-mode lightwave transceiver that transmits and receives light up to 115,000 feet (22 miles or 35 km). Single-mode fiber optic cable connects from the lightwave transceiver on 1 EPN carrier to the lightwave transceiver on another PPN or EPN carrier. The cable consists of 2 separate 8-10-micron core diameter fiber optic cables. The fiber optic connection allows full duplex (simultaneous bi-directional) transmission.

Fiber loss must be less than 17 dB. Saturation may occur if distances are short; simple in-line attenuators may be required if the total loss on the fiber link is less than 10 dBm. An optical time domain reflectometer (OTDR) test is recommended to determine specific fiber optic hardware requirements.

315x/316x-Series Channel Service Unit

The 315x/316x-series of the Channel Service Unit (CSU) is an interface between the T1 digital network and the customer premises equipment. A CSU provides an interface between the DSX1 levels of a DS1 Interface circuit pack and the levels of a DS1 transmission facility. The CSU also

- Isolates the DS1 interface circuit pack from DC voltages that may be on the facility
- Provides jacks to test access to receive and transmit signals between the DS1 circuit pack and the CSU
- Provides secondary surge protection between the DS1 facility and the DS1 circuit pack
- Provides loopbacks for the signals from the DS1 circuit pack and from the facility for fault isolation purposes
- Allows software configuration menus to display for quick and easy operation

The 3150/3160 units can sit on a desktop or a shelf. The Model 3151 is a circuit card and installs in a COMSPHERE® 3000-series carrier.

400A T1 Splitter for ATM (being replaced by the 401A (Not available with Category B))

The 400A splitter supplies the 8-KHz clock signal from the incoming T1 to an external ATM switch via a twisted pair cable. It attaches to the 50-pin connector behind a DS1 (T1) circuit pack.

In the USA, the 400A resides behind the Channel Service Unit, which serves as a barrier between the 400A and the public network.

401A T1 100 Ohm Sync Splitter for ATM (replacing the 400A) (Not available with Category B)

The 401A splitter supplies the clock signal from an incoming T1 to an external ATM switch via twisted pair cable. The 401A supports distances of up to 1000 feet from the sync splitter to 1 or 2 ATM switches, with a loss of 6 dB allowed in the cable. It is only for use on DEFINITY ATM PNC and WAN PNC configurations on the r model. The 401A attaches to the 50-pin connector behind the DS1 (T1) circuit pack. It is designed to comply with all the applicable US domestic and international signaling, EMC and safety specifications. The 401A is self-contained, which should reduce service calls that are related to ATM timing synchronization connectivity.

402A E1 S120 Ohm (twisted pair) Sync Splitter for ATM (Not available with Category B)

The 402A splitter supplies the 8-KHz clock signal from the incoming E1 to an external ATM switch via a twisted pair cable. The 402A supports distances of up to 1000 feet from the sync splitter to the ATM switch, with a loss of 6 dB allowed in the cable. It is only for use on DEFINITY ATM PNC and WAN PNC configurations on the r model. The 402A attaches to the 50-pin connector behind a DS1 (E1) circuit pack. It is designed to comply with all the applicable ETSI signaling, EMC and safety specifications.

403A E1 75 Ohm (coax) Sync Splitter for ATM (Not available with Category B)

The 403A is sometimes used to extend an E1 from the network interface where E1 is provided. One or two 75-ohm cables are used from the 403A splitter to 1 or 2 ATM switches. The 403A supports distances of up to 1000 feet from the sync splitter to the ATM switch, with a loss of 6 dB allowed in the cable. The 403A is only for use on DEFINITY ATM PNC and WAN PNC configurations on the r model. It attaches to the 50-pin connector behind a DS1 (E1) circuit pack. The 403A is designed to comply with all the applicable ETSI signaling, EMC and safety specifications.

700A DS1 CPE Loopback Jack

The 700A is a loopback device intended for permanent installation in DS1 house wiring at the network interface (NI) point when ICSUs are used. The 700A allows all customer wiring between the system and the NI to be looped and tested, either locally or remotely, via the management terminal. Using the 700A, DS1 problems can be quickly isolated to either the customer premises or to the external DS1 span.

The 700A operates with any vintage of TN767E (or later), TN464F (or later), TN2313, and TN2464 DS1 circuit packs and with G3V3 Release 3 (or later) software. The unit operates with the 120A2 (or later) integrated channel service unit (ICSU); *not* the 31xx series of CSUs or other external CSUs or earlier ICSUs.

The 700A is required when DC power appears at the interface to the ICSU. The 700A isolates the ICSU from the DC power and properly loops the DC span power. The 700A is also used when no smart jack is installed by the local phone company.

9823A/B Multi-Mode Fiber Transceiver

The 9823A-type lightwave transceiver transmits light up to 4,900 feet (0.93 miles or 1.5 km). The 9823B lightwave transceiver transmits light up to 25,000 feet (4.73 miles or 7.6 km). Multi-mode fiber optic cable connects from the lightwave transceiver on 1 carrier to the lightwave transceiver on another carrier. The cable consists of 2 separate 62.5-micron diameter fiber optic cables or 50-micron diameter fiber optic cables. The fiber optic connection allows full duplex (simultaneous bi-directional) transmission.

BU3200A/B Battery Interface Unit

The Battery Interface Unit (BIU) controls the RM0850HA100 rectifier modules, manages the batteries, and reports the status of system power. The BIU provides the emergency power off option and provides all battery alarm interfaces for internal and external alarms.

BTD08 Busy Tone Disconnect for Loop-Start, 2-Wire, Analog Trunks

This adjunct provides the method to detect disconnect of incoming calls connected by loop start 2-wire analog trunks used in some countries. In these cases, the Public Switched Telephone Network (PSTN) sends voice band tones instead of line disconnect, to indicate the caller has disconnected; while the called end remains connected.

This adjunct prevents connecting abandoned calls to the answering call center agent, locking up trunk-to-trunk connections, or locking up connections to repetitive announcements.

Customer-Supplied ESPA-Compliant Radio-Paging Equipment

The European-Standard Paging Access (ESPA) radio paging interface is the Western European standard paging protocol. The interface to the DEFINITY system is via an ASAI link.

Customer-Supplied External Alarm Equipment

The external alarm allows analog line ports to be used as additional external device alarm inputs to the DEFINITY System. This feature operates with all supported analog line circuit packs and with all maintenance circuit packs. This interface does not include a contact relay closure.

Each analog port used for this feature is administered as an external alarm connection. This administration includes information identifying the port, the external device connecting to the port, the alarm level assigned to the external device, and the "product identifier" of the adjunct or external equipment.

DECT/ETSI-Compliant DEFINITY Wireless Business System for Non-US Markets

The DEFINITY Wireless Business System Digitally Enhanced Cordless Telecommunications (DECT) provides mobility management with an adjunct processor. The system uses the DECT/ETSI standard, which defines the interface between the wireless phones and the base stations.

The DEFINITY wireless business system (DWBS) has the following capacities:

- 360 wireless telephones
- 24 base stations
- 12 E1 CAS links to DEFINITY
- 1 administration PC
- 1 modem for remote maintenance

The DWBS-DECT adjunct communicates to the DEFINITY ECS via a DS1 interface (providing E1 CAS).

RM0850HA100 Rectifier Module

The rectifier module is used in the J588980CH Power Distribution Unit. It operates as an integral part of a complete power system with battery backup. The modules operate in a redundant, high reliability mode to provide -48 VDC at 850 Watts to a common power bus.

4—Technical Specifications

This section includes the following technical specifications on the capabilities, performance, and feature capacities:

- Representative Number of Lines
- Call Performance
- Additional Hardware to Use Features
- Allocation of Buttons
- Cabling Distances
- Initialization and Recovery
- Call Progress Tones
- Indicator Lamp Signals

Representative Number of Lines/Trunks

Table 47 lists the representative number of lines/trunks for each configuration of PPNs, EPNs, and CSSs in R9. The actual number of lines depends on the features and characteristics of the configuration.

Table 47. Representative Number of Lines/Trunks

Configuration	R9csi	R9si	R9r
1 processor port network (PPN)	400	400	800
Direct connect with 1 PPN and 2 EPNs	Does not apply	2400/400	2400/400
1 switch node (SN) in the CSS with 1 PPN and 15 EPNs	Does not apply	Does not apply	12,500/ 2000
3 SNs in the CSS with 1 PPN and 43 EPNs	Does not apply	Does not apply	25,000/ 4000
1 PPN and 4 EPNs with ATM port network connectivity (Not available with Category B)	Does not apply	Does not apply	25,000/ 4000

Call Performance

Table 48 lists call processing performance for R9. This is also termed as Busy Hour Call Completion or BHCC. Realistic system capacity is what a DEFINITY ECS system, including a processor, TDM bus, Packet bus, etc., can support on a sustained basis. With allowances for system maintenance, administration, audits, etc., the system is still able to meet the various timing requirements, such as cut through. The numbers are based on 0.57 call processing occupancy, allowing 0.28 for maintenance, administration, audits, etc., and 0.15 for normal bursts in traffic and for minimization of queuing delays in the processor. Keep in mind that the following chart is intended to be a guideline. The BHCC rate may vary depending on what features are being used with which DEFINITY ECS.

**NOTE:**

Call performance can vary with different customer applications. A Processor Occupancy Evaluation (POE) may be required.

Table 48. Call Processing Performance (BHCC, calls per hour)

System Type	R9csi	R9si	R9r
All Analog	10,000	20,000	135,000
General business	10,000	20,000	100,000
ISDN	10,000	20,000	40,000
Automatic call distribution (ACD)	10,000	20,000	70,000
Inbound call management (ICM)	10,000	20,000	30,000
Outbound call management (OCM)	10,000	20,000	44,000
Computer Telephony Interface (CTI)	10,000	20,000	70,000

In the case of the csi model and si model, we allow for higher call volumes than would be expected from the number of stations, or in the case of ACD, the number of agents without having to perform a POE.

The system capacity for the r model is dependant upon the call mix and is bounded by processor occupancy and the number of stations. The number of agents in ACD applications and the TDM bus do not limit the BHCC rate as it does for the csi model and si model. In the case of the r model, when the expected call volume will exceed 70% of the System Capacity BHCC rate, a processor occupancy evaluation must be performed by the SDSC before certification of a new order or an upgrade.

The r model ISDN is limited by packet capabilities.

[Table 49](#) lists response times for R9.

Table 49. Response Times

Attribute	Response Time
Call processing	General voice path cut-through: 750 ms Attendant ring tip: 260 ms Direct extension selection (DXS) lamp update: 1 second Announcement circuit pack upload (no call processing load): 40 minutes
System management	4 to 6 seconds mean response time
Maintenance	High-priority periodic tests must be completed within 1 hour. High-priority scheduled tests must be completed once each day, but not during busy hours.
Booting and recovery	11 minutes (not including announcements)

Allocation of Buttons

The allocation of buttons in [Table 50 on page 206](#) is by station type. The minimum button capacity was calculated by administering each terminal with the default number of call appearances and adding a non-call appearance/bridged-appearance button to the highest allowed button for every possible screen.

The maximum button capacity was calculated by administering each terminal with the default number of call appearances, then adding additional call appearances as the highest allowed button number for each SMT screen which contained buttons.

