Lucent Technologies
Bell Labs Innovations

DEFINITY®
Enterprise Communications Server
Release 8.2
Administration for Network Connectivity

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Preface

This book describes how to administer connections between DEFINITY® ECS switches (csi, si, and r models). The main focus is on TCP/IP for DCS signaling, introduced with DEFINITY Release 7, and H.323 trunks, introduced with DEFINITY Releases 8.

Purpose

This document provides the information needed to understand and administer the connections between DEFINITY ECS systems in a network using IP connections. It does *not* cover the installation or upgrade procedures for establishing physical connectivity between DEFINITY switches or for connecting the CMS and Intuity AUDIX adjuncts to a DEFINITY switch — that information is contained in the upgrades and installation documents listed in the References section.

Audience

This document is intended for anyone involved in planning, designing, or administering DEFINITY ECS systems as part of networks using IP connectivity.

Issue Status

First issued for DEFINITY ECS Release 7, this update includes Release 8 new hardware and administration, as described below.

IP Interface assembly   The Release 8 IP Interface assembly is a 3-slot wide TN802B circuit pack. It enables the transmission of voice and signaling data over IP connections. It can be used in one of two operating modes:

- MedPro mode — enables H.323 tie trunks over IP connections

- IP trunk mode (as in Release 7) — enables emulation of DS1 trunks over IP connections.

Each IP Interface assembly operates in either Medpro mode or IP trunk mode for all trunks assigned to it — it cannot mix modes. The MedPro mode is the normal operating mode for R8 systems. The IP Trunk mode is used only for compatibility with existing R7 systems that cannot be upgraded to R8.

The C-LAN (TN799B) circuit pack is required to handle signaling for the Medpro mode. C-LAN can be used, but is not required, for signaling in the IP Trunk mode.

Administration for the MedPro mode includes the H.323 trunking introduced with Release 8 and is documented in Chapter 2. Administration for the IP trunk mode is documented in Appendix F and is unchanged from Release 7.

Screen Changes   In Release 8, the following changes have been made to screens related to IP networks.

Ethernet Data Module screen

The ethernet Data Module screen is changed in Release 8.

```
add data-module next                                    Page 1 of X
                        DATA MODULE

   Data Extension: 2377          Name: _____
              Type: ethernet
              Port: _____
              Link: 2

Network uses 1's for broadcast addresses?: y
```

1 The following fields have been *removed* from the ethernet Data Module screen:

- Broadcast Address
- Automatic Subnet Routing

   The Broadcast Address field previously enabled you to specify that broadcast messages are to be sent to a subset of the host's subnet. Now, broadcast messages are always sent to the host's full subnet.

   The Automatic Subnet Routing field previously enabled you to disable automatic subnet routing. Now, automatic subnet routing is always enabled.

2 The following fields have been *moved* from the ethernet Data Module screen to the new IP Interfaces screen:

- Enable Link?
- Node Name
- Subnet Mask

3 The following field is *added* to the ethernet Data Module screen:

- Network uses 1's for broadcast addresses?

   This field enables you to accommodate systems on your network that use the older method of putting 0's instead of 1's in the host portion of a broadcast address.

ppp Data Module screen

The ppp Data Module screen is changed in Release 8.

```
add data-module 1994
                                                              Page 1 of x
                          DATA MODULE

    Data Extension: 1994              Name: _ppp on link 4 to node 4___  BCC: 2
              Type: ppp              COS: 1
              Port: 01c1502          COR: 1
              Link: 4_               TN: 1
      Enable Link? n

        Node Name: ppp14_____
      Subnet Mask: 255.255.255.0_

Establish Connection: y

DESTINATION
          Digits: 7241991_____
       Node Name: ppp41_____
           CHAP? n
```

The following fields have been *added* to the ppp Data Module screen:

- Subnet Mask

  The Mask field enables you to specify a subnetwork for the IP address of this node.

iP routing and the IP Route screen

```
add ip-route next                              Page   1 of   1
                         IP ROUTING

      Route Number: 3
  Destination Node:
           Gateway:
        C-LAN Board:
            Metric:
```

The following fields have been *added* to the IP Routing screen:

- Route Type — display only

  For the display, change, and list IP Route commands, a display-only field, Route Type, indicates whether this IP route is a "host" or "network" route. Whether an IP route is a host or network route is determined by the Destination Node IP address and the subnet mask associated with that address.

New Fields

In addition to the R8 screen changes described above, the following screens have new fields that specify IP trunk or IP Softphone parameters:

- Optional Parameter (System-Parameters Customer Options)

- Trunk Groups

- Signaling Group

- Station

- Several Status and Measurement screens

New Screens   In Release 8, the following IP-related screens are new.

IP Interfaces screen

The IP Interfaces screen is new for Release 8.

```
change ip-interfaces                                          Page   1 of   2

                           IP Interfaces

 Inter-region IP connectivity allowed?   n
Enable                                                                     Net
Eth Pt Type   Slot  Code Sfx Node Name    Subnet Mask      Gateway Addr   Rgn
   n                                       255.255.255.0      .   .   .
   n                                       255.255.255.0      .   .   .
   n                                       255.255.255.0      .   .   .
   n                                       255.255.255.0      .   .   .
```

The fields for this screen are described in Appendix A, "Screens Reference."

IP Media Parameters

The IP Media Parameters screen specifies the type of codecs available for voice processing. The order in which you list the codecs is the order in which the system will use them. This screen also specifies the range of audio port numbers available.

```
change ip-parameters                                       Page   1 of   1

                          IP Media Parameters

Audio Codec Preferences

 1: G.711MU
 2: G.723-6.3K
 3: G.729A
 4:


UDP Port Range

    Min: 2048
    Max: 65535
```

Reorganization   The following chapter reorganization has been made for Release 8.

- New Chapter 2 covers H.323 trunk administration.

- The previous Chapter 2 has been renamed Chapter 3. This chapter now describes how to connect switches and adjuncts using the C-LAN signaling connectivity — without the H.323 functionality — if you are running Release 8 software. This would be the case if you use R8 as a bugfix for R7 or if you are using the IP Interface board in IP Trunk mode.

- Chapter 3 has been renamed Chapter 4. The example network is the same as for R7 with the Data Module and IP Interfaces screens updated. A subsequent issue of this book will add MedPro functionality in the example network.

- The appendix sections are organized as in R7 and updated for R8 changes.

Organization

This document is organized into four chapters and seven appendixes. Chapter 2 gives the essential information needed to administer H.323 trunk connections.

Chapter 1 –
Overview

An overview of DEFINITY Connectivity and IP Addressing

Chapter 2 –
H.323 Trunk Administration

Gives detailed procedures for initial administration of IP trunks using H.323 IP connections.

Chapter 3 –
C-LAN Administration

Gives detailed procedures for six basic network configurations using C-LAN IP connections.

Chapter 4 –
Network Example

Shows administration screens for setting up a complex network.

Appendix A –
Screens Reference

Field descriptions for network-related administration screens.

Appendix B –
Private Networking

DCS features and QSIG.

Appendix C Security

A brief discussion of security issues as related to networking.

Appendix D –
Capacity and Performance

A brief discussion of network capacities and how to estimate C-LAN and voice-processing resources.

Appendix E –
C-LAN Installation

Installation procedures for the C-LAN circuit pack.

Appendix F–
IP Trunk Installation & Admin

Installation and initial administration for IP Trunk.

Appendix G–
Document Reference

The DEFINITY documentation library.

Glossary

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Terminology

The terms *form*, *screen* and *node* are used in this book with somewhat different meanings than in previous documents. The usage of the terms *MedPro* and *IP Interface* in this book deserve an explanation.

Screen
The term "screen" is used in this book to mean what used to be called "form" — the set of switch-administration interface pictures that contain the fields that hold the switch-translations values. For example, the "Data Module screen." Each screen can have one or more pages.

In some parts of this book, he terms "screen" and "form" are used interchangeably.

Node
The term "node" has two meanings for DEFINITY ECS switches connected in a network. In a DCS network, *node* means a switch or adjunct. This is how the term is used on the Dial Plan screen for the field name, "Local Node Number."

With TCP/IP connectivity, *node* has a different meaning — it refers to an interface to a network. For example, each of the 17 ports on the C-LAN board is a node in this sense. This is how the term is used on the Node Names, Data Module, Processor Channel, and IP Routing screens. This is also the common usage in a data networking environment. With these definitions, a "DCS node" (a switch) can have many "IP nodes," (network interfaces).

In this book, *node* is used in the second sense, as a network interface. A "DCS node" is referred to as a *switch* or, in Chapter 4, as a *switch node*.

IP Interface and MedPro
The official name for the TN802B circuit pack is *IP Interface assembly*. It is a media processing circuit pack in a 3-slot wide assembly. It can be administered to operate in one of two modes — *IP Trunk* mode or *MedPro* mode.

MedPro is a contraction of the words, *media processor*. Since the TN802B IP Interface assembly does media processing, it is also referred to as the *MedPro board*.

The TN802B IP Interface assembly is an IP interface for DEFINITY ECS — it connects directly to a 10/100BaseT LAN or WAN, which uses the TCP/IP protocols. The C-LAN (TN799B) circuit pack is also an IP interface for DEFINITY ECS.

In this book, the terms *TN802B circuit pack*, *TN802B IP Interface*, *IP Interface assembly*, and *MedPro board* are used interchangeably.