Table 50. Allocation of Buttons by Station Type

Station Type	Typical Button Units R9csi, si		Typical Button Units R9r
	Minimum	Maximum	
Analog sets: 500, 2500, 6200, 7101A, 7103A, 7104A, 8110, DS1SA, and DS1FD	76	76	76
Other Analog Ports ¹ , Wired Spare Ports, and Non-wired Spare Ports	76	76	76
10MET set — 10 buttons	64	64	64
20MET set — 20 buttons	184	184	184
30MET set — 30 buttons	304	304	304
Terminal — 510 BCT	388	400	388
Terminal — 515 BCT	280	364	
602A1 Callmaster I	412	496	412
603A1 Callmaster II	412	448	412
603D1 Callmaster III	412	448	412
603E1 Callmaster III	412	448	674
606A1 Callmaster IV	952	1552	
4600 IP telephone	88	88	88
4612 IP telephone	496	604	496
4624 IP telephone	640	892	640

Continued on next page

Table 50. Allocation of Buttons by Station Type — Continued

Station Type	Typical Button Units R9csi, si		Typical Button Units R9r
	Minimum	Maximum	
Digital set — 6402	184	184	—
Digital set — 6408	112	112	—
Digital set — 6408D	448	508	—
Digital set — 6408D+	448	508	—
Digital set — 6416D+	544	700	—
Digital set — 6416D+w/XM24B expansion module	832	1276	—
Digital set — 6424D+	640	892	—
Digital set — 6424D+w/XM24B expansion module	928	1468	—
Voice/data — 6538 (Constellation)	112	112	—
Hybrid set — 7303S	124	124	124
Hybrid set — 7305S	412	412	412
Hybrid set — 7309H	124	124	124
Hybrid set — 7313H	124	124	—
Hybrid set — 7314H	268	268	—
Hybrid set — 7315H	364	448	—
Hybrid set — 7316H	412	412	—
Hybrid set — 7317H	508	592	—

Continued on next page

Table 50. Allocation of Buttons by Station Type — Continued

Station Type	Typical Button Units R9csi, si		Typical Button Units R9r
	Minimum	Maximum	
Digital set — 7401D/7401+	112	112	112
Digital set — 7403D	124	124	124
Digital set — 7404D	76	76	76
Digital set — 7404D w/display	232	268	232
Digital set — 7405D	412	412	412
Digital set — 7405D w/display	568	652	—
Digital set — 7405D w/cov	652	652	—
Digital set — 7406D	340	340	340
Digital set — 7406D w/display	412	436	412
Digital set — 7406+	340	340	340
Digital set — 7406+ w/display	412	436	412
Digital set — 7407D	568	652	568
Digital set — 7407+	568	652	568
Digital set — 7410D	124	124	102
Digital set — 7410+	124	124	124
Digital set — 7434D	412	412	412
Digital set — 7434D w/display	568	940	—
Digital set — 7434D w/call coverage module	652	652	652
Digital set — 7444D	568	940	568

Continued on next page

Table 50. Allocation of Buttons by Station Type — Continued

Station Type	Typical Button Units R9csi, si		Typical Button Units R9r
	Minimum	Maximum	
Digital set — 8403B	184	184	204
Digital set — 8405B/B+	64	64	124
Digital set — 8405D/D+	352	376	352
Digital set — 8410B	124	124	124
Digital set — 8410D	352	436	124
Digital set — 8411B	124	124	124
Digital set — 8411D	352	436	352
Digital set — 8434 D	676	1048	676
Digital set — 8434 with XM24B Expansion Module	964	1552	—
Digital set — 9403B	184	184	184
Digital set — 9410D	352	436	124
Digital set — 9434D	676	1048	676
Basic attendant console (302A, 302B)	412	—	—
Enhanced attendant console (302C, 302D)	—	—	—
Attendant selector console (26B1)	—	—	—
ISDN-BRI			
— 7505D	232	288	232
— 7506D	304	444	304
— 7507D	532	107	532
— 8503D	64	64	64
— 8510T w/display	232	372	232
— 8520T w/display	352	692	352
Wireless 9601A ²	—	—	—

Continued on next page

Table 50. Allocation of Buttons by Station Type — Continued

Station Type	Typical Button Units R9csi, si		Typical Button Units R9r
	Minimum	Maximum	
ADJLK ³	4	4	4
ADX8D	568	652	568
ADX16A	76	76	76
ADX16D	568	652	568
ASAI	4	4	—
CP9530	76	—	—
DIG800	568	652	—
K2500	76	76	—
MDC9000	52	64	—
MDW9000	52	64	—
PC	482	580	—
VRU ⁴	76	76	—
VRUFD	62	76	—
VRUSA	62	76	—
WCBRI	24	24	—
105TL	28	28	—

1. Includes music-on-hold, recorded announcement, and loudspeaker paging.
2. The radio controller supports 24 simultaneous calls and 2 wireless fixed bases.
3. Needs ASAI interface and ASAI prop adjunct links turned on in “sys-param customer options.”
4. Needs DTFMF turned on in “sys-param customer options.”

The following notes apply to the button and data module records in [Table 50 on page 206](#):

- Any DCP station (except 8400-series) can add a 7400B, requiring 1 data module record.
- A data module can be added to a 7403D or 7405D, requiring 1 data module record.
- A data module (ADM-T) can be added to a 7505D, 7506D, or 7507D, requiring 1 data module record.
- An ISDN-BRI endpoint record is required for each distinct ISDN-BRI endpoint. Thus each voice-only, data-only, or voice-data endpoint uses 1 of these records.

Cabling Distances

When the system layout is being determined, consider the maximum cabling distances to the system cabinet. [Table 51](#) lists the allowable intra-premises cabling distances. If using mixed wire sizes, use the table columns for 26 AWG (#4) (0.14 mm²) wire. These distances are based on a minimum of -42.5 VDC at the equipment connecting to the system.

Table 51. Allowable Intra-premises Cabling Distances

Equipment	24 AWG Wire (0.26 mm ²)		26 AWG Wire (0.14 mm ²)	
	Feet	Meters	Feet	Meters
Enhanced attendant console (302C1)				
With selector console				
Phantom powered	800	244	500	152
Locally powered	5000	1524	3400	1037
Without selector console				
Phantom powered	1400	427	900	274
Locally powered	5000	1524	3400	1037
510D or 515 terminals	3000	914	2200	670

Continued on next page

Table 51. Allowable Intra-premises Cabling Distances — Continued

Equipment	24 AWG Wire (0.26 mm ²)		26 AWG Wire (0.14 mm ²)	
	Feet	Meters	Feet	Meters
513, 610 BCT, 615 MT, 715, 2900/715, 715 BCS-2, 4410 or 4425 terminals (see also “data modules” or “EIA interface”). Maximum distance from terminal to data module or ADU	50	15.2	50	15.2
Data modules:				
Z702AL1-DSU data module base	5000	1524	4000	1219
Z703AL1-DSU data module base	5000	1524	4000	1219
7404D data module	5000	1524	4000	1219
DTDM	3400	1037	2200	670
High-speed data link	5000	1524	4000	1219
MTDM	5000	1524	4000	1219
3270 data module	5000	1524	4000	1219
7400A/B data module	5000	1524	4000	1219
8400B Plus data module	5000	1524	4000	1219
EIA interface (data line circuit pack and ADU):				
19.2 kbps	2000	610	2000	610
9.6 kbps	5000	1524	4000	1219
4.8 kbps	7000	2130	6000	1827
2.4 kbps	12000	3654	10000	3050
1.2 kbps	20000	6100	16000	4875
0.3 kbps	40000	12200	30000	9150

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Cabling Distances

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Table 51. Allowable Intra-premises Cabling Distances — Continued

Equipment	24 AWG Wire (0.26 mm ²)		26 AWG Wire (0.14 mm ²)	
	Feet	Meters	Feet	Meters
Voice terminals: Analog 8-port circuit pack (TN742 or TN769), on-premises or out-of-building — same premises (notes 1 and 2) 500- or 2500- type (note 3) 7100 series 8100 series on/off premises and out of building	20000 15200 15200	6100 4633 4633	13000 10000 10000	3962 3050 3050
16-port circuit pack (TN746/B or TN2183), on-premises only no out-of-building or bridging ¹ 500 or 2500 type terminals without adjuncts 8100 series	3100 3000 3000	945 914 914	2000 2000 2000	610 610 610
16-port circuit pack (TN746B or TN2183), on-premises or out-of-build- ing, same premises ^{1, 2} 500 or 2500 type ³ 7100 series 8100 series	20000 15200 15200	6100 4633 4633	13000 10000 10000	3962 3050 3050
Hybrid (TN762) 7300 series (Phantom powered) 7300 series (with Local power)	1000 2000	305 610	750 2000	229 610
Digital (TN754B, TN2181, or TN2224) 7400D, 8400, or 9400 Series Phantom powered Locally powered (no Digital Line Protectors)	3500 5000	1067 1524	2200 4000	670 1219

Continued on next page

Technical Specifications

Cabling Distances

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Table 51. Allowable Intra-premises Cabling Distances — Continued

Equipment	24 AWG Wire (0.26 mm ²)		26 AWG Wire (0.14 mm ²)	
	Feet	Meters	Feet	Meters
Digital (TN2181 and TN2224), 2-wire 6400 series (cabling distance can increase to 5500 feet/1992 m using 22-AWG/0.32-mm ² wire)	3500	1066	2200	670
Digital (TN754) 7400D series				
On-premises-only	3500	1066	2200	670
Out-of-building, same premises	3500	1066	2200	670
Out-of-building, with Digital Line Protectors	5000	1524	4000	1219
ISDN-BRI (TN556)				
7500 and 8500 series				
Termination resistor (3 feet)	1900	579	1600	488
Termination resistor (250 feet)	1600	488	1300	396
ISDN-BRI (TN2198) (See Table 52 on page 215)				
MET sets (TN735)	1000	305	650	198

1. An out-of-building, same-premises, analog terminal requires a carbon block, gas tube, or equivalent solid state device at each end of the interbuilding cable.
2. Use only 500- or 2500-type terminals off-premises to a CO.
3. Point-to-point connections and terminals are within 33 feet (10m) of the jack.

ISDN-BRI Two-Wire Line Cabling Distances

The TN2198 BRI 2-Wire line circuit pack supports various cabling configurations using 22, 24, and 26 AWG (0.34 mm², 0.26 mm², 0.14 mm², respectively) wire. Up to 18,000 feet (5486m) (maximum) may be used between the TN2198 and the NT1 network interface. Refer to [Table 52](#) for the cabling distances from the NT1 network interface to the 7500- and 8500-series voice terminals using 24 AWG (0.26 mm²) and 26 AWG (0.14 mm²) wire. If 22 AWG (0.34 mm²) wire is used, contact your Avaya representative. Distances from the power closet to the telephone are typically less than 250 feet (75m).

Table 52. Cabling Distances from the NT1 to the ISDN-BRI telephone

Equipment		24 AWG (0.26 mm ²)		26 AWG (0.14 mm ²)	
		Feet	Meters	Feet	Meters
NT1 to ISDN-BRI Four-Wire telephone (7500 and 8500 Series)	Termination resistor (3 feet) (0.9 m)	1900	579	1600	488
	Termination resistor (250 feet) (75 m)	1600	488	1300	396

Fiber Optic Cabling Distances

The DEFINITY ECS may contain a Class 1 LASER device if single-mode fiber optic cable is connected to a remote EPN in a direct- or CSS-connected switch. The LASER device operates within the following parameters:

- Maximum Power Output: -5 dBm
- Wavelength: 1310 nm
- Mode Field Diameter: 8.8 microns

CLASS 1 LASER PRODUCT IEC 825 1993



CAUTION:

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Contact your Avaya representative for more information.

For the maximum fiber optic cabling distances for a system, determine:

- The mean loss and the length of the outside plant fiber cable
- The mean loss and the length of fiber cable shipped with the cabinet (including any fiber riser cable)
- The mean loss of an ST connector and the number of ST connections
- The mean loss due to the total number of splices
- Higher-order mode loss



NOTE:

If estimated fiber limits such as loss, length, excessive splices, and so forth are expected, OTDR (Optical Time Domain Reflectometer) tests should be made to ensure a successful installation of a remote EPN fiber link.

Direct-connect or CSS

For multi-mode fiber: The 9823A lightwave transceiver transmits up to 4,900 feet or 0.93 miles (1.5 km). The 9823B lightwave transceiver transmits up to 25,000 feet or 4.73 miles (7.6 km). Multi-mode fiber optic cable consists of 2 separate 62.5-micron diameter or 50-micron diameter fiber optic cables. The transmission speed across a fiber link between the PPN and an EPN is 32.768 Mbps.

For single-mode fiber: The 300A lightwave transceivers transmits light up to 115,000 feet or 22 miles (35 km). Fiber loss must be less than 17dB. Saturation may occur if distances are short; attenuators may be required if the total loss on the fiber link is less than 10dBm. Single-mode fiber optic cable consists of 2 separate 8- to 10-micron core cables. The transmission speed across a fiber link between the PPN and an EPN is 32.768 Mbps.

ATM (Not available with Category B)

For multi-mode fiber: The TN2305 supports a loss budget of 9.5dB. Multi-mode fiber optic cable consists of 2 separate 62.5-micron diameter or 50-micron diameter fiber optic cables. The transmission speed across a fiber link is 155.52 Mbps. Transmit power for the TN2305 ranges from a maximum of -14 dB to a minimum of -19 dB. Receiver sensitivity ranges from a maximum of -14 dB to a minimum of -30 dB.

For single-mode fiber: The TN2306 supports a loss budget of 17.5dB. Single-mode fiber optic cable consists of 2 separate 8- to 10-micron core cables. The transmission speed across a fiber link is 155.52 Mbps. Transmit power for the TN2306 ranges from a maximum of -8 dB to a minimum of -15 dB. Receiver sensitivity ranges from a maximum of -8 dB to a minimum of -34 dB.

DS1 Remoting Transmission Distance

When the distance between cabinets is greater than 115,000 feet or 22 miles (35 km), or if fiber optic cabling right-of-way is not available, use DS1 remoting for greater distances. Contact your Avaya representative for network engineering guidelines.

Initialization and Recovery

The time needed to initialize a system or for a system to recover from being reset depends on the line size of the system, active features, trunks, and adjuncts connecting to the system. The system needs several minutes to initialize or recover automatically from being reset.

Call Progress Tones

This section details the tones generated by the systems for the United States. See [Table 53](#) for the default call progress tones generated for country code 1.

Table 53. Default Call Progress Tones

Tone	Frequency	Pattern (ms)
Answerback 3 tone	2225 Hz	3000 on, followed by silence; no repeat
Answerback 5 tone	2225 Hz	5000 on, followed by silence; no repeat
Bridging warning tone ¹	440 Hz	1750 on, 12000 off, 650 on; repeated
Busy tone	480 Hz + 620 Hz	500 on, 500 off; repeated
Call waiting tones: Internal	440 Hz	200 on, followed by silence; no repeat
External or handled by attendant	440 Hz	200 on, 200 off, 200 on followed by silence; no repeat
Priority call	440 Hz	200 on, 200 off, 200 on, 200 off, 200 on fol- lowed by silence; no repeat

Continued on next page

Table 53. Default Call Progress Tones — Continued

Tone	Frequency	Pattern (ms)
Call waiting ringback tone	440 Hz + 480 Hz; 440 Hz	900 on (440 Hz + 480 Hz), 200 on (400 Hz), 2900 off; repeated
Centralized attendant call: incoming call identification	480 Hz & 440 Hz & 480 Hz	100 on (480 Hz), 100 on (440 Hz), 100 on (480 Hz), followed by silence; no repeat
Coverage tone	440 Hz	600 on, followed by silence; no repeat
Confirmation tone	350 Hz + 440 Hz	100 on, 100 off, 100 on, 100 off, 100 on fol- lowed by silence; no repeat
Continuous confirmation tone	350 Hz + 440 Hz	100 on, 100 off; repeated
Dial tone	350 Hz + 440 Hz	continuous
Dial zero, attendant transfer, and test calls	440 Hz	100 on, 100 off, 100 on followed by silence; no repeat
Recall on don't answer, audi- ble ringing	440 Hz	300 on, followed by silence; no repeat
Hold recall, hold confirma- tion	440 Hz	50 on, 50 off, 50 on, 50 off, 50 on, 50 off, 50 on, 50 off, 50 on followed by silence; no repeat
Camp-on recall, camp-on confirmation	440 Hz	100 on, followed by silence; no repeat
Executive override tone	440 Hz	3000 on, followed by silence; no repeat
Intercept tone	440 Hz & 620 Hz	250 on (440 Hz), 250 on (620 Hz); repeated
Precedence audible alert tone	440 Hz + 480 Hz	1600 on, 300 off; repeated

Continued on next page

Table 53. Default Call Progress Tones — Continued

Tone	Frequency	Pattern (ms)
Recall dial tone	350 Hz + 440 Hz	100 on, 100 off, 100 on, 100 off, 100 on, 100 off, followed by continuous dial tone
Reorder tone	480 Hz + 620 Hz	250 on, 250 off; repeated
Remote hold tone	440 Hz	50 on, 50 off; repeated
Ringback tone	440 Hz + 480 Hz	1000 on, 3000 off; repeated
Voice signaling tone	440 Hz	1000 on, followed by silence; no repeat
Zip tone	480 Hz	500 on, followed by silence; no repeat

1. Used with the Busy Verification and Executive Override features, and Service Observing feature when the warning tone is enabled.

Table 54 lists the call progress tones available for customizing the tones. The tones in the list can be generated only when using a TN780 or TN2182 Tone-Clock circuit pack and the tone customizing feature is used. Tag tones are available only on the TN2182. The tones are used to customize from 1 to 20 tones in the 5 administrable tone plans.

In Table 54, **Level** is the tone amplitude in decibels (dBm). **0** dBm is referenced to 1 milliwatt. To customize these tones, refer to *DEFINITY Enterprise Communications Server Administrator's Guide*.

Table 54. Customizable Call Progress Tones

Frequency	Level (dBm)
Null	None
330 Hz	-8.0 ¹
330 Hz + 440 Hz	-5.0 + 8.5 ¹

Continued on next page

Table 54. Customizable Call Progress Tones — Continued

Frequency	Level (dBm)
330 Hz + 440 Hz	-8 + -11 ¹
350 Hz	-17.25
350 Hz + 425 Hz	-4.0 ¹
350 Hz + 425 Hz	- 4.0
350 Hz + 440 Hz	-13.75
350 Hz + 440 Hz	-13.0 ¹
350 Hz + 440 Hz	-13.75 ¹
375 Hz + 425 Hz	-15.0
404 Hz	-11.0
404 Hz	-16.0
404 Hz + 425 Hz	-11.0
404 Hz + 450 Hz	-11.0
425 Hz	-4.0 ¹
425 Hz	-5.0 ¹
425 Hz	-8.0 ¹
425 Hz	-11.0 ¹
425 Hz	-17.25 ¹
440 Hz	-11.0 ¹
440 Hz	-13.0 ¹
440 Hz	-17.25
440 Hz + 350 Hz	-13.0 ¹
440 Hz + 480 Hz	-13.0 ¹

Continued on next page

Table 54. Customizable Call Progress Tones — Continued

Frequency	Level (dBm)
440 Hz + 480 Hz	-19.0
480 Hz + 620 Hz	-13.0 ¹
480 Hz + 620 Hz	-24.0
525 Hz	-11.0
620 Hz	-17.25
697 Hz or 700 Hz	-8.5/-8.0
770 Hz or 900 Hz	-8.5/-8.0
852 Hz or 1100 Hz	-8.5/-8.0
950 Hz	-5.0 ¹
950 Hz	-10.0 ¹
Chimes (860 Hz)	- 3.0
941 Hz or 1300 Hz	-8.5/-8.0
DMW (1000 Hz)	0.0
Square (1000 Hz)	+ 3.0
1004 Hz	0.0
1004 Hz	-16.0
1209 Hz or 1500 Hz	-7.5/-8.0
1336 Hz or 1700 Hz	-7.5/-8.0
1400 Hz	-5.0 ¹
1400 Hz	-10.0 ¹
1400 Hz	-11.0
1477 Hz or 2600 Hz	-7.5/-8.0

Continued on next page

Table 54. Customizable Call Progress Tones — Continued

Frequency	Level (dBm)
1633 Hz or 1004 Hz	-7.5/ 0.0
1700 Hz	-16.0 ¹
1800 Hz	-5.0 ¹
1800 Hz	-10.0 ¹
2025 Hz	-12.1
2100 Hz	-12.1
2225 Hz	-12.1
2804 Hz	-16.0
Count	None

¹. Available only with TN2182 Tone-Clock circuit pack.

Audible Ringing Patterns

Table 55 lists the administrable audible ringing patterns that can appear on analog line circuit pack ports. The times under the columns "0 - 5" are in milliseconds. *DEFINITY Enterprise Communications Server Administrator's Guide* contains ringing pattern administration.

Table 55. Ringing Patterns

Bursts	Set Number	0	1	2	3	4	5
One	on	900	1000	1000	1000	1000	1000
	off	4100	2150	4000	4000	4000	2150

Continued on next page

Table 55. Ringing Patterns — Continued

Bursts	Set Number	0	1	2	3	4	5
Two	on	400	300	600	400	300	400
	off	200	300	200	200	300	200
	on	300	400	200	400	300	400
	off	4100	2150	4000	4000	4100	2150
Three	on	200	100	200	200	200	200
	off	100	200	200	200	100	200
	on	200	100	200	200	200	200
	off	100	200	200	200	100	200
	on	300	400	200	200	300	200
	off	4100	2150	4000	4000	4100	2150

The following circuit packs default to the associated ringing pattern sets:

- TN2180 — Set 1
- TN2135 — Set 2
- TN2144 — Set 3
- TN468B — Set 4
- TN2149 — Set 4
- TN2181, TN2183, and TN2224 — Set 0 (administrable ringing cadence)

The following list shows the intended use for administered ringing pattern sets:

- Set 0 — United States
- Set 1 — Japan and Spain
- Set 2 — Italy
- Set 3 — Netherlands and Sweden
- Set 4 — Australia, Belgium, and United Kingdom
- Set 5 — India, Malaysia, New Zealand, and Singapore

Multi-Frequency Compelled Tones

With Multi-Frequency Compelled (MFC) signaling used on Direct Inward Dialing (DID) and Direct Outward Dialing (DOD) trunks in countries outside the United States, a system responds to the frequencies generated by the CO with answering frequencies.