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1 Networking Overview

This chapter provides background information that will help you understand and use the information in the remainder of the book. There are two major sections in this chapter. The first section describes how DEFINITY ECS switches can be connected, with a focus on IP connectivity. The second section describes IP addressing and subnetting.

DEFINITY Switch Connectivity

This section describes the basic components of a network of DEFINITY switches and how voice and signaling data are transmitted between switches for the different types of switch connections. It also provides a summary of the administration procedures for connecting switches via an IP network (using the C-LAN and TN802B-MedPro circuit packs).

Connectivity Overview

Why connect switches?   DEFINITY switches can be connected in various ways for various reasons. The main motivation for connecting switches is to enable people within an enterprise to easily communicate with one another, regardless of their physical location or the particular communications server they are assigned to. Inter-switch connections also enable the sharing of communications resources such as messaging and Call Center services.

What kinds of connections are possible?

Trunks

Switches communicate with each other over *trunk* connections. There are several kinds of trunks — each kind provides a different set of services for the connection. Commonly used trunk types are (Central Office) *CO trunks*, which provide connections to the public telephone network through a central office, and *tie trunks*, which provide connections between switches in a private network.

These and other common trunk types are described in *DEFINITY ECS Administrator's Guide*, 555-233-506.

DEFINITY ECS Release 8 introduces the H.323 trunk, which allows voice and fax data to be transmitted over the Internet to another DEFINITY system with H.323 Trunk capability. The H.323 trunk supports Q.931 services such as DCS+ and QSIG.

Networks

When two or more switches are connected via tie trunks, they form a private network. There are two basic types of networks for Lucent switches:

- Main-satellite/tributary (MS/T) — A network of switches in which a *main* switch is fully functional and provides attendants and CO trunks for connected *satellite* switches. *Tributary* switches are connected to the main and may have their own attendant and CO trunks. The main switch may be connected to one or more Electronic tandem networks (ETNs).

- Electronic tandem network (ETN) — A wide-area network of switches in which a call can tandem through one or more switches on its way from the originating switch to the destination switch. ETNs have a uniform dial plan (UDP), automatic alternate routing (AAR), and automatic route selection (ARS).

AT&T provides a service called *software-defined network* (SDN) that allows you to build a private network through the AT&T public network facilities. An ETN can be combined with an SDN to form a hybrid (ETN/SDN) network.

The switches in MS/T or ETN networks need to be provisioned with special DEFINITY networking software packages.

DCS

Distributed Communications System (DCS) is a messaging overlay for ETN or MS/T networks. The overlay provides signaling connections between network nodes that enable certain key call features to operate transparently across the DCS network. That is, the transparent features appear to operate as if the switches in the DCS network were a single switch. For example, the DCS Call Coverage feature enables calls to an extension on one switch to be covered by extensions on a remote switch in the network.

DCS consists of two components — routing and message signaling. Routing the message requires one of several networking software packages. Typically, UDP is used singe it is included with DCS at no additional charge.

Although DCS is actually a messaging overlay for an existing network, it is commonly thought of as a type of network itself. In this document, we will refer to DCS in this way — *DCS network* will refer to a cluster of switches that are part of an existing ETN or MS/T network and are also administered for DCS.

In addition to the normal tie-trunk connections for the transmission of voice and call-control data, DCS requires a special signaling connection to carry the information needed to make the DCS features work. This signaling connection, or link, between two switches in a DCS network can be implemented in one of three ways:

- over a processor interface (PI) channel (on the si model) or a packet gateway (PGATE) channel (r model) using the X.25 protocol

- over an ISDN-PRI D-channel (csi, si, or r models)

- over a TCP/IP (either PPP or 10Base-T Ethernet) connection (csi, si, or r models)

Note: The csi model does not support X.25 connections.

TCP/IP signaling connections were introduced with DEFINITY Release 7. Starting with R7, X.25 was no longer sold with new systems. R7 and later new systems ship with only TCP/IP connections or ISDN-PRI for DCS signaling. However, existing systems with X.25 and/or ISDN-PRI DCS signaling can be upgraded to the latest version and keep those signaling links, or a new system can be added to an existing DCS network. Connections to the CMS Call Center and Intuity AUDIX adjuncts can use either X.25 or 10Base-T DCS signaling.

When a DCS network uses a mixture of two or three of the different DCS signaling types, one or more switches in the network must act as a *gateway*. A gateway switch is connected between two switches using different signaling protocols and the gateway enables the two end switches to communicate by converting the signaling messages between the two protocols. A gateway switch can provide conversion between two or all three of the signaling protocols, but only one protocol can be used for DCS signaling between any two switches.

What is transmitted between connected switches?

A telephone call consists of voice (bearer) data and call-signaling data. If the call is over a DCS network, DCS signaling data is also required. The DCS signaling data is sent over a separate path from the voice and call-signaling data.

Call-signaling data

The call-signaling data includes messages necessary to set up the call connection, maintain the connection during the call, and remove the connection when the call is finished.

DCS-signaling data

The DCS-signaling data is separate from the call-signaling data. How it gets transmitted depends on the connection type, which determines the type of signaling protocol used.

How does the data move between switches?

Figure 1 shows some of the major components of switch connections. Before R7, a call from switch 1 to switch 2, which consists of voice and signaling data, is sent through a trunk circuit pack across a TDM transmission facility to a trunk circuit pack in switch 2. Releases 7 and later add alternate pathways for the call data. In R8 and later releases, Q.931 signaling is used, which enables support for DCS+ and QSIG. The C-LAN circuit pack enables signaling data to be packetized and sent over a LAN, WAN, or the Internet. The IP Interface (TN802B) circuit pack enables voice data and non-DCS signaling data to be sent over IP facilities.

Figure 1.　Components of Switch Connectivity
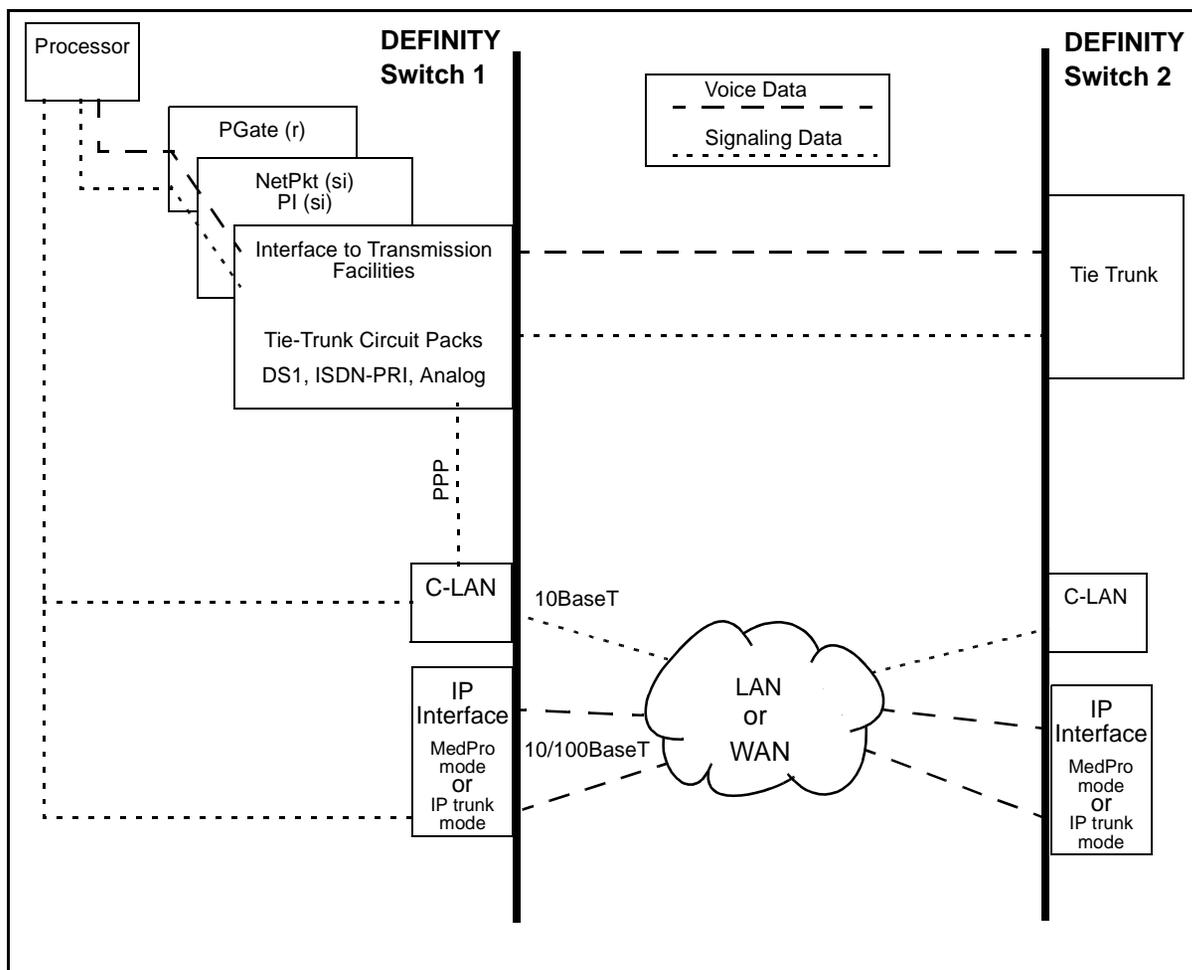
What do the components do?

The function of each circuit pack shown in Figure 1 is described below.