The MFC tones and signaling sequence follows the International Telecommunications Union (ITU-T) recommendations for MFC signaling defined in Volume VI, Fascicle VI.4 of the 1989 CCITT blue books.

Refer to *DEFINITY Enterprise Communications Server Administrator's Guide* for more details.

Indicator Lamp Signals

[Table 56](#) lists the light signals generated by the system for the attendant console and multi-appearance voice terminals.

Table 56. Light Signals Generated

Light Signal	Pattern in Milliseconds (ms)
Dark	Off
Lighted	On
Flashing	500 on, 500 off; repeated
Fluttering	50 on, 50 off; repeated
Broken flutter	5 cycles of 50 on, 50 off, followed by 500 off; repeated
Wink	350 on, 50 off; repeated

A — Wireless Business Solutions

This appendix briefly describes the DEFINITY Wireless Business System (DWBS) platform for DEFINITY G3, R6 and later.

DWBS—Personal Wireless Telephony

The DWBS firmware release 6.02 Personal Wireless Telephony (PWT) solution provides wireless applications within the North American region, which consists of the United States, Canada, and some Latin American countries (please refer to the DWBS Offer Reference Manual). The DWBS platform uses the Unlicensed PCS band (1920–1930 MHz).

In EMEA and abroad, the DEFINITY Wireless sister system—Digital Enhanced Cordless Transmission (DECT)—is sold and installed as the in-building wireless office solution. The DECT platform uses the Unlicensed 20 MHz band (1880–1900 MHz).

Both DWBS PWT and DECT are integrated into DEFINITY ECS and provide wireless in-building mobility to enterprise customers for single-, dual-, and multiple-campus environments. Both can therefore be added to an existing switch, while providing the same voice features and quality of service available with the DEFINITY platform today. In addition, DWBS PWT and DECT are ideally suited for all types of skill sets found in the workplace (for example, building security, maintenance, IT engineering, sales, management, health care). They are designed to help increase productivity and improve employee morale across all industries and work environments.

DWBS Overview

DWBS is a wireless communication system that allows the user to communicate through the DEFINITY ECS using pocket-sized wireless telephones. The wireless telephone can be administered to bridge with a specific desk set, which allows users the freedom to make and receive calls while working at or away from their desks. These telephones can be used like any other digital extension connected to the DEFINITY ECS. Users can make and receive outside calls, make and receive calls from other extensions, and use DEFINITY ECS features such as conference, transfer, drop, or hold.

DWBS Components

DWBS contains the following main components:

- Mobility Manager (MM) software for DEFINITY ECS
- Radio controller (RC)
- Wireless fixed base (WFB)
- Cell antenna unit (CAU)
- DWBS 9631 pocket wireless telephone (WT)
- Battery chargers
- Power supplies
- Cables (both twisted pair and COAX)

The following sections describe each of the main components of DWBS. Contact your Avaya representative to determine the types and quantity of each component required for each of your locations.

Mobility Manager Software

Mobility Manager is software that executes on all DEFINITY switch platforms (G3si, G3r, G3csi, G3cfs, and BCS). The Mobility Manager provides maintenance, administration, and call processing for DWBS. It directs all control and voice information to the appropriate RC for each pocket telephone. In addition, Mobility Manager is responsible for the administration and maintenance of the DWBS and pocket telephones.

Radio Controller

The TN789B RC is a circuit pack that is compatible with the DEFINITY ECS switch universal port slot. Each RC connects to and controls up to two WFBs over separate standard twisted-pair (12) interfaces. The RC provides the interface between the DEFINITY switch and the DWBS network of WFBs.

The RC circuit pack operates in all applicable DEFINITY cabinets, over the full range of temperature and humidity specifications:

- 40 to 120 °F (4.4 to 48.9 °C)
- 10% to 95% relative humidity at 84 °F (28.8 °C)
- 10% to 45% relative humidity at 110 degrees °F (43.3 °C)

Wireless Fixed Base (WFB)

The WFB is the radio base station. The WFB connects to an RC by standard twisted-pair (CAT3 or better) cable of up to 5,000 feet (if locally powered). A WFB can support up to 4 CAUs via 100 feet of specially engineered fixed-length coaxial cable. The number of simultaneous calls that can be supported by a WFB with multiple CAUs is 12, minus the number of idle CAUs. Therefore, for a WFB to carry 12 calls, each CAU must carry at least one of the calls. [Table 57](#) details the WFB dimensions and weight

Table 57. WFB Physical Characteristics

Height	Width	Depth	Weight	Heat Dissipation (Per Hour)
2 inches (12.7 cm)	9 inches (17.8 cm)	13 inches (5.08 cm)	2 Pounds (0.9 kg)	6.82 to 34.1 BTUs (1.72 to 8.6 Kilocalories)

The WFB provides the radio functions necessary to do the following:

- Communicate to the RC via a 4-wire 12 interface using proprietary protocol
- Transform calls from the DEFINITY switch into radio signals, which are transmitted via a 13-link to a CAU for transmission through the air to the appropriate DWBS pocket phones
- Transform radio signals from the pocket phones into data and transmit the data to the DEFINITY switch

The actual arrangement of CAUs connected to WFBs is determined by the layout of the site, as well as the other customer wiring preferences. At a minimum, one antenna must be connected to the WFB. CAUs are connected to the WFB by a coaxial cable (13) interface. The 13 interface is a connectorized, coaxial cable of 100 feet fixed length and must be provided by Avaya. The cable is plenum-rated; however, the WFB and CAU are not plenum-rated.

A standard -48 volt power supply is required for every WFB. The power supply can be centrally located in the switch room or IDF closet. The cable distance between a power supply and WFB is 325 feet using a single pair of twisted wire or 2,000 feet if the pair is doubled up.

 NOTE:

Adding CAUs to the DWBS increases the coverage area. Adding WFBs increases the traffic capacity that the system can handle. In any given area, antennas from different WFBs can be positioned a minimum of three meters apart when higher traffic density is needed.

 NOTE:

You can now order the Outdoor CAU (OCAU). Please visit the following web site for more information: <http://eidweb.ho.lucent.com/dwdt/>

The WFB meets the requirements for “Equipment not Normally Customer Carried” and is intended for use indoors:

- 0 to 120° F (-17.8 to 48.9 °C)
- 0% to 95% relative humidity

Each WFB can be phantom-powered by the I2 interface on the TN789 radio controller circuit pack or powered from an auxiliary AC power supply (WP-92464).

The TN789 can supply 250 mA of load current if no CAUs are installed. The auxiliary AC power supply provides 400 mA of load current.

Each WFB can dissipate from 1.8 Watts to 10 Watts of power, depending on number of simultaneous calls.

 NOTE:

The auxiliary power supply is required if one or more CAUs connect to the WFB.

WFB with Antenna

The WFB with antennae is a new product. This unit has the same dimensions, weight, and specifications as the regular WFB. However, it has an internal antenna. Therefore, no CAU is required and no coaxial cable is needed.

This WFB performs the same as the regular WFB, except it allows for a more dense call capacity. The call capacity is denser because all 12 simultaneous calls are assigned to the internal CAU. So, if you have a higher traffic area and are willing to give up extended coverage, then this product is a perfect fit. For product and ordering information, please access the following link: http://www.bcs.lucent.com/sales_market/wireless/.

Cell Antenna Unit

The cell antenna unit (CAU) is a remote antenna that connects to a WFB to expand the coverage area. The CAU is 9 inches long by 5 inches wide by 2 inches high. Up to four CAUs can connect to a single WFB. Each CAU is connected to its associated WFB by 100 feet of 13 connectorized coaxial cable, which is an Avaya proprietary interface.



NOTE:

The 100-foot cable length is part of the product specification and is not negotiable. Indoor and outdoor CAUs are available. You can order the Indoor CAU (DCAU) by PEC Code 3279-DCAU. You can order the OCAU by PEC Code 3279-OCAU.

The CAU meets the requirements for “Equipment not Normally Customer Carried” and is intended for use indoors:

- 0 degrees to 120 °F (-17.8 to 48.9 °C)
- 0% to 95% relative humidity

Each CAU weighs 0.5 pound (0.22 kg) and can dissipate up to 2 Watts of power. The average heat dissipation is 6.82 BTUs (1.7 gram-calories) per hour.

DEFINITY ECS Pocket Phone

The DEFINITY ECS 9631 pocket phone is a portable multiple-call-appearance wireless telephone with a display (2.5 inches X 6 inches X 1.1 inch). Some of the features of the pocket phone are as follows:

- Compact size (7.5 ounces; no-flip design)
- Built-in antenna
- 3x16 display screen
- Three call appearances
- Soft keys with menu options for ease of use
- Bridging capability
- Business features, including Conference, Transfer, Hold, Mute, Speed Dial, and Drop
- Rapid battery recharge time
- Warning tones and indicators
- Upgradeable microprocessor software
- Headset interface

In DWBS firmware release 0.6.2, the following new features were added:

- **Speed Dial:** Enables users to store up to six numbers for easy dialing access.
- **Speed Dial Labels:** Enables users to change the labels for the speed dial locations to personalize what is stored in each speed dial location.
- **Keypad Lock:** Enables users to lock the pocket phone keypad, thus preventing an undesired phone call or unwanted dial tone. This new feature ensures that outgoing calls cannot be made and menu functions cannot be accessed when the keypad is locked.
- **Low Vibrator Option:** Allows the vibrator to work with a lower vibration, which will not cause a disturbance in quiet meetings.
- **Headset Auto Answer:** Provides users who are accustomed to using a headset with the pocket phone the option of having the phone automatically answered (first call only).
- **Headset Type Selection:** Enables users to select either the Avaya “standard” or “David Clark” headsets.
- **Silent Key Press Shorter:** Provides a shorter key press, ensuring that the SILENT feature can be accessed quicker.
- **Back Light on for all Incoming Calls:** Activates the back light for all incoming calls, regardless of how the user has optioned the back light feature.

TransTalk Pocket Phone

The TransTalk 9000 Digital Wireless System pocket phone is a portable, multiple-call-appearance telephone that gives users control of their wireless communications. Some of the features of the TransTalk pocket phone are as follows:

- 1x16 backlit alphanumeric display
- 10 virtual button appearances for lines, intercoms, and features
- Rapid/upright battery charger
- Small size (6 inches x 2 inches x 1 inch)
- Mobility range of up to 900 feet
- Wireless Test Mode
- Full-duplex voice transmission for clear voice quality and two-way communication
- Noise cancellation and sound enhancement software

Battery Chargers

The battery for the 9631 pocket phone will provide 12 hours of talk time, or 120 hours of standby time. Rapid charging capability will be standard; it will take 1.5 hours to charge a completely discharged battery. The charger allows for a handset with battery and a spare battery to be plugged in simultaneously. Also, the battery charger can be either wall- or desk-mounted. The battery charger meets the "Equipment not Normally Carried" and is intended for use indoors:

- 32 to 120 F (0 to 48.9 C)
- 0% to 95% relative humidity

DWBS System Capacities

Release 9 DWBS offers greater system capacities than were offered for Releases 6 through 8, as described in the following sections.