Processor

The processor board is the main control element in handling the call. This is the UN332B for the r model, the TN 790B for the si model, and the TN798B for the csi model.

PGATE (r only)

On the r model, the PGATE board (TN577) connects the processor to the packet bus and terminates X.25 signaling.

NetPkt (si only)

The Network control/Packet Interface (NetPkt) board (TN794) replaces the NETCON (TN777B) and the PACCON (TN778) circuit packs in the R7si model. It also replaces the LAPD portion of the PI (TN765) circuit pack.

C-LAN

The C-LAN circuit pack (TN799B) enables signaling data to be transmitted via the TCP/IP protocols across a LAN or WAN. Signaling types include call setup and teardown, registration of IP softphones, TSCs, QSIG and DCS signaling.

The C-LAN circuit pack provides the data link interface between the switch processor and the transmission facilities. C-LAN prepares the signaling information for TCP/IP transmission over one of two pathways — either via an Ethernet LAN or a point to point protocol (PPP) connection — depending on how the data link is administered. If the link is administered for an ethernet connection, the signaling data is sent out on a 10Base-T network, which is connected directly to the C-LAN ethernet port. If the link is administered for a PPP connection, C-LAN inserts the signaling data on the TDM bus for subsequent inclusion (via the switching fabric) in the same DS1 bit stream as the voice transmissions.

The C-LAN board can be inserted in any available port slot. Up to 10 C-LAN boards can be used in the DEFINITY ECS R8r and R8si models — up to 2 C-LAN boards can be used in the R8csi model. Each C-LAN board has 17 ports; port 17 is used for the LAN interface and the other 16 can be used for PPP connections. Up to 508 sockets are available on each C-LAN circuit pack.

IP-Interface

The IP Interface circuit pack (TN802B) enables two switches to transmit voice data between them over an IP network. The TN802B normally operates in the MedPro mode, which enables support of applications that comply with the H.323-v2 protocols. It can also operate in the IP Trunk mode to support R7 IP trunks that emulate DS1 connections.

Tie-Trunk Circuit Packs

The tie-trunk circuit packs provide an interface between the switch and the transmission facilities for voice data, call-signaling data and data. See *System Description*, 555-230-211 for descriptions of tie-trunk (and other) circuit packs.

Pre-R7 circuit packs

PI (si only)

The PRI functionality of the Processor Interface (PI) board (TN765) is replaced by the NetPkt board (TN794) in R7. The PI board will no longer be shipped with new systems starting with R7. The PI board is needed in switches upgraded to R7 and later releases only if existing X.25 connections are retained. The PI board has 4 data links that can connect to DS1 tie trunks over the TDM bus for interface to DCS or ISDN applications. The PI board terminates BX.25 and ISDN-PRI link access procedure on the D-Channel (LAPD).

NETCON (si only)

The network controller (NETCON) board (TN77B) is replaced by the NetPkt board (TN794) starting in R7. For pre-R7 systems, NETCON provides an interface to the processor for the port circuit packs on the TDM bus.

PACCON (si only)

The Packet Controller (PACCON) board (TN778) is replaced by the NetPkt board (TN794) starting in R7. For pre-R7 systems, PACCON provides an interface to the processor for D-Channel signaling over the packet bus.

The following table gives a summary of the different types of call connections and how the voice and signaling data are transmitted between switches.

Connection Type	Tie Trunk		LAN or WAN	
	Voice & Call-Signaling	DCS Signaling	Voice	Call & DCS Signaling
ISDN (DCS+) & QSIG	T1/E1 facilities using ISDN-PRI or DS1 B-Channel	TSCs on the ISDN-PRI D-Channel		TSCs on the ISDN-PRI D-Channel
X.25	T1/E1 facilities using ISDN-PRI or DS1 B-Channel OR Analog trunk	Packet PVC		
C-LAN PPP	T1/E1 facilities using ISDN-PRI or DS1 B-Channel OR Analog trunk	Packet PVC		
C-LAN Ethernet	T1/E1 facilities using ISDN-PRI or DS1 B-Channel OR Analog trunk			TCP Packet (DCS signaling only)
IP Interface **R7—DS1 emulation** **(IP Trunk mode)**		Packet PVC (X.25)	RTP Packet (IP Interface in *ip trunk* mode)	TCP Packet (C-LAN)
IP Interface **R8 — H.323 trunk** **(MedPro mode)**			RTP Packet (IP Interface in *medpro* mode)	TCP Packet (C-LAN)

For DCS+, X.25, and ppp connection types, the signaling and voice data are sent together over tie-trunk facilities as TDM-multiplexed frames. The DCS signaling data is sent as packets over a permanent virtual circuit (PVC) on tie-trunk facilities.

For C-LAN Ethernet connections, the signaling and voice data are sent together over tie-trunk facilities as TDM-multiplexed frames. The DCS signaling data is sent as TCP datagrams over an IP network through the C-LAN.

For IP Trunk connections, the voice data is sent over IP facilities as RTP datagrams using the IP Interface assembly (TN802 or TN802B) — each packet can potentially take a different route through the network. The call and DCS signaling data are sent as datagram packets over an IP network using the C-LAN interface. The R7 type of IP trunk (IP Interface operating in *ip trunk* mode) can also use tie-trunk PVC facilities for the DCS signaling.

Release 8 Hardware Requirements

For the three DEFINITY ECS switch models — csi, si, and r — Release 8 IP trunking (H.323) and IP Softphone connections require at least one IP Interface (TN802B) circuit pack and at least one C-LAN (TN799B) circuit pack. DEFINITY One requires only the IP Interface circuit pack.

IP Interface

The IP Interface assembly (J58890MA-1 L30) is a 3-slot wide TN802B circuit pack that provides voice processing over IP connections. The IP Interface assembly contains an NT processor, which is automatically administered by the DEFINITY software. The TN802B can be administered to operate in *medpro* mode for H.323 trunks and IP softphones, or in *ip trunk* mode for R7-type IP Trunk connections.

C-LAN

The C-LAN circuit pack, TN799B, provides call setup, TSCs, QSIG, and DCS signaling over IP connections.

> **Note:** The TN799B must be used to handle call signaling for the TN802B in MedPro mode. However, the previous version of C-LAN (TN799) can be used for call signaling with the TN802 or the TN802B operating in IP Trunk mode. The TN799 can also be used for DCS signaling connections on a switch that is using the TN802B in MedPro mode, as long as there are TN799Bs to handle the call signaling for the TN802B.

Hardware Requirements for Upgrades from Pre-R7 Switches

DEFINITY release 7 introduced several hardware changes that are also required for release 8. This section summarizes the hardware changes needed for pre-R7 switches upgrading to R8 for each switch model and each type of non-H.323 connectivity.

R8r model

The following table shows the hardware required for an upgrade to an R8r.

Connection Type	Hardware Required
BX.25 (Existing systems only)	PGATE (TN577)
TCP/IP (ethernet and ppp)	C-LAN (TN799B)
ISDN-PRI	No hardware changes required

R8si model The following table shows the hardware required for an upgrade to an R8si.

Connection Type	Hardware Required
BX.25 (Existing systems only)	• PI (TN765) • NetPkt (TN794) — replaces the NetCon (TN777B) and the PACCON (TN778) circuit packs • Upgraded processor (TN790B) • In duplicated systems, a second NetPkt Control Assembly and a new DUPINT (TN792)
TCP/IP (ethernet and ppp)	• C-LAN (TN799B) • NetPkt (TN794) — replaces the NetCon (TN777B) and the PACCON (TN778) circuit packs • Upgraded processor (TN790B) • In duplicated systems, a second NetPkt Control Assembly and a new DUPINT (TN792) • Expansion Interface (TN570) if there is an EPN and there are packet-based applications (such as TCP/IP over the C-LAN or ISDN-PRI over the TN464). The TN776 EI can be used only when the switch has no packet-based applications.
ISDN-PRI	• NetPkt (TN794) — replaces the NetCon (TN777B) and the PACCON (TN778) circuit packs • Upgraded processor (TN790B) • In duplicated systems, a second NetPkt Control Assembly and a new DUPINT (TN792) • Expansion Interface (TN570) if there is an EPN. ISDN-PRI capabilities formerly provided by the PI and PACCON circuit packs are now provided by the NetPkt. Note that you *do not* need to replace the TN767 with the TN464 since NetPkt supports D-channel signaling over the TDM bus.

R8csi model The following table shows the hardware required for an upgrade to an R8csi.

Connection Type	Hardware Required
BX.25 (Existing systems only)	The csi model does not support BX.25 connectivity.
TCP/IP (ethernet and ppp)	• C-LAN (TN799B) • Upgraded processor (TN798B)
ISDN-PRI	• Upgraded processor (TN798B)

DEFINITY Connection types and capacities

This subsection gives an overview of the types of connections that can be set up with DEFINITY switches and adjuncts and capacities for some connectivity parameters.

Types of connections   This table lists the types of connections possible with each DEFINITY model and adjunct.

DEFINITY ECS R8 Model	Connection Type	Endpoint
R8csi	Ethernet	DCS, CMS, Intuity AUDIX
	Synchronous PPP	DCS
	ISDN-PRI	DCS+
	H.323 Trunk	DCS+
R8si	Ethernet	DCS, CMS, Intuity AUDIX
	Synchronous PPP	DCS
	ISDN-PRI	DCS+
	BX.25	DCS, CMS, Intuity AUDIX, DEFINITY AUDIX
	H.323 Trunk	DCS+
R8r	Ethernet	DCS, CMS, Intuity AUDIX
	Synchronous PPP	DCS
	ISDN-PRI	DCS+
	BX.25	DCS, CMS, Intuity AUDIX, DEFINITY AUDIX
	H.323 Trunk	DCS+

If an R8 switch is connected to two endpoints by different connection types, it acts as a gateway (protocol converter) between the endpoints.

DEFINITY Capacities   The following table shows maximum allowable values and ranges for several connectivity parameters for DEFINITY ECS Release 8. Note that some or all maxima may not be achievable, depending on specific switch/traffic configurations.

	csi	si	r
Circuit Packs[*]	2 C-LAN X IP-Interface (medpro)	10 C-LAN 1 NetPkt 2 PI 14 IP-Interface (medpro)	10 C-LAN 4 PGATE 46 IP-Interface (medpro)
Audio Streams per IP-Interface board[†]	31 for G711 codec 22 for compression codecs	31 for G711 codec 22 for compression codecs	31 for G711 codec 22 for compression codecs
H.323 IP Trunks + IP Stations	300	300	1000
Processor Channels: X.25 ethernet/ppp	na 1–128	1–64 1–256	1–128 1–384
Interface Channels (listen ports): X.25 ethernet/ppp	na 5000–64,500	1–64 5000–64,500	1–64 5000–64,500
ISDN-TSC Gateway Channels	na	128	256
Links per System	25	25	33
Links per Circuit Pack: PI PGATE C-LAN	na na 1 ethernet, 16 ppp	4 na 1 ethernet, 16 ppp	na 4 1 ethernet, 16 ppp
IP Routes	270	400	650
Hop Channels (X.25 only)	na	128	256

[*] Circuit pack abbreviations:
  C-LAN: Control LAN (TN799B)
  NetPkt: Network Control/Packet Interface (TN794)
  PI: Processor Interface (TN765; used only for X.25 connections retained from pre-R7 systems)
  PGATE: Packet Gateway (TN577)
  IP-Interface: Used in the *Medpro* mode (TN802B)
[†] The number of audio streams per board is 22 if only one call uses a compression codec, even if all other calls use the G711.

IP Softphones

This book focuses on administration for the trunk side of the DEFINITY IP Solutions offer. The administration of the line side (IP Softphones) is covered in *DEFINITY ECS R8 Administrator's Guide*, 555-233-506. For completeness, a brief checklist of IP Softphone administration is presented here.

For R8, there are two main types of DEFINITY IP Softphone applications — the telecommuter application and the road-warrior application. The CentreVu IP Agent is a variation of the telecommuter application.

Telecommuter application

The telecommuter application uses two connections to the DEFINITY system: a connection to the PC over the IP network and a connection to the telephone over the PSTN. The user places and receives calls with the DEFINITY IP Softphone interface running on a PC and uses the telephone handset to speak and listen.

To administer a telecommuter application, you must complete these steps:

1 Verify that the DEFINITY system is enabled for IP Softphone use. On the System Parameters Customer Options screen, verify that:

- ~ Maximum H.323 Stations is > 0
- ~ Maximum IP Softphones is > 0
- ~ IP Stations is **y**

2 Add a DCP station (or change an existing DCP station) using the Station screen:

- ~ Type [enter the phone model you wish to use, such as 6408D]
- ~ Port: **x** if virtual, or the port number of an existing phone
- ~ Security Code: [enter the user's password]
- ~ IP Softphone: **y**
- ~ Go to page 2; Service Link Mode: **as-needed**

3 Install the IP Softphone software on the user's PC

Road-warrior application

The road-warrior application uses two separate software applications running on a PC that is connected to a DEFINITY system over an IP network. The single network connection carries two channels: one for call control signaling and one for voice. DEFINITY IP Softphone software handles the call signaling and an H.323 V2-compliant audio application (such as Microsoft® NetMeeting®) handles the voice communications.

To administer a road-warrior application, you must complete these steps:

1 Verify that the DEFINITY system is enabled for IP Softphone use. On the System Parameters Customer Options screen, verify that:

- ~ Maximum H.323 Stations is > 0
- ~ Maximum IP Softphones is > 0
- ~ IP Stations is **y**

2 On the DEFINITY system, add an H.323 station using the Station screen:

- ~ Type **H.322**
- ~ Port: **x**

3 Add a DCP station (or change an existing DCP station) using the Station screen:

~ Type [enter the phone model you wish to use, such as 6408D]

~ Port: **x** if virtual, or the port number of an existing phone

~ Security Code: [enter the user's password]

~ Media Complex Ext: [enter the extension of the H.323 station from the previous step]

~ IP Softphone: **y**

~ Go to page 2; Service Link Mode: **as-needed**

4 Install the IP Softphone software on the user's PC

5 Install an H.323 V2-compliant audio application (such as Microsoft NetMeeting) on the user's PC

IP Addressing

This section describes IP addressing, subnetting, and routing.

Physical Addressing

The Address Resolution Protocol (ARP) software on the C-LAN circuit pack relates the 32-bit logical IP address, which is configured in software, with the 48-bit physical address of the C-LAN circuit pack, which is burned into the board at the factory. The C-LAN board has an ARP table that associates the IP addresses with the hardware addresses, which are used to route messages across the network. Each C-LAN board has one physical address and up to 17 assigned IP addresses (one for each port).

Logical Addressing

An IP address is a software-defined 32-bit binary number that identifies a network node. The IP address has two main parts -- the first n bits specify a "network ID" and the remaining $32 - n$ bits specify a "host ID."

Format

	n	$32 - n$
Class Type	Network ID	Host ID
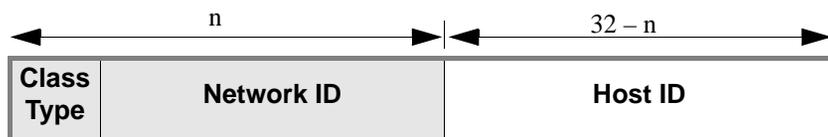
Dotted Decimal notation

The 32-bit binary IP address is what the computer understands. For human use, the address is typically expressed in dotted decimal notation — the 32 bits are grouped into four 8-bit octets (bytes) and converted to decimal numbers separated by decimal points, as in the example below.

Octet 1	Octet 2	Octet 3	Octet 4
11000010	00001101	11011011	00000111

194 . 13 . 219 . 7
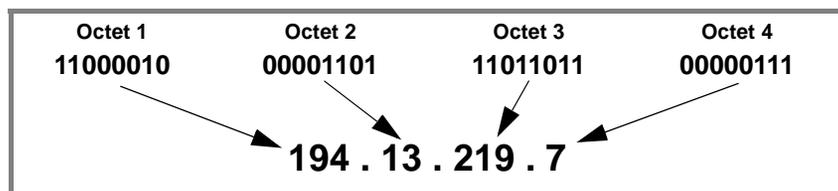
The eight binary bits in each octet can be combined to represent decimal numbers ranging from 0 to 255.

Conversion between binary and decimal

Conversion from binary to decimal notation is accomplished by adding the powers of 2 corresponding to the 1's positions in each byte:

	$2^7 =$ 128	$2^6 =$ 64	$2^5 =$ 32	$2^4 =$ 16	$2^3 =$ 8	$2^2 =$ 4	$2^1 =$ 2	$2^0 =$ 1
194 =	1	1	0	0	0	0	1	0
13 =	0	0	0	0	1	1	0	1
219 =	1	1	0	1	1	0	1	1
7 =	0	0	0	0	0	1	1	1

IP Address Classes

The IP address space (2^{32} or about 4.3 billion addresses) has been divided into five groups, Classes A–E, to accommodate the need for different network sizes. Each class has a different allocation of bits between the network and host IDs. The classes are identified by a fixed pattern of leading bits.

In Class A addresses, the first (leftmost) bit is always 0. So Class A IP addresses have 7 bits to define network IDs; 7 bits can define a total of 128 (0-->127) Class A networks. The remaining 24 bits of a Class A IP address are used to define host IDs. So for each of the 126 networks, there are 2^{24} or 16,777,216 possible hosts.

The following table shows how IP addresses are the allocated among the five classes.

	Octet 1	Octet 2	Octet 3	Octet 4
Class A 50%	0 Network ID		Host ID	
Class B 25%	1 0 Network ID		Host ID	
Class C 12.5%	1 1 0 Network ID			Host ID
Class D 6.5%	1 1 1 0 Reserved for Multicast addresses			
Class E 6.5%	1 1 1 1 Reserved for future use			
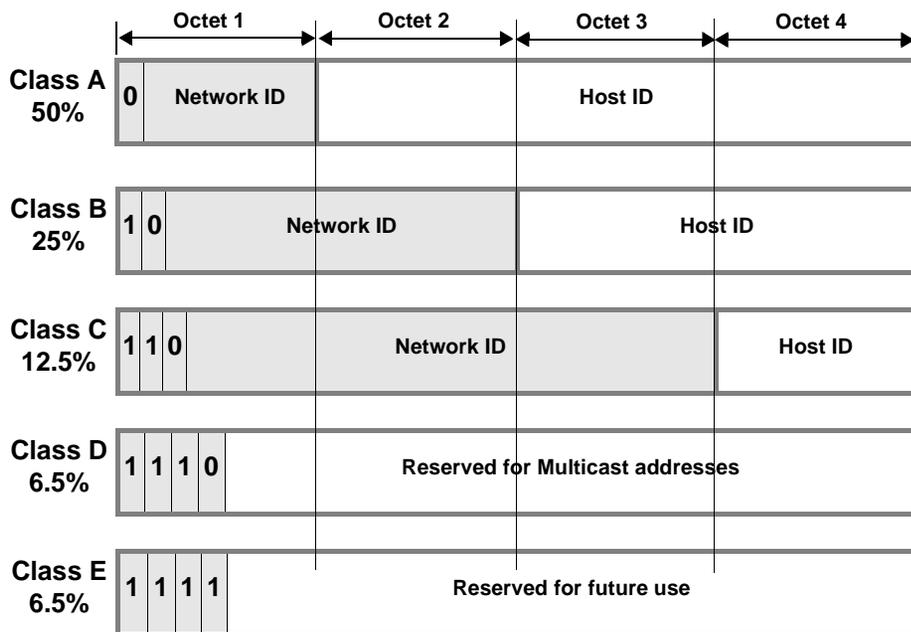
Address classes A, B, and C cover 87.5% of the address space. These addresses are assigned by the ISP or the Internet Assigned Number Authority (IANA) to organizations for their exclusive use. The remaining 12.5% of addresses, designated classes D and E, are reserved for special purposes.