NOTE:

All DEFINITY switches will need to include 3279-FLS (10 Mg flash memory) to be able to offer wireless capability. Flash memory must be included anytime RRU PEC is ordered.

Release 9 System Capacities

With DEFINITY ECS R9, DWBS system capacities increase over those available with Release 6 through 8. Release 9 capacities are as follows:

- 150 RCs
- 300 WFB
- 1200 CAU
- 1500 WTs

With these system capacities, the maximum wireless coverage achieved is 12.0 million square feet, depending upon exact building specifications and campus environment.

Release 6 through 8 System Capacities

Following are the DWBS system capacities for DEFINITY ECS R6 through R8:

- 50 RCs
- 100 WFB
- 400 CAU
- 1500 WTs

With these system capacities, the maximum wireless coverage achieved is 4.0 million square feet, depending upon exact building specifications and campus environment.

Wireless Terminals Feature Access

The Class of Restriction (COR) and Class of Service (COS) features can be used to limit unauthorized access to features or services for a specific handset. Any telephone not administered on a system displays a "service denied" indication.

DEFINITY Wireless Business System Books

For more information about installing the DEFINITY wireless business system, refer to *DEFINITY Wireless Business System Installation and Test*, 555-232-102.

For information about connecting the wireless fixed base to the DEFINITY system, refer to *DEFINITY ECS Interface Wireless Business System*, 555-232-108.

For more information on how to use the wireless telephone handsets, refer to the *DEFINITY Wireless Business System Pocket Phone User Guide*, 555-232-105.

For more information about the DEFINITY wireless business system, refer to *DEFINITY Wireless Business System Multi-language User Guide*, Comcode 407 648 112.

B — System Capacity Limits

Overview

This appendix provides information on the overall characteristics and capacities of the DEFINITY Systems.

System Capacity Limits

The maximum parameters for the DEFINITY hardware and software items are listed on the following pages. These parameters apply to Compact Modular Cabinets, Single-Carrier Cabinets, and Multi-Carrier Cabinet systems in category A (ECS and ProLogix Solutions), and category B (DEFINITY BCS and GuestWorks).

Terminal and digital station capacities are reduced by such administered items as: attendant consoles, number of EAS login IDs, and number of ACD agents.

**NOTE:**

Not all maximum capacities listed in [Table 58 on page 234](#) can be reached simultaneously with all versions or all configurations of the system. See Station Button Capacity for the system button limitations.

**NOTE:**

In [Table 58 on page 234](#), with the exception of DEFINITY One capacities, a single entry denotes that capacities for category A and category B are the same. If the capacities are different, a slash (/) separates the entries (for example, 8/NA). For DEFINITY One, which does not have categories A and B, all capacities will be single entries.

An asterisk, *, indicates that the software capacity limit cannot be achieved due to hardware capacity limits for this platform.

Table 58. Maximum System Parameters (Category A/B)

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Abbreviated Dialing (AD)				
AD lists per system	2400*	2400*	2400	5000
AD list entry size	24	24	24	24
AD entries per system	12,000*	12,000*	12,000	100,000
Auto dialing button¹				
Entries per systemAuto dialing button	Note ¹	Note ¹	Note ¹	Note ¹
Enhanced list (system list)	1	1	1	1
Maximum entries	10,000	10,000	10,000	10,000
Group lists	100	100	100	1000
Maximum entries	100	100	100	100
Group lists per extension	3	3	3	3
System list	1	1	1	1
Maximum entries	100	100	100	100
Personal lists	2400*	2400*	2400	5000
Maximum entries	100	100	100	100
Personal lists per extension	3	3	3	3

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Applications Adjuncts				
CallVisor ASAI adjuncts	8	4 ² /NA	8/NA	16 ³ /NA
IP Asynchronous links (RS-232) ⁴	NA	5	9	10
CDR output devices	Note ⁵	2	2	2
Journal printers: System printer	NA	2:1	2:1	2:1
Property management systems	NA	1	1	1
Maximum Links ⁶	25	25	25	33
BX.25 physical links ⁷	NA	NA	8	16
PPP Links (switch using C-LAN board) ⁶	25	25	25	33
C-LAN IP Routes ⁶	270	270	400	650
Voice processing adjuncts	NA			
Traditional AUDIX	NA	NA	1	8
DEFINITY AUDIX	NA	1	1	1
DEFINITY AUDIX DCP emulation	NA	1	1	1
DEFINITY AUDIX control link	NA	NA	1	1

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
INTUITY AUDIX	NA			
INTUITY AUDIX (Via mode code)	NA	1	1 ⁸	1 ⁸
INTUITY AUDIX (Via BX.25)	NA	NA	1	8
INTUITY AUDIX (Via TCP/IP)	NA	1	1	8
INTUITY AUDIX (MAPD)	NA	1	1	1
Mode code voice mail systems	NA	1	1 ⁸	1 ⁸
DEFINITY ONE coresident AUDIX	1	NA	NA	NA
Other adjuncts				
CMS X.25 adjunct (PI/PGATE) ⁹	NA	1/NA	1/NA	1/NA
CMS C-LAN adjuncts	1 ⁹	2/NA	2/NA	2/NA
ICM adjuncts (ISDN gateway)	NA	NA	NA	NA
BX.25 Processor channels	NA	NA	64	128
BX.25 Hop channels	NA	NA	64	128
TCP/IP Processor Channels (includes Gateway Channels)	128	128	256	384

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Automatic Call Distribution (ACD)				
Announcements per split	2	2	2	2
Announcements per system	128	128	128	1000
Splits	99	99	99	999
ACD members per split	200	200	200	1500
Maximum administered ACD members ¹⁰	1000*	1000*/ 150	1000/ 150	10,000/150
Logged-In splits per agent ¹¹				
No CMS	4	4	4	4
R2 or R3V1 CMS	NA	3/NA	3/NA	3/NA
R3V2 or later CMS ⁹	4	4/NA	4/NA	4/NA
Maximum Logged-in ACD agents when each logs into ¹²				
1 split	500*	500/150	500/150	5200/150
2 splits	500*	500/75	500/75	5000/75
3 splits	333*	333/50	333/50	3333/50
4 splits	250*	250/37	250/37	2500/37
Queue slots per group ¹³	200	200	200	999
Queue slots per system	1500	1500	1500	25,000

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — *Continued*

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
ARS/AAR				
AAR/ARS patterns (shared)	254	254	254	640
ARS/AAR analysis tables	2000	2000	2000	4000
Choices per RHNPA table	12	12	12	12
Digit conversion entries	400	400	400	600
AAR/ARS digit conversion				
Digits deleted for ARS/AAR	28	28	28	28
Digits inserted for ARS/AAR	18	18	18	18
AAR/ARS sub-net trunking				
Digits deleted for ARS/AAR ¹⁴	28	28	28	28
Digits inserted for ARS/AAR	36	36	36	36
Entries in each RHNPA table	1000	1000	1000	1000
FRLs	8	8	8	8
Inserted digit strings ¹⁵	1200	1200	1200	3000

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Patterns for measurement				
Shared patterns for measurement	20	20	20	25
RHNPA tables	32	32	32	32
Routing plans	8	8	8	8
ARS toll tables	32	32	32	32
Entries per toll table	800	800	800	800
Trunk groups in ARS/AAR pattern	6	6	6	16
UDP (entries)	10,000	10,000	10,000	50,000
TOD charts	8	8	8	8
Toll analysis table entries	1000	1000	1000	1000
ATM				
WAN spare processor (WSP)	NA	NA	NA	7/NA
Attendant Service				
Attendant consoles (day:night) ¹⁶	15:1	15:1	15:1	27:1
Attendant console 100s groups per attendant	20	20	20	20
Attendant control restriction groups	96	96	96	96

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Centralized attendant service				
Release link trunks at branch	99	99/NA	99/NA	255/NA
Release link trunk groups at branch	1	1/NA	1/NA	1/NA
Release link trunks at main	400	400/NA	400/NA	4000/NA
Release link trunk groups at main ¹⁷	99	99/NA	99/NA	666/NA
Other access queues				
Maximum number of queues	12	12	12	12
Maximum number of queue slots ¹⁸	80	80	80	80
Size range of reserved queue	2-75	2-75	2-75	2-75
Reserved queue default size	5	5	5	5
Queue length	80	80	80	300
Switched loops per console	6	6	6	6

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Authorization				
Authorization codes	5000	5000	5000	90,000
Station security code length	7	7	7	7
Classes of restriction	96	96	96	96
Classes of service	16	16	16	16
Length of authorization code	4-13	4-13	4-13	4-13
Length of barrier code	4-7	4-7	4-7	4-7
Length of account codes	1-15	1-15	1-15	1-15
Restricted call list	1	1	1	1
Remote access barrier codes	10	10	10	10
CDR account code list	1	1	1	1
Toll call list	1	1	1	1
Unrestricted/allowed call lists	10	10	10	10
Total call list entries	1000	1000	1000	1000
Automatic Callback Calls	240	240	240	1500
Automatic Wakeup				
Simultaneous display requests	10	10	10	30
Wakeup requests per system	2400	2400	2400	15,000
Wakeup requests per extension	2	2	2	2
Wakeup requests per 15-minute interval	450	450	450	950

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Basic CMS (BCMS)				
Measured agents or Login IDs	25	400/25	400/25	2000/25
Measured agents per split	25	200/25	200/25	999/25
Measured splits	99	99/5	99/5	600/5
Measured trunk groups	32	32	32	32
Measured VDNs	99	99/10	99/10	512/20
Maximum agents displayed by monitor BCMS split command ¹⁹	100	100	100	100
Maximum BCMS terminals	3	3	3	4
Maximum active maintenance commands for the system	1	1	1	5
Maximum simultaneous BCMS terminals in monitor mode ²⁰	1	1	1	3
Reporting periods				
Intervals	25	25	25	25
Days	7	7	7	7
Cabinets				
Expansion port network (EPN)				
Multicarrier cabinet (medium-capacity MCC) ²¹	NA	NA	2	43
Single-carrier cabinet (SCC or CMC) ²¹	NA	NA	8	164

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — *Continued*

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Inter-port network connectivity				
Port networks	1	1	3	44
Maximum number of PNs per cabinet	1	1	1	2
Switch nodes (Simplex)	NA	NA	NA	3
Switch nodes (Duplex)	NA	NA	NA	6
ATM interfaces used for port network (PN) connectivity, per system	NA	NA	NA	88
DS1 converter complex (simplex)	NA	NA	NA	41
DS1 converter complex (duplex)	NA	NA	NA	82
Processor port network (PPN)				
Multicarrier cabinet (MCC)	NA	NA	1	1
Single-carrier cabinet (SCC/ESCC)	NA	NA	4	NA
Compact single-carrier cabinet (CSCC)	NA	NA	NA	NA
Compact modular cabinet (CMC)	3 ²²	3 ²²	NA	NA