The IANA assigns a network address to an organization and a network administrator in the organization assigns the Host IDs associated with that Network ID to nodes within the organization's network.

The following table shows the ranges of network and host IDs, and the total number of IP addresses (# network IDs times # host IDs), for each class.

	Network ID Range	Host ID Range	Total IP Addresses
Class A	7 bits 126 Networks: **1 to 126**	24 bits 16.8 Million Hosts per network: **0.0.1 to 255.255.254**	2.1 Billion 50%
Class B	14 bits, 16,382 Networks: **128.0 to 191.255**	16 bits 65,534 Hosts per network **0.1 to 255.254**	1.1 Billion 25%
Class C	21 bits, 2.1 Million Networks: **192.0.0 to 233.255.255**	8 bits 254 Hosts per network: **1 to 254**	0.5 Billion 12.5%
Classes D&E			0.5 Billion 12.5%

You can tell the class of an IP address by the first octet. For example, 191.221.30.101 is a Class B address and 192.221.30.101 is a Class C address.

Private IP Address   Addresses on the Internet need to be unique to avoid ambiguity in message routing over the Internet. To insure uniqueness, the Internet Assigned Number Authority (IANA) controls the use of IP addresses. Organizations that maintain private networks that never communicate with the Internet can use arbitrary IP addresses as long as they are unique within the private network. To help prevent the duplication of IP addresses on the Internet, the IANA has reserved the following ranges of IP addresses for private networks:

1 Class A networks: 16.6 Million addresses: 10.0.0.0 --> 10.255.255.255

16 Class B networks: 1 Million addresses: 172.16.0.0 --> 172.31.255.255

256 Class C networks: 65,000 addresses:192.168.0.0 --> 192.168.255.255

These IP addresses can be used repeatedly in separate private networks, which are not connected to the Internet. Routing tables prohibit the propagation of these addresses over the Internet. (See RFC 1918). All other IP addresses are unique and must be assigned by the IANA or ISP.

Subnetting

Subnetting is the grouping of IP addresses associated with a network ID into two or more subnetworks. The subnets of a network ID are visible only within the organization that owns the network ID; Internet routers route messages based on the network ID and the routers within the private organization differentiate between the individual subnets.

Reasons for subnetting Subnetting is desirable because it enables a more efficient allocation and management of IP addresses.

The three-class hierarchy of IP addresses results in an inefficient allocation of addresses in many cases because addresses are assigned and managed in blocks by network ID. For example, a company that needs 10,000 IP addresses in each of two locations might be assigned two Class B network IDs, each of which provides 65,534 IP addresses. Even though one Class B network ID would provide more than enough addresses for both locations, having a separate network ID for each location is easier to manage. If the company uses only 20,000 of these addresses, about 100,000 go unused.

In this case, subnetting would enable the company to use one Class B network ID and subdivide the addresses into two subnets, one for each location. Each subnet would have a unique "extended network ID" that would enable them to be managed as if they had unique network IDs.

Typically, organizations need to manage IP addresses in separate groups based on several criteria in addition to location:

- different types of LANs
- different server applications
- different work projects
- security

The grouping of IP addresses provided by the three-Class structure does not allow nearly enough flexibility to meet the needs of most organizations. Subnetting allows the N IP addresses associated with a network ID to be divided into as few as 2 groups, each with N/2 addresses, or into as many as N/2 groups, each with 2 addresses, if desired.

How subnets are created RFC 950 defines a standard procedure to divide a Class A, B, or C network ID into subnets. The subnetting adds a third level of hierarchy to the two-level hierarchy of the Class A, B, and C network ID number. An "extended network prefix" is formed by using two or more bits of the Host ID as a subnet number, and appending this subnet number to the network ID.

Two-level classful hierarchy

Class Type	Network ID	Host ID

Three-level subnet hierarchy

Class Type	Network ID	Subnet ID	Host ID

◄———————— Extended Network Prefix ————————►

Subnet mask

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 . . . 1	0 0 0 0 0 . . . 0
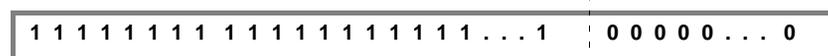
The extended network prefix is then treated as a normal network ID. The remaining host ID bits define the host IDs within each subnet. For example, a block of IP addresses could be subdivided into four subnets by using 2 host bits to "extend" the network ID. Now there are 4 times as many (extended) networks and 1/4 as many hosts per network.

Note: In adding up the number of network and host IDs, certain addresses cannot be counted. In general, addresses with all ones or all zeros in either the network portion or the host portion of the address are not usable. These are reserved for special uses, such as broadcasting or loopback.

Subnet Masks

Routing protocols use a *subnet mask* to determine the boundary between the extended network ID and the host ID in an IP address. The subnet mask is a 32-bit binary number consisting of a string of contiguous 1's followed by a string of contiguous 0's. The 1's part corresponds to the extended network prefix and the 0's part corresponds to the host ID of the address.

Each of the three classes of addresses has a default subnet mask that specifies the end of the 1st, 2nd, and 3rd octet as the boundary between the extended network prefix and the host ID. The default subnet mask in each case means "no subnetting."

	Default Subnet Mask
Class A	**11111111.00000000.00000000.00000000** **255.0.0.0**
Class B	**11111111.11111111.00000000.00000000** **255.255.0.0**
Class C	**11111111.11111111.11111111.00000000** **255.255.255.0**

In addition to the default subnet masks, which divide the network and host IDs at the octet boundaries in the IP address, subnets can be formed by using 2 or more bits from the host octets to define the subnet ID.

Class-C subnets

The following table shows that Class-C IP addresses can have 5 subnetting schemes, each with a different number of subnets per network. The first and last subnet, formed by using 1 and 7 bits respectively, are unusable because they result in either the subnet ID or the host ID having all zeros or all ones.

No. Sub-net bits	No. of Usable Subnets per NW	No. of Hosts per Subnet	No. of Usable IP Addresses	Binary Subnet ID (4th Octet)	Decimal Subnet ID	Class C Subnet Masks
1	0	126	0	10000000	128	255.255.255.128
2	2	62	124	11000000	192	255.255.255.192
3	6	30	180	11100000	224	255.255.255.224
4	14	14	196	11110000	240	225.225.225.240
5	30	6	180	11111000	248	255.255.255.248
6	62	2	124	11111100	252	255.255.255.252
7	126	0	0	11111110	254	255.255.255.254

3-bit subnets

As an example, the third row of the table shows the results of using 3 bits for the subnet ID. Three bits are "borrowed" from the host ID leaving 5 bits for the host IDs. The number of subnets that can be defined with three bits is $2^3 = 8$ (~~000~~, 001, 010, 011, 100, 101, 110, ~~111~~). Of these, only 6 are usable (all ones and all zeros are not usable). The remaining 5 bits are used for the host IDs. Of these, $2^5 - 2 = 30$ are usable. As shown in columns 2–4 (row 3), by using 3 bits for subnetting, a Class C network can be divided into 6 subnets with 30 host IDs in each subnet for a total of 6 X 30 = 180 usable IP addresses.

Subnet mask

The subnet mask is defined as follows. The subnet bits "borrowed" from the host ID are the highest-order bits in the octet of the host ID. The 5th and 6th columns of the table show the binary and decimal subnet IDs, formed by using the subnet bits as the highest-order bits in an octet. For example, in the third row of the table, the binary bit pattern is 11100000, which is decimal 224. This is the highest number that can be formed with the 3 high-order bits in the octet. The subnet mask is formed by putting this number in the 4th octet of the default subnet mask (shown in the last column of the table).

The mask, 255.255.255.224, corresponds to a bit pattern of 27 ones followed by 5 zeros. This mask would be used to check that two IP addresses are on the same or different subnets by comparing the first 27 binary digits of the two addresses. If the first 27 binary digits are the same, the two addresses are on the same subnet.

Example

To continue the example using a 3-bit subnet ID, assume a Class C network ID of 192.168.50.xxx. This network ID can provide 254 usable IP addresses, all on the same network — from 192.168.50.1 to 192.168.50.254. If we divide this network into 3-bit subnets, we will have 6 usable subnets with 30 usable IP addresses in each subnet. Note that we have lost 74 usable IP addresses in the process because we had to discard the all-ones and all-zeros subnet IDs (62 addresses) and host IDs (12 addresses). There is always a loss of usable IP addresses with subnetting.