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Call Appearances				
Bridged images per appearance ²³	64	64	64	64
Call appearances per station ²⁴	54	54	54	54
Maximum appearances per extension	10	10	10	10
Minimum appearances per extension	0	0	0	0
Total bridged appearances	2400*	2400*	2400	25,000
Maximum simultaneous off-hook per call ²⁵	5	5	5	5
Call Coverage				
Coverage answer groups (CAG)	200	200	200	750
Coverage paths	999	999	999	9999
Coverage paths including in call coverage report	100	100	100	100
Coverage path per station	2	2	2	2
Coverage points in a path	6	6	6	6
Remote coverage points	999	999	999	999
Maximum users per coverage path ²⁶	3500*	3500*	3500	36,065
Members per coverage answer group	8	8	8	8
Time of day coverage tables	999	999	999	999

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Time of day changes per table	5	5	5	5
Remote administration Coverage paths	2	2/NA	2/NA	2/NA
Call Detail Recording				
Intra-switch call trackable extensions	1000	1000	1000	1000
Maximum number of CDR records buffered in switch	Note ²⁷	500	500	9614
Number of records buffered for the primary output device to cause secondary device to be busied out for 2 minutes	NA	200	200	1800
Call Forwarding				
Call forwarded digits (off-net)	16	16	16	16
Call forwarded numbers	2400	2400	2400	25,000
Call Park				
Attendant group common shared extension numbers per system ²⁸	80	80	80	80
Number of Parked Calls	723	723	723	10,604
Call Pickup Groups				
Call pickup members per group	50	50	50	50
Call pickup members per system	2400*	2400*	2400	25,000
Number of groups	800	800*	800	5000

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Call Vectoring				
Maximum skills a call can simultaneously queue to	3	3/NA	3/NA	3/NA
Priority levels	4	4	4	4
Recorded announcements/audio sources for vector delay	128	128	128	256
Steps per vector	32	32	32	32
Vector directory numbers	512	512/10	512/10	20,000 ²⁹ /20
CMS measured VDNs ³⁰	512	512/NA	512/NA	20,000 ³¹ / NA
Vectors per system	256	256/10	256/10	999/20
Number of collected digits for call prompting or CINFO	16	16	16	16
Number of dial-ahead digits for call prompting	24	24	24	24
Vector routing tables	NA	10/NA	10/NA	100/NA
BSR Application-Location Pairs ³²	NA	1000/NA	1000/NA	1000/NA
Holiday tables	10	10	10	10

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
CallVisor ASAI				
Adjunct control associations per call	1	1/NA	1/NA	1/NA
Active adjunct control associations (simultaneous active call-controlled calls)	300	800 ² /NA	800/NA	7000 ³³ /NA
Active adjunct route requests system-wide	300	300 ² /NA	300/NA	4000/NA
Active adjunct route requests per link (switch to adjunct associations)	300	300 ² /NA	300/NA	4000/NA
Active notifications per call	3	3/NA	3/NA	6/NA
Active notifications per split domain	3	3/NA	3/NA	6/NA
Active notifications per VDN domain	3	3/NA	3/NA	6/NA
Call controllers per call	1	1 ² /NA	1/NA	1/NA
Call monitors per call	28	28 ² /NA	28/NA	28/NA
CRVs ECS to adjunct	126	500 ² /NA	500/NA	4000/NA
Domain-control associations per call	12	12 ² /NA	12/NA	24/NA
Domain-control station associations (active station control associations)	2,000	2000/NA	2000/NA	6000/NA
Domain-control split/skill associations	300	300 ² /NA	300/NA	2000/NA

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Domain-controls per station domain	1	2 ² /NA	2/NA	4/NA
Domain-controls per split/skill domain	1	4/NA	4/NA	8/NA
Notification associations (requests or monitors)	300	300 ² /NA	300/NA	10,000/NA
Maximum calls with send DTMF active	16	16 ² /NA	16/NA	32/NA
Number of CallVisor ASAI links (open & proprietary)	8	8 ² /NA	8/NA	8, 16 ³ /NA
Maximum simultaneous calls being classified	80	80 ² /NA	80/NA	600/NA
Monitors per VDN or split	6	6 ² /NA	6/NA	6/NA
Split/skill domain controls system-wide	300	300 ² /NA	300/NA	2000/NA
Simultaneous billing (MultiQuest) requests	100	100 ² /NA	100/NA	1000/NA
Station controllers per station	4	4 ² /NA	4/NA	4/NA
Simultaneous selected listening disconnected paths	75	75 ² /NA	75/NA	300/NA

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
ASAI traffic				
Messages/second per ASAI/BRI link	NA	20/NA	30/NA	30/NA
Messages/second per ASAI IP link	30	NA	NA	NA
Messages/second per MAPD LAN-gateway link	NA	NA	Note ³⁴ / NA	180/NA
Messages/second per system	Note ³⁴	80/NA	Note ³⁴ / NA	240/NA
LAN gateway board max links				
LAN gateway links per multifunction circuit pack	4	NA	4/NA	4/NA
LAN gateway links per MAPD	8	NA	8/NA	8/NA
Conference Parties	6	6	6	6
Simultaneous 3-way conference calls ³⁵	483	483	483	7084
Simultaneous 6-way conference calls ³⁶	240	240	240	3520

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Data Parameters				
Administered connections	128	128	128	128
Alphanumeric dialing				
Maximum entries	200	200	200	1250
Characters per entry	22	22	22	22
PRI endpoints (PE)	8	8	25	50
Access endpoints (number of trunks)	400	400	400	4000
Multimedia Parameters				
TN787D MMI boards ³⁷	4	4 ² /NA	4/NA	12/NA
TN788B VC boards ³⁷	25	25/NA	25/NA	69/NA
MMI and VC boards in multiple PNs	NA	NA	Yes/NA	Yes/NA
Multimedia One Number conferences per system ³⁷	800*	800* ² /NA	800/NA	2000/NA
Multimedia Dynamic Conference Records	64	64/NA	64/NA	192/NA
Maximum BRI connections	1000*	84 ² /NA	1000/NA	7000/NA
MASI nodes	15	15/NA	15/NA	15/NA
MASI links	15	15/NA	15/NA	15/NA
MASI trunk groups	96	96/NA	96/NA	120/NA
Digital Data Endpoints	800	800	800	7500

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — *Continued*

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Dial Plan				
Direct inward dialing listed directory numbers	8	8	8	20
Extensions (total) ³⁸	3500*	3500*	3500*	36,065
Station extensions ³⁹	2416*	2416	2416	25,028
Extension number portability ⁴⁰	10,000	10,000	10,000	50,000
Feature dial access codes	77	77	77	77
Number of digits in a feature access code	1-4	1-4	1-4	1-4
Integrated directory entries ⁴¹	2416*	2416*	2416	25,028
Maximum extension size	5	5	5	5
Minimum extension size	1	1	1	1
Miscellaneous extensions ⁴²	900	900	900	20,317
Names				
Number of names ⁴³	4215	4215	4215	36,511
Number of characters in a name	27	27	27	27
Non-DID LDNs	50	50	50	666
Prefix extensions	Yes	Yes	Yes	Yes
Trunk dial access codes				
Number of access codes	317*	317*	317	884/317
Number of digits	1-4	1-4	1-4	1-4

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Do Not Disturb (DND)				
Do not disturb requests per system	2400*	2400*	2400	25,000
Simultaneous display requests	10	10	10	30
Expert Agent Selection (EAS)				
Skill groups	99	99/NA	99/NA	999/NA
VDN skill preferences	3	3/NA	3/NA	3/NA
Maximum skills a call can simultaneously queue to	3	3/NA	3/NA	3/NA
Maximum administered ACD members (login ID-skill pairs) ⁴⁴	6000	6000/NA	6000/NA	65,000/NA
Maximum staffed (logged-in) ACD members ⁴⁵	1000	1000/NA	1000/NA	10,000/NA
Maximum agent login IDs administered ⁴⁶	1500	1500/NA	1500/NA	10,000/NA
Maximum skills per agent				
No CMS	20	20/NA	20/NA	20/NA
R3V2 to R3V4 CMS	4	4/NA	4/NA	4/NA
R3V5 or later CMS	20	20/NA	20/NA	20/NA
Skill levels (preferences) per agent skill	16	16/NA	16/NA	16/NA

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — *Continued*

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Maximum logged-in EAS (per system) when each has:¹²				
1 skill	500	500/NA	500/NA	5200/NA
2 skills	500*	500/NA	500/NA	5000/NA
4 skills	250*	250/NA	250/NA	2500/NA
10 skills	100*	100/NA	100/NA	1000/NA
20 skills	50*	50/NA	50/NA	500/NA
External device alarming	32	32	32	90
Facility busy indicators				
Buttons per tracked resource	100	100	100	500
Number of indicators (station and trunk groups)	3600*	3600*	3600	10,000
Hunt Groups (Non-ACD)⁴⁷				
Announcements per group	2	2	2	2
Announcements per system	128	128	128	1000
Groups	99	99	99	999
Group members per group	200	200	200	1500
Group members per system ⁴⁷	1000	1000	1000	10,000
Queue slots per group	200	200	200	999
Queue slots per system	1500	1500	1500	25,000

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Intercom Translation Table (ICOM)				
Auto/manual and Dial				
ICOM groups per system	32	32	32	256
Auto/Manual	32	32	32	256
Dial	32	32	32	256
Members per ICOM group				
Auto	32	32	32	32
Dial	32	32	32	32
Members per system	1024*	1024*	1024	8192
Last Number Dialed				
Entries per system ⁴⁸	3216*	3216*	3216	32,528
Number of digits	24	24	24	24
Leave Word Calling (Switch-Based)				
Messages stored	2000*	2000*	2000	6000
Messages per user	125	125	125	125
Remote message waiting indicators				
Per extension	80	80	80	80
Per system	240	240	240	1250
Simultaneous message retrievers	60	60	60	400
System-wide message retrievers	10	10	10	10

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — *Continued*

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Malicious Call Trace				
Maximum simultaneous traces	16	16	16	16
MLDN				
Via direct inward dialing	8	8	8	20
Via direct inward dialing with tenant partition	20	20/NA	20/NA	100/NA
Via Central Office	99	99	99	666
Modem Pool Groups (Mode-2/Analog)				
Group members per system	160	160/NA	160/NA	2016/NA
Number of groups	5	5/NA	5/NA	63/NA
Members per group	32	32/NA	32/NA	32/NA
Networking				
Centralized attendants service (CAS) nodes	99	99/NA	99/NA	99/NA
Distributed communications system (DCS) nodes⁴⁹				
BX.25 (Private)	NA	NA	20/NA	20/NA
TCP/IP	20	20/NA	20/NA	20/NA
ISDN PRI	20	20/NA	20/NA	20/NA
Hybrid (combination of PRI, BX.25, and & TCP/IP)	NA	20/NA	20/NA	20/NA

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
EN nodes ⁵⁰	999	999/NA	999/NA	999/NA
Paging				
Code calling IDs	125	125	125	125
Loudspeaker zones	9	9	9	9
Partitions				
Attendant groups	15	15/NA	15/NA	27/NA
Extension partition groups	8	8/NA	8/NA	8/NA
Extension partition	8	8/NA	8/NA	8/NA
Tenant partition	20	20/NA	20/NA	100/NA
Multiple music-on-hold sources	20	20/NA	20/NA	100/NA
Personal CO Lines (PCOL)				
PCOL appearances	16	16	16	16
PCOL lines (trunk groups)	200	200	200	200
PCOL trunks per trunk group	1	1	1	1
Port Circuit Pack Slots⁵¹				
Per Expansion Port Network				
Multi-Carrier Cabinet standard reliability	NA	NA	99	99
Single-Carrier Cabinet standard reliability	NA	NA	71	71
Small cabinet standard reliability (upgrade only)	NA	NA	39	39