The following table shows the subnet boundaries for the six subnets formed with 3 bits. The boundaries are the numbers formed by using all combinations of 3 bits as the highest-order bits in an octet (Columns 1 and 2) and then using these numbers in the 4th octet for the host IDs.

Binary Subnet Boundaries (for 3 bits)	Decimal Subnet Boundaries	Range of usable IP Addresses in the Subnet
00000000	0	not usable
00100000	32	192.168.50.**33** to 192.168.50.**62**
01000000	64	192.168.50.**65** to 192.168.50.**94**
01100000	96	192.168.50.**97** to 192.168.50.**126**
10000000	128	192.168.50.**129** to 192.168.50.**158**
10100000	160	192.168.50.**161** to 192.168.50.**190**
11000000	192	192.168.50.**193** to 192.168.50.**222**
11100000	224	not usable

For example, the IP addresses 192.168.50.75 and 192.168.50.91 are on the same subnet but 192.168.50.100 is on a different subnet. This is illustrated in the following diagram where the subnet mask, 255.255.255.244 is used to compare the first 27 binary digits or each address.

192	168	50	75
11000000	10101000	00110010	01001011

192	168	50	91
11000000	10101000	00110010	01011011

192	168	50	100
11000000	10101000	00110010	01100100

Subnet mask
255	255	255	224
11111111	11111111	11111111	11100000

◄─────────────── 27 digits ───────────────►

The other four possible subnetting schemes for Class C addresses, using 2, 4, 5, and 6 subnet bits, are formed in the same way. Which of the 5 subnetting schemes to use depends on the requirements for the number of subnets and the number of hosts per subnet.

Class-A and Class-B subnets

For Class A and Class B IP addresses, subnets can be formed in the same way as for Class C addresses. The only difference is that many more subnets per network can be formed. For Class B networks, subnets can be formed using from 2 to 14 bits from the 3rd and 4th octets. For Class A networks, subnets can be formed using from 2 to 22 bits from the 2nd, 3rd and 4th octets.

The Subnet Mask field on the ppp Data Module screen (used for ppp connections) and on the IP Interfaces screen (used for ethernet connections) enables the specification of a subnet for the IP address.

Valid subnet masks　　　The valid subnets for each Class of address are:

Class A (default 255.0.0.0)	Class B: (default 255.255.0.0)	Class C (default 255.255.255.0)
255.192.0.0	255.255.192.0	255.255.255.192
255.224.0.0	255.255.224.0	255.255.255.224
255.240.0.0	255.255.240.0	255.255.255.240
255.248.0.0	255.255.248.0	255.255.255.248
255.252.0.0	255.255.252.0	255.255.255.252
255.254.0.0	255.255.254.0	
255.255.0.0	255.255.255.0	
255.255.128.0	255.255.255.128	
255.255.192.0	255.255.255.192	
255.255.224.0	255.255.255.224	
255.255.240.0	255.255.255.240	
255.255.248.0	255.255.255.248	
255.255.252.0	255.255.255.252	
255.255.254.0		
255.255.255.0		
255.255.255.128		
255.255.255.192		
255.255.255.224		
255.255.255.240		
255.255.255.248		
255.255.255.252		

Notice that all 5 valid Class C subnet masks can also be valid Class B or Class A subnet masks, and all 13 valid Class B subnet masks can also be valid Class A subnet masks.

For example, 255.255.255.224 is a valid subnet mask for all three address classes. It allows 6 ($2^3 - 2$) subnetworks for Class C addresses, 2046 ($2^{11} - 2$) subnetworks for Class B addresses and 524,286 ($2^{19} - 2$) subnetworks for Class A addresses. Each of these subnetworks can have 30 ($2^5 - 2$) hosts.

Default Gateway

On LANs that connect to other networks or subnetworks, it is convenient to define a *default gateway* node. The default gateway node is usually a router that is connected to 2 or more different (sub)networks. It could also be a C-LAN ethernet port that is connected to other C-LANs on the same switch. Any packets addressed to a different (sub)network, and for which no explicit IP route is defined, are sent to the default gateway node. The default gateway node is either directly connected to the addressed node or knows of another router that knows how to get to the packet address.

A default gateway can be assigned to a node (C-LAN port or IP Interface port) on the IP Interfaces screen. If you do not assign a default gateway to a node, an explicit host IP route must be defined to enable communications to any node on a different (sub)network.

You can also assign a default gateway by setting up an IP route with the *default* node as the destination and the router (or C-LAN) as the gateway. The default node is a display-only entry on the Node Names screen with IP address 0.0.0.0. It acts as a variable that takes on unknown addresses as values. When the "default" IP route is set up, any address not know by C-LAN is substituted for the default address in the default IP route, which uses the router as the "default" gateway.

⚠ **SECURITY ALERT:**
A default gateway could allow unauthorized access to your network if it is not properly administered and maintained.

When to use IP routes

You need to define IP routes only in special cases when default gateways are not defined or when you want to limit communication between nodes. This section describes the network configurations that require explicit IP routes.

The following table summarizes when you would use IP routes:

Connection Type	When IP Routes are Needed:
Ethernet	The endpoints are on different subnets and no default gateway is defined on the IP Interfaces screen for the local node, ***and*** • You want the local node to communicate with only the specified node on a remote subnet (this is a *host* route type), ***or*** • You want the local node to communicate with any node a remote network but not with nodes on other networks (this is a *network* route type)
PPP	There are one or more intermediate nodes between endpoints.

The host and network route types are not specified directly. The system implies the type from the specified destination IP address and its associated subnet mask. The route type is displayed on the IP Routing screen for the display, list, and modify commands.

The endpoint nodes are on the same subnet if the following three conditions are met:

- the endpoints are on the same physical subnetwork

- the Subnet Mask field is assigned the same value on the IP Interface screens for the two endpoint nodes

- the network + subnet portions of the IP addresses (as determined by the subnet mask) are the same

See for more information about subnet masks.

IP Routing Screen   The following diagram shows the IP Routing screen.

```
display ip-route 1                                    Page    1 of    1
                          IP ROUTING


      Route Number: 1
  Destination Node: clan-a2
           Gateway: router-1
        C-LAN Board: 1b01
            Metric: 0
         Route Type: host
```

To set up an IP route, enter the node names for the destination and the gateway, and enter the slot location of the C-LAN on the local switch. The destination and gateway node names and their associated IP addresses must be specified on the Node Names screen.

The Route Type is a display-only field that appears on the screen for the display, list, and change ip-route commands. This field indicates whether the route is a *host* or *network* route. It is a host route if the destination address (associated with the Destination Node on the Node Names screen) is the address of a single host, or node. It is a network route if the destination address is the address of a network, not a single node.

An IP address for a network has the network ID in the network portion and 0 in the host portion. For example, 192.168.1.0 is the network address for the 192.168.1 network.

When a network is subnetted, and you want to set up a network IP route to a subnetwork, the IP address of the subnetwork is the first address in that subnetwork, which has all 0's for the host portion of the address. For example, the subnet mask formed by using 2 bits of the host portion of a Class C address is 255.255.255.192 (1100000 = 192). For the 192.168.1 network, this subnet mask creates 2 usable subnetworks whose IP addresses are 192.168.1.64 (0100000 = 64) and 192.168.1.128 (1000000 = 128), with 62 usable host addresses in each subnetwork.

If you wanted the local C-LAN node to be able to communicate with the nodes on the 192.168.1.64 subnetwork and not with others, you could do the following:

1 Leave blank the Gateway Address field on the IP Interfaces screen.

2 Enter a node name — for example, "subnet-1" — and the IP address, 192.168.1.64, on the Node Names screen.

3 Set up an IP route with "subnet-1" in the Destination Node field.

See the description of the subnet mask in Subnetting (page 16) for more information on subnet addresses. See IP Routing (page 251) in Appendix A for a description of the Metric field.

IP Route Examples   **PPP Connections**

The diagram below shows three switches in a DCS network with PPP signaling connections between switches A & B and between switches A & C. All nodes in this diagram are C-LAN ports. PPP data modules are administered between nodes 1 & 2 on switches A & B, and between nodes 3 & 4 on switches A & C. With these connections, switch A can communicate with switches B and C without using the IP Routing screen to administer explicit host IP routes. However, switches B and C need host IP routes to communicate with each other because they are not directly connected.
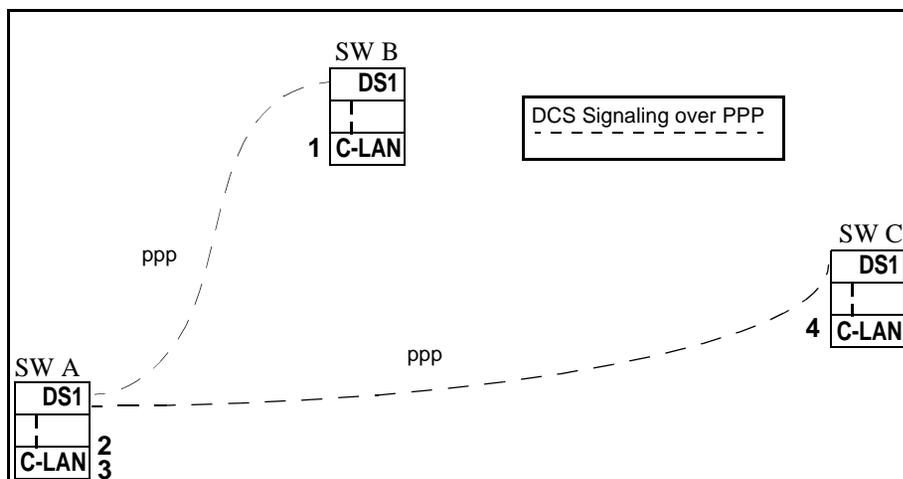
The IP routes needed between nodes for this example are listed in the following table. The Destination Node and Gateway Node columns in the table show the nodes that you would enter on the IP Routing screen to administer a host IP route. On the IP Routing screen, you would enter the node names assigned on the Node Names screen for these nodes.

Switch	Node Connections	Destination Node	Gateway Node	Route Type	Comments
B	1 —> 4	4	2	host	IP route needed because there is an intermediate node between nodes 1 & 4.
C	4 —> 1	1	3	host	IP route needed because there is an intermediate node between nodes 4 & 1.

Note: (1) The PPP data modules on switches B and C for the connections to A must be enabled before the IP routes can be administered.

Note: (2) Nodes 2 and 3 in this example are two ports on the same C-LAN board. Messages from node 1 destined for node 4 arrive at node 2; the C-LAN ARP software routes the messages to node 4 through node 3.

PPP with Ethernet Connections

The diagram below shows two interconnected (sub)networks. There are three switches in a DCS network with a ppp signaling connection between switches A & B and an ethernet signaling connection between switch A and the adjunct. Switches A & B and the adjunct are on one (sub)network and switch C is on another (sub)network.

Switch A acts as a gateway to convert between the two signaling protocols. PPP data modules are administered between nodes 1 & 3 on switches A & B and ethernet data modules are administered on switches A & C for the C-LAN ethernet port interfaces to their LANs. With these connections, switch A can communicate with switch B and with the adjunct without using the IP Routing screen to administer explicit IP routes.

Normally, node 5 would be defined as the default gateway for node 2 on the IP Interfaces screen, which would enable switch A to communicate with switch C without an explicit IP route defined. However, if node 5 is not assigned as the default gateway for node 2, switch A needs an IP route to communicate with switch C because these switches are on different (sub)networks. Similarly, node 6 would normally be defined as the default gateway for node 7; if not, switch C needs an IP route to communicate with switch A.

Also, switch B needs an IP route to communicate with switch C because B is connected to A via ppp and there are intermediate nodes between B & C.
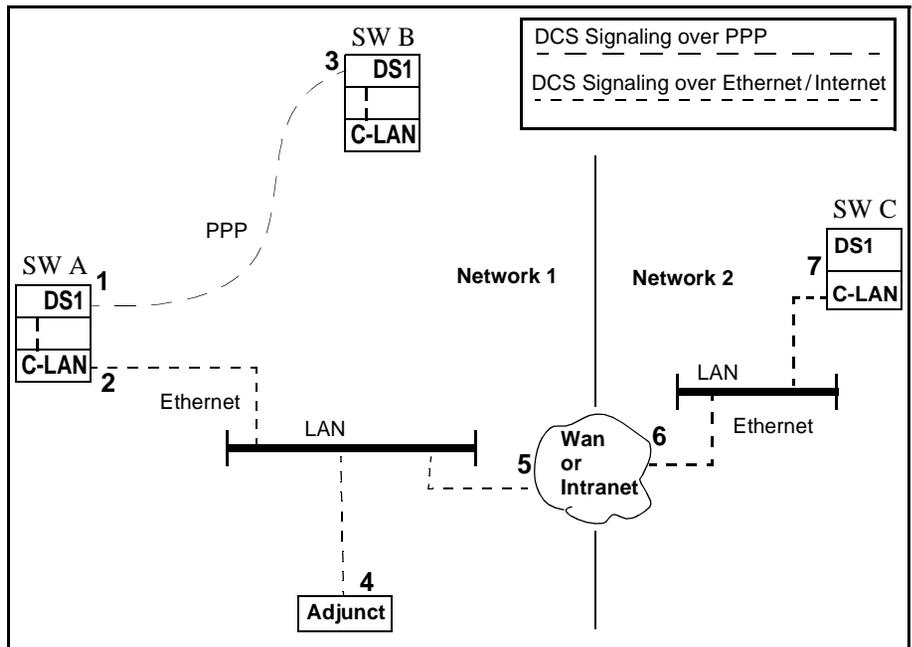
The following table shows the IP routes needed if nodes 5 and 6 *are not* defined as default gateways for nodes 2 and 7, respectively.

Switch	Node Connections	IP Route Destination Node	IP Route Gateway Node	Comments
A	2 —> 7	7	5	IP route needed because nodes 2 & 7 are on different subnets and the Gateway Address field for the node-2 C-LAN is blank on the IP Interfaces screen.
B	3 —> 4	4	1	IP route needed because 3 is connected to 1 via ppp and there are intermediate nodes between 3 & 4. The data module for the ppp connection between nodes 3 and 1 must be enabled before administering this route.
	3 —> 7	7	1	IP route needed to because 3 is connected to 1 via ppp and there are intermediate nodes between 3 & 7. The data module for the ppp connection between nodes 3 and 1 must be enabled before administering this route.
C	7 —> 4	4	6	IP route needed because nodes 4 & 7 are on different subnets and the Gateway Address field for the node-7 C-LAN is blank on the IP Interfaces screen.
	7 —> 2	2	6	IP route needed because nodes 2 & 7 are on different subnets and the Gateway Address field for the node-7 C-LAN is blank on the IP Interfaces screen.
	7 —> 3	3	2	IP route needed because nodes 3 & 7 are on different subnets. This route depends on route 7—>2. **Note:** this route would not be needed if node 6 is administered for proxy ARP to act as a proxy agent for node 3.

Ethernet-only Connections

The diagram below shows three interconnected (sub)networks. There are three switches in a DCS network with ethernet signaling connections between them. Switches A & B and the adjunct are on one (sub)network and switch C is on another (sub)network. Nodes 1, 2, and 6 are C-LAN ports. Node 3 is the adjunct interface port to the LAN. Nodes 4, 5, and 7 are interfaces to the WAN/Internet cloud and have IP addresses that are on different (sub)networks. An ethernet data module and IP Interface is administered for the C-LAN ethernet port on each switch.

Switches A and B can communicate with each other and with the adjunct without using the IP Routing screen to explicitly administer host IP routes. Normally, node 4 would be defined as the Gateway Address for node 1 on the IP Interfaces screen, which would enable switch A to communicate with switch C without an explicit host IP route defined. However, if node 4 is not assigned as the Gateway Address for node 1, switch A needs an IP route to communicate with switch C because these switches are on different (sub)networks. Similarly, node 5 would normally be defined as the default gateway for node 6; if not, switch C needs an IP route to communicate with switch A.

In this configuration, network IP routes could be used alone, or in combination with host IP routes, to tailor access among nodes. For example, if you wanted node 1 to be able to communicate with any node on (sub)networks 2 and 3, you would define node 4 as the Gateway Address for node 1. Then you would not need any IP routes defined for node 1. If you wanted node 1 to be able to communicate with all nodes on (sub)network 3 but none on (sub)network 2, you would define a network IP route to (sub)network 3 (and *not* assign node 4 as the Gateway Address for node 1). Then node 1 could communicate with any node on (sub)network 3 without defining host IP routes to them.
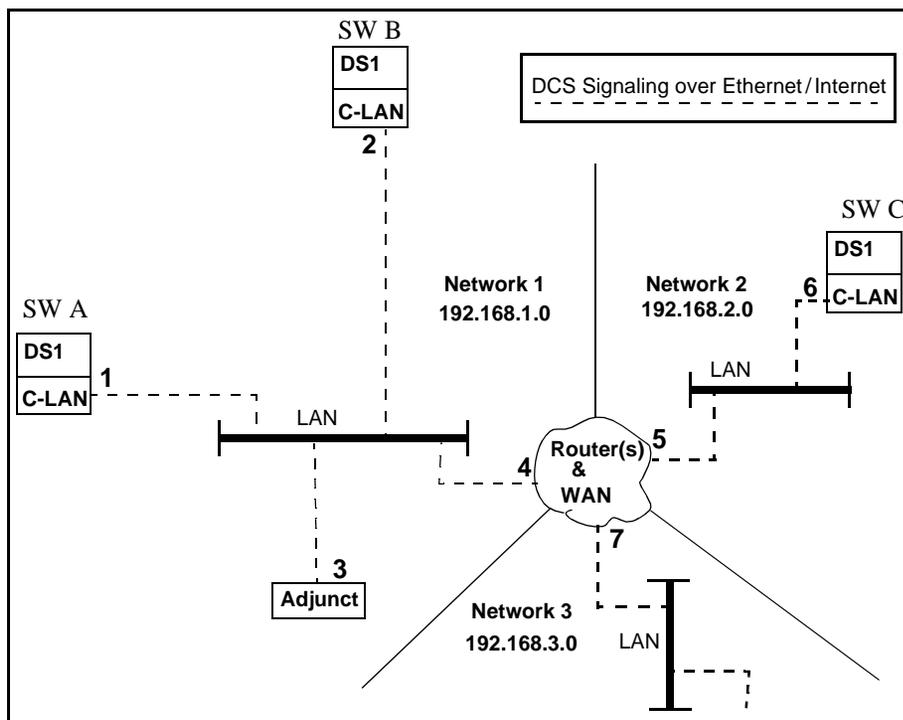
The following table shows the IP routes needed if node 4 is *not* defined as the Gateway Address (on the IP Interfaces screen) for nodes 1, 2, and 3 but node 5 is defined as the Gateway Address for node 6.