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Per Processor Port Network				
Multi-Carrier Cabinet standard reliability	NA	NA	89	60, 80
Single-Carrier Cabinet standard reliability	NA	NA	64	NA
Enhanced Single-Carrier Cabinet standard reliability	NA	NA	70	NA
Compact Modular Cabinet	28	28	NA	NA
Recorded Announcements/Audio Sources for Vector Delay				
Analog and auxiliary trunk announcements				
Analog and auxiliary trunk queue slots per announcement	150	150	150	1000
Analog and auxiliary trunk queue slots per system	150	150	150	1000
Trunk calls connected per announcement	150	150	150	1000
Integrated SSP announcements				
Channels per SSP	8	NA	NA	NA
16 kB recording	4 hr	NA	NA	NA
32 kB recording	2 hr	NA	NA	NA

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
64 kB recording	1 hr	NA	NA	NA
Integrated announcements				
Integrated announcement circuit packs	5	5	5	10
Channels connected per integrated announcement circuit pack	16	16	16	16
Announcement circuit pack saved	Note ⁵²	1	1	1
Calls connected per integrated announcement	50	50	50	1000
Integrated announcement recording time (minutes: seconds) per circuit pack				
16 kB recording	8:32	8:32	8:32	8:32
32 kB recording	4:16	4:16	4:16	4:16
64 kB recording	2:08	2:08	2:08	2:08
Integrated queue slots per system	200	200	200	4000
Total recorded announcements	128	128	128	1000

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
System Administration				
Number of logins	16	16	16	25
Administrable history file entries	500	500	500	1250
Simultaneous administration commands	1	1	1	5
Simultaneous maintenance commands	1	1	1	5
Simultaneous system maintenance sessions	1	5	5	8
Number of scheduled reports	Note ⁵³	50	50	50
Access Security Gateway Session History Log Entries	NA	100	100	250
Speech Synthesis Circuit Packs	6	6	6	40
Channels per speech circuit pack	4	4	4	4
Terminating Extension Groups (TEG)				
TEGs	32	32	32	32
Users that may share a TEG	4	4	4	4
Time Slots				
Simultaneous circuit-switched calls ⁵⁴	242	242 ⁵⁵	726	7744
Total time slots	512	512 ⁵⁵	1536	22,528
Time slots for voice and data ⁵⁶	484	484 ⁵⁵	1452	21,296

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Time slots per port network	512	512 ⁵⁵	512	512
Tone Classifiers				
Tone receivers (general) ⁵⁷	200	200	200	840
TTR queue size	4	4	4	4
Prompting TTR queue size	80	80	80	80
Trunks				
DS1 circuit packs	30*	8	30	166
Queue slots for trunks	198	198	198	1332
Measured trunks in system	400*	400*	400	4000
Total PRI interfaces	30	8	30	166
PRI interface via TN799 C-LAN	NA	8	NA	NA
PRI interface via TN794 NetPkt	NA	NA	30	NA
PRI Interfaces via TDM Bus	8	8	NA	NA
Emulated circuits per ATM-CES interface	8	8/NA	8/NA	8/NA
PRI D-channels per ATM-CES interface	8	8/NA	8/NA	8/NA
ATM-CES interfaces used per PN	2	2/NA	2/NA	2/NA
ATM-CES interfaces used for PRI circuit-emulation, per system	2	2/NA	6/NA	88/NA
ATM circuit-emulation and port network-connectivity interfaces, per system	2	2/NA	6/NA	176/NA

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — *Continued*

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
BRI trunks⁵⁸				
BRI trunk circuit packs	8	8	8	30
BRI trunks total	192	160	192	720
ISDN temporary signaling connections				
TSCs in system	656	656/NA	656/NA	4256/NA
Call associated TSCs	400	400/NA	400/NA	4000/NA
Non call associated TSCs	256	256/NA	256/NA	256/NA
Administered TSCs	128	128/NA	128/NA	128/NA
Ringback queue slots	198	198	198	1332
Trunk groups				
Trunk group hourly measurements	25	25	25	75
Trunk groups in the system	99	99	99	666
Trunk members in a trunk group	99	99	99	255
ISDN services				
Incoming call handling treatment (per trunk group)	18	18	18	54
Incoming call handling treatment (per trunk system)	288	288	288	576
User defined services	24	24	24	60
Usage allocation entries (per plan)	15	15	15	15

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Voice Terminals⁵⁹				
Associated data modules (such as DTDMs)	800*	800 ⁶⁰	800	7500
BRI stations⁶¹				
Point-to-Point	1000*	84 ²	1000	7000
Multipoint (passive bus)	1000*	168 ²	1000	7000
Digital stations	2400*	900 ⁶⁰	2400	25,000
Display stations	2400*	900 ⁶⁰	2400	10,000
Stations ⁶²	2400*	900 ⁶⁰	2400	25,000 ⁶³
Station button capacity (K Units) ⁶⁴	656.4	656.4	662.4	5260
Station button feature capacity ⁶⁵	15,900	15,900	15,900	15,900
VuStats				
Measured agents or login IDs	400	400/NA	400/NA	2000/NA
Measured splits	99	99/NA	99/NA	600/NA
Measured trunk groups	32	32/NA	32/NA	32/NA
Measured VDNs	99	99/NA	99/NA	512/NA
Reporting periods				
Intervals	25	25/NA	25/NA	25/NA
Days	1	1/NA	1/NA	1/NA

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Displays				
Display formats	50	50/NA	50/NA	50/NA
Simultaneous updating displays	100	100/NA	100/NA	500/NA
DEFINITY Wireless Business System Terminals (9601)	400	400	1000	1500
Radio controller circuit packs ⁶⁶	50	10	50	150
Wireless fixed bases	100	20	100	300
Cell antenna units (CAU)	400	80	400	1200
Coverage (million square feet)	3	3	3	3
Button capacity for wireless (k units)	18	4.8	18	18
Hard Disk Drive		NA	NA	NA
Total Capacity (Mbytes)	3000	NA	NA	NA
C drive allocation	1500	NA	NA	NA
D drive allocation	1500	NA	NA	NA
Hard Drive Budgets by application (Mbytes) (D drive only)		NA	NA	NA
Station Capacity	408	NA	NA	NA
Windows NT Client Licenses		NA	NA	NA
Total client licenses in NT workstation	10	NA	NA	NA

Continued on next page

Table 58. Maximum System Parameters (Category A/B) — Continued

ITEM	DEFINITY One (cfs)	R9csi	R9si	R9r
Window NT License Budget				
Intuity Message Manager	5	NA	NA	NA
Audix Networking	2	NA	NA	NA
DSA	1	NA	NA	NA
Services Access	1	NA	NA	NA
Call Accounting Access (CAS)	1	NA	NA	NA
IP Solutions				
H.323 endpoints (stations and trunks combined) ⁶⁷	408	1000	1000	5000
TN799 circuit packs (C-LAN)	10	10	10	10
TN802B and TN2302AP IP Media Processor	50*	50	50	50
Network regions	80*	80	80	250
R300 Remote Office Communicator	80	80	80	250
IP stations	256 ⁶⁸	900	1000	5000
IP trunks	152 ⁶⁸	400	400	4000
Signaling groups ⁶⁹	30	30	30	166
IP Telephones (4600 series)⁷⁰	1000	1000/NA	1000/NA	5000/NA

¹ There is no limit on the maximum number of auto dial buttons (other than the system limit on button capacity). See Station Button Capacity for system button limitations.

- 2 BRI stations are supported on R6.2csi and later only with the TN556C. The TN2198 is not supported on R6.2csi or R6.3csi, but can be used with R7.1csi over C-LAN. ASAI is available on R6.3.2 and later csi models using the TN801B MAPD. The TN2198 cannot be supported over the TDM bus, thus BRI station capacities are less with TN2198 (6 circuit packs instead of 7). ASAI via the LAN Gateway R1 (MFB) is not supported on csi.
- 3 The capacity for ASAI links is 8 in R6.1 - 6.2. The capacity was increased to 16 links in R6.3 with the MAPD (BRI link capacity is still limited to 8).
- 4 For R7 and later releases, the si has eight (8) NetCon channels plus one (1) direct-connect.
- 5 CONTRY stores CDR records on a disk file, either on the local disk or on any disk on the LAN.
- 6 Each C-LAN circuit pack has one Ethernet connection and 16 PPP connections. A maximum of 10 C-LAN circuit packs are allowed for each model. The combination of BX.25 links, the new TCP/IP PPP links, and the new TCP/IP Ethernet links have to be less than the maximum number of links.
- 7 In the case of SCC/ESCC/CSCC, only 4 BX.25 physical links are supported in the configuration.
- 8 Mode code integration with Intuity AUDIX is only marketed on csi models.
- 9 ProLogix or CONTRY only connects to R3V6 or later CMS via C-LAN TCP/IP starting with R7.1 DEFINITY.
- 10 Number of agent-split combinations supported. Agent-split pairs is the total combination used by ACD agents, Auto-Available Splits (AAS) ports (e.g., VRUs), non-ACD hunt groups (hunting groups w/ or w/o queues, Message Center Service, INTUITY/AUDIX, Remote AUDIX, etc.). Each non-ACD hunt group member, AAS split member and split assigned to an ACD agent is counted when administered.
- 11 An agent can be assigned more splits during administration but only this number can be simultaneously logged into.
- 12 The number of agents that can log into the same split/skill is limited by the maximum Members per Group limits. Maximum agent limits are reduced by the number of non-ACD members and AAS ports administered and, with non-EAS, the additional splits assigned to agents that are not logged into.
- 13 Queue slots are shared across non-ACD, ACD (splits/skills) and AAS hunt groups.
- 14 Plus up to 7 inter-exchange carrier (IXC) digits.

- 15 This is the number of available 12 character inserted-digit-strings available for AAR/ARS preferences.
- 16 The number of attendant consoles listed is per software limitations. 4 consoles are supported per vs and 1 per CMC cabinet without supplemental power.
- 17 The number of release link trunk groups at the Main is the same as the number of trunk groups in the system.
- 18 "Maximum number if queue slots" is referred to as "emergency access queue length" in si.
- 19 The Monitor Split command will only display status for the first 100 agents logged into the split regardless of how many additional agents log into the split.
- 20 BCMS monitoring, being a maintenance command, is limited by the active maintenance commands limit, reduced by 2 in the "r" system configuration (since 2 active command slots are reserved for the INADS and SMT logins respectively).
- 21 Only EPNs in r can be DS1-remoted EPNs.
- 22 R6csi is limited to 3 carriers (28 slots) by the DEFINITY ProLogix Solutions offer. The A (1st) carrier provides 8 slots in addition to 2 slots that are required by the TN798 Processor and TN2182 Tone Clock circuit packs. The B (2nd) and C (3rd) carriers provide 10 slots each. The R6csi software and hardware allow a D (4th) carrier. This capability may be allowed in future offers. In CONTRY R1 limited to 1 cabinet.
- 23 Twenty-six bridged appearances (principal + 25) are supported on all R6 platforms, provided that ASAI is not used. The capacity is 16 with ASAI.
- 24 The number of call appearances is the sum of primary and bridged appearances; at most 10 can be primary. A maximum of 54 administrable buttons can be supported for the 7434 terminal without display. The 8434 terminal with display and expansion module can support up to 52 call appearances.
- 25 Does not apply to conferencing.
- 26 Maximum number of users per coverage path equals to the number of extensions.
- 27 CONTRY stores CDR records on a disk file. The disk can be either the local "office" disk or a disk on the LAN. The size of the file is disk dependent. DEFINITY, however, can still buffer 500 records in memory should this disk be unavailable.
- 28 Shared extensions must be shared among all attendant groups in the system including Tenant Partition scenarios.

- 29 VDNs are counted as part of the miscellaneous extensions capacity. The total of VDNs, hunt groups, announcements, LDNs, TEGs, PCOL groups, access endpoints, administered TSCs and Code Calling IDs extensions and common shared extensions cannot exceed 20,317 for r models. In addition, the total of stations (station extensions including ACD agent physical set extensions, Logical Agent IDs and AWOH) assigned and the VDNs assigned can not exceed 25,000 for r models (share message server space). Also, the total of all extensions assigned for any purpose can not exceed 36,065 for r models. See the Dial Plan section for details.
- 30 Measured limits depend on the CMS release used.
- 31 CMS permission checking for VDNs is disabled when more than 2,000 VDNs are to be measured. Also, interval reporting on CMS for large numbers of VDNs is limited due to an Informix 2 GB file size limit.
- 32 BSR application numbers and location numbers are limited to a range of 1 to 255 (i.e., each is limited to 255).
- 33 Requires 2 byte CRVs.
- 34 This information has not yet been determined.
- 35 Simultaneous 3-way Conference Call= $(483 / 3) * \text{number PNs}$.
- 36 Simultaneous 6-way Conference Call= $(483 / 6) * \text{number PNs}$.
- 37 This feature was introduced in the Release 5.4 load and is not available in previous R5 loads.
- 38 Total extensions is the count of all extension assignments for any use. Included in this count are "station extensions," "miscellaneous extensions," data extension groups (800 for csi/si and 7500 for r), PRI endpoint groups (8 for csi, 25 for si, and 50 for r), and trunk group extensions (99 for csi/si and 666 for r).
- 39 "Station extensions" consist of attendant extensions (max. 28 for r), station set assignments (including ACD agent physical sets), AWOH (admin. without hardware), and administered Logical Agent IDs extensions.
- 40 The numbers shown in "Extension Number Portability" are Uniform Dialing Plan (UDP) entries.
- 41 Integrated Directory Entries = Stations + Attendant Consoles.
- 42 Miscellaneous extensions consist of VDNs, hunt groups, announcements, LDNs, PCOL groups, common shared extensions, access endpoints, administered TSCs, Code Calling IDs, TEGs and Phantom ACAs.

- 43 Number of Names = number of stations + attendant consoles + trunk groups + digital data endpoints + miscellaneous extensions.
- 44 Total of the administered Login ID skill-pair members (for agents and AAS ports).
- 45 Number of agent-skill combinations supported. Agent-skill pairs is the total combination used by ACD agents, Auto-Available Skills (AAS) ports (e.g., VRUs), non-ACD hunt groups (hunting groups w/ or w/o queues, Message Center Service, INTUITY/AUDIX, Remote AUDIX, etc.). Each non-ACD hunt group member and AAS skill member is counted when administered. Each skill assigned to an EAS agent is counted as an ACD member when the EAS agent logs in, not when administered.
- 46 This limit can be reached on DEFINITY ECS only if 4 skills or less are assigned per Login ID due to the ACD Members Administered (Login ID-skill pair) limits. The following shows the Login ID limits for different number of skills per Login ID (assumes increased administered Login ID-skill pair capacity provided in R6.3.3):

Max. Login IDs With:	csi/si	r
1 to 4 Skills Each	1,500	10,000
10 Skills Each	600	6,500
20 Skills Each	300	3,250

- 47 Hunt group members include non-ACD (hunting, Message Center Service, Intuity/AUDIX, Remote AUDIX, etc.) and ACD uses (splits or skills including Auto-Available Splits/Skills). Each ACD agent-split/skill assignment counts as a hunt group member.
- 48 Last Number Dialed Entries = Stations + Digital Data Endpoints + Attendant Consoles.
- 49 The actual limit in the software is 63, but due to performance considerations the recommended number of DCS Nodes is 20.
- 50 The numbers here are node number addresses.
- 51 Only port slots are included in this count. For example, there are 100 slots per MCC EPN cabinet with 99 port slots and one slot dedicated for the Tone Clock board. There may be other service circuits required which would further reduce the number of port slots available. In r model and G3i MCC port carriers, the service slots may be equipped with service boards that do not require tip & ring connections.
- 52 Saved on TN97C only.
- 53 Reports are not produced via DEFINITY, but through DSA. There isn't the concept of a limit to this activity in DSA.

- 54 241 Simultaneous Circuit Switched Calls per port network. DEFINITY r has a total of 7,712 which is limited by the number of call records supported. This is the total number of simultaneous 2-party calls. Multimedia calls tend to be multi-party calls. See DEFINITY Hardware and Traffic Guidelines for R6, CID 57864, for further details.
- 55 Supports PRI D-Channels over the TDM bus. Each D-Channel for PRI uses one timeslot pair. An R6csi with 8 PRIs utilizes 8 timeslot pairs, allowing a maximum of 233 simultaneous circuit switched calls.
- 56 483 time slots for Voice & Data per port network.
- 57 G3V4, R5, and R6 use the TN744 Call Classifier/Detector for basic TTR usage as well as call prompting/call classification/MFC. In addition the TN2182 Tone/Clock/Detector is used for multiple tone detection functions. The number of TN748, TN420, or TN744 boards is limited only by the number of available slots. The number of TN2182 boards is limited only as described in DEFINITY Hardware and Traffic "Configuration Guidelines for G3V5, CID 49756. There is a single limit on the total number of tone receiver (classifier) ports for the system. The Configuration Guidelines have been updated for R6 (CID 57864).
- TN748/TN420 have 4 ports for TTR use
- TN748/TN420 have 2 ports for GPTD use
- TN744 has 8 ports for call prompting/call classification/MFC/TTR/GPTD use
- TN2182 has 8 ports for call prompting/call classification/MFC/TTR/GPTD use
- 58 The TN2185 BRI Trunk circuit pack provides 8 ports. Each port (2B + D) provides 2 BRI trunks.

- 59 The following items subtract from the total number of available "Stations" on a given switch:
- Analog Music-On-Hold
 - Attendants
 - Modem Pool Conversion Resources
 - TAAS Port
 - Stations (Digital, display, BRI, etc.)
 - Analog Announcements
 - Analog External Alarm Port
 - Agent Login Ids
 - ACD Agents
- These items constitute all the valid objects within software that limits the number of available stations on a switch. Customers must be made aware that Attendant Consoles and Stations are not the only objects that detract from the total number of available stations on a switch. Also see the Dial Plan section for more details.
- 60 Up to 900 stations can be assigned in software (AWOH). The physical number of stations is limited by the hardware capacity of 28 slots (3 CMCs).
- 61 All BRI stations can be display stations.
- 62 Including extensions administered without associated hardware. Also see the Dial Plan section for details.
- 63 The total of stations (station extensions including ACD agent physical set extensions, Logical Agent IDs and AWOH) assigned and the VDNs assigned can not exceed 25,000 for r models (share message server space). Dial plan limits also apply, see the Dial Plan section for details.
- 64 "Station Button Capacity (units)" replaces "Maximum Button Modules" (from pre-R1V5.1). See Section 5.3 of the R6 Configuration Guidelines (CID 57864) for complete information.

- 65 The following button features share a common resource in memory:
- Call Forwarding
 - Call Forward Busy Don't Answer
 - Send Extension Calls (SAC w/extension)
 - Station Busy Indicators
 - Trunk Group Status
 - Hunt Group Status
 - Loudspeaker Paging Zone Status
 - PCOL Group Status
 - Data Module
 - Terminating Extension Group Status
 - Announcement Status
 - Attendant Group Status/DXS
 - Remote Trunk Group Select
- 66 For r, TN789 Radio Controller Circuit Packs cannot be used in DS-1 remoted EPNs.
- 67 Note that in R8, IP telephones and IP softphones in Road-warrior mode takes up two endpoints. The IP softphone in Telecommuter mode takes up one H.323 endpoint. In R9, these endpoints and the Remote Office phones each take up one H.323 endpoint.
- 68 The maximum number of IP ports is 408. The total combined IP trunks and stations cannot exceed the maximum number of IP ports. A value of 152 for IP trunks is the recommended limit. A value of 256 IP stations is the recommended limit.
- 69 The signaling connections are shared by ISDN and ATM trunk signaling.
- 70 Each IP telephone will use one of the capacities of the H.323 endpoints shown in the IP Solutions section of this table.

-
- * Software capacity limit cannot be achieved due to hardware capacity limits for this platform.

<i>System Capacity Limits</i>	<i>272</i>
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C — National Type-Approval Labels

Overview

This section contains displays of national type-approval labels. The presence of these displays in this document makes it unnecessary to apply the labels to the physical product.

Hong Kong

These are the type-approval labels for the systems that have shown compliance with their technical specifications. The Telecommunications Authority has granted certificates of approval to sell these systems in Hong Kong.

Certified to meet HKTA 2011, HKTA 2013, HKTA 2014,
HKTA 2015 and HKTA 2017 Specifications for connection to
the Public Telecommunications Networks of Hong Kong

證明符合接駁香港公共電訊網絡所須達至的HKTA 2011，
HKTA 2013，HKTA 2014，HKTA 2015及HKTA 2017規格

Certificate No.: IN 399053

證明書號碼：

Office of the Telecommunications Authority
電訊管理局

Figure 52. Type-approval label for Avaya DEFINITY G3si

Certified to meet HKTA 2011, HKTA 2013, HKTA 2014,
HKTA 2015 and HKTA 2017 Specifications for connection to
the Public Telecommunications Networks of Hong Kong

證明符合接駁香港公共電訊網絡所須達至的HKTA 2011，
HKTA 2013，HKTA 2014，HKTA 2015及HKTA 2017規格

Certificate No.: IN 399054

證明書號碼：

Office of the Telecommunications Authority
電訊管理局

Figure 53. Type-approval label for Avaya DEFINITY ProLogix

Certified to meet HKTA 2011, HKTA 2013, HKTA 2014,
HKTA 2015 and HKTA 2017 Specifications for connection to
the Public Telecommunications Networks of Hong Kong

證明符合接駁香港公共電訊網絡所須達至的HKTA 2011，
HKTA 2013，HKTA 2014，HKTA 2015及HKTA 2017規格

Certificate No.: IN 399055

證明書號碼：

Office of the Telecommunications Authority
電訊管理局

Figure 54. Type-approval label for Avaya DEFINITY G3r

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DEFINITY Enterprise Communications Server Release 9

System Description

555-233-200, Issue 2, November 2000

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