Switch	Node Connec-tions	IP Route Destination Node	IP Route Gateway Node	Route Type	Comments
A	1 —> 6	6	4	host	IP route needed because nodes 1 & 6 are on different subnets and no Gateway Address is specified for the node-1 C-LAN on the IP Interfaces screen.
	1—> network 3	network-3	4	network	This route enables node 1 to communicate with any node on Network 3. The node name *network-3* must be associated with the IP address 192.168.3.0 on the Node Names screen.
B	2 —> 6	6	4	host	IP route needed because nodes 2 & 6 are on different subnets and no Gateway Address is specified for the node-1 C-LAN on the IP Interfaces screen.
C					No IP routes are needed on Switch C because node 5 is defined as the Gateway Address for node 6.

2 H.323 Trunks

This chapter describes how to set up and perform initial administration of IP Trunks between **DEFINITY ECS** switches and between DEFINITY and non-DEFINITY switches that support the **H.323 V2 signaling protocols. The IP trunk connections described in this chapter use the TN802B circuit pack in the MEDPRO mode. See Appendix F for administration of trunk connections that use the TN802 or TN802B in the IP Trunk mode.**

Overview

This section provides a summary of DEFINIY IP Solutions for DEFINITY ECS Release 8.2.

IP Solutions

DEFINITY ECS IP Solutions provide TCP/IP connectivity for two types of trunks and three types of IP Softphones. On DEFINITY ECS, IP Solutions use the TN802B IP Interface assembly for voice processing and the TN799B C-LAN for signaling. The TN802B IP Interface includes a Windows NT server that resides on the TN802B circuit pack inside the DEFINITY ECS.

The TN802B IP Interface, introduced in Release 8, can be administered to operates in either the MedPro mode (for H.323-compliant ISDN PRI-equivalent trunk connections) or IP Trunk mode (for DS1-emulation connections). It will typically be used in the MedPro mode. The IP Trunk mode is provided for compatibility with existing R7 IP Trunk connections.

The TN802 IP-Interface introduced in Release 7, which operates only in the IP Trunk mode, can be upgraded via firmware download to the TN802B.

The following table lists the IP Solutions configurations and the circuit packs and software used with each.

IP Solutions		Circuit Pack Requirements		Software Requirements
		R7	**R8**	
Trunks	H.323 Trunk	–	TN802B in *medpro* mode with TN799B	–
	IP Trunk	TN802	TN802B in *ip trunk* mode with TN799B	–
IP Softphones	Road-warrior application	–	TN802B in *medpro* mode with TN799B	DEFINITY IP Softphone, Microsoft NetMeeting*
	Telecommuter application	–	TN799B	DEFINITY IP Softphone
	CentreVu IP Agent	–	TN799B	DEFINITY IP Softphone

* The IP Softphones should work with other audio applications that are fully H.323 v2-compliant. DEFINITY IP Solutions was developed and tested with Microsoft NetMeeting.

IP-Connected Trunks

IP-connected trunks allow trunk groups to be defined as ISDN-PRI-equivalent tie lines between switches over an IP network.

Trunks using IP connectivity provide cost-reduction and simplified management. Benefits include a reduction in long distance voice and fax expenses, facilitation of global communications, full-function networks with data and voice convergence, and network optimization by using the existing network resources.

H.323 Trunk   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" trunk providing access to the switch for unregistered users. A variety of signaling options can be chosen by the system administrator.

IP Trunk   The IP Trunk mode (of the TN802B IP Interface) will typically be chosen for interoperability with existing TN802 (as opposed to the TN802B) IP Interface circuit packs. IP Trunk mode can be used only between two DEFINITY switches. 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.

IP Softphones

DEFINITY IP Softphones operate on a PC equipped with Microsoft Windows 95/98/NT and with TCP/IP connectivity to DEFINITY ECS. DEFINITY IP Solutions supports three IP Softphone configurations:

- Road-warrior application of IP Softphone — a PC running the DEFINITY IP Softphone application and an H.323v2-compliant audio application, with a single IP connection to a DEFINITY server.

- Telecommuter application of IP Softphone — a PC running the DEFINITY IP Softphone application with an IP connection to the DEFINITY server, and a standard telephone with a separate PSTN connection to the DEFINITY server.

- CentreVu IP Agent — same as the Dual-Connection IP Softphone with the addition of call-center agent features that enable agents to work at home.

The DEFINITY IP Softphone can also operate in a "native H.323" mode, which is a PC-based single phone with limited features.

Documentation on how to set up and use the IP Softphones is included on the CD-ROM containing the IP Softphone software. The documentation includes a Getting Started quick reference, an overview and troubleshooting document, and context-sensitive help integrated with the softphone software.

Procedures for administering the DEFINITY ECS server to support IP Softphones are given in *DEFINITY ECS R8.2 Administrator's Guide*, 555-233-506.

H.323 Trunk Administration

This section describes the administration steps needed to setup H.323 trunks. The first subsection covers the enabling administration that needs to be in place before the trunk administration can be done. The second subsection gives a summary of the H.323 trunk administration and the last subsection gives the detailed steps. The screens used for this administration are described in detail in Appendix A, Screens Reference.

Screen fields not mentioned here are administered as in previous releases.

Enabling Administration

Before you can administer an H.323 trunk, a few customer options and circuit pack parameters need to be properly set. In addition, there are some optional maintenance and IP parameters that can be administered. These enabling settings are summarized here.

Optional Features (System Parameters Customer Options)
The Optional Features screen must be administered by the *init* login. Open the screen with the change command (**ch sys cu**) and set the following fields:

page 1
- *G3 Version* = **V8**
- *Maximum H.323 Trunks* = number purchased; must be **greater than 0**.

page 3
- *H.323 Trunk*s? = **y**
- *ISDN-PRI?* = **y**

Circuit Pack
The C-LAN and IP Interface assembly circuit packs must be administered on the Circuit Pack screen. Open the Circuit Pack screen with the change command (**ch ci**) and enter the board codes in available port slots:

C-LAN
- *Code* = **TN799**
- *Sfx* = **B**
- *Name* = **C-LAN**

IP Interface assembly — enter in a slot with at least two empty slot before it
- *Code* = **TN802**
- *Sfx* = **B**
- *Name* = **MAPD Board** {entered automatically by system}

   The two slots immediately before this slot are automatically populated as follows:
- *Code* = **DSMAPD** {displays automatically}

   Change DSMAPD to **MEDPRO** {the IP Interface board defaults to the IP Trunk mode, which is specified by the DSMAPD in this field. Changing this field to MEDPRO changes the board's mode to MEDPRO}
- *Sfx* = {blank}
- *Name* = **Reserved - IP** {displays automatically}

Maintenance-Related System Parameters

Four parameters on the Maintenance-Related System Parameters screen set threshold values for network performance:

page 4

- Roundtrip Propagation Delay (sec)   High: <u>800</u>   Low: <u>400</u>

- Packet Loss (%)   High: <u>40</u>   Low: <u>15</u>

- Ping Test Interval (sec): <u>20</u>

- Pings per Measurement Interval: <u>10</u>

These parameters have no effect unless the bypass function is activated on the Signaling Group screen. If the bypass function is activated for a signaling group, ongoing measurements of network activity collected by the system are compared with these values. If the values of these parameters are exceeded by the current measurements, the bypass function terminates further use of the network path associated with the signaling group. The following actions are taken when thresholds are exceeded:

- existing calls are maintained

- incoming calls are allowed

- outgoing calls are blocked on this signaling group; if so administered, blocked calls are diverted to alternate routes (either IP or circuits) as determined by the administered routing patterns

You can use the default values set for these parameters, or you can change them to fit the needs of your network. The Maintenance-Related System Parameters screen can be administered by the *init*, *inads*, or *craft* logins. Open the screen with the change command (**ch sys ma**).

IP Parameters

The IP Media Parameters screen allows you to specify the type of codec used for voice encoding and companding (compression/decompression). The main difference between codecs is in the compression algorithm used: some codecs compress the voice data more than others. A greater degree of compression results in lower bandwidth requirements on the network, but may also introduce transmission delays and lower voice quality.

The default codec is set for G711. The G711 provides the highest voice quality because it does the least amount of compression, but it uses the most bandwidth. The G711 default setting can be changed to one of four other codecs if the G711 does not meet your desired voice-quality/bandwidth tradeoff specification. Also, if the far-end switch is a not a DEFINTIY ECS, you may need to change the codec to match one that is supported by that switch.

The order in which the codecs are listed on this screen is the order of preference of usage. A trunk call between two DEFINITY switches will be set up to use the first common codec listed on the two IP Parameters screens.

NOTE: The codec ordering *must be the same* on DEFINITY switches at both ends of an H.323 trunk connection. The *set* of codecs listed need not be the same, but the *order* of the listed codecs must be the same.

You can also use the Audio IP port number range field to specify a block of port numbers to be used for audio connections. Then, if your network is equipped with the appropriate data filtering devices, audio data can be segregated from other data traffic to improve quality of service.

Open the screen with the change command (**ch ip-p**) and set the following fields:

- *Codec type* = {enter as many of the following types as supported by this switch, in the preferred order of usage — G711A, G711Mu, G723-6.3k, G723-5.3k, G.729A}. Refer to the following table of bandwidth requirements to decide which codecs to administer:

Codec	Bandwidth Requirement
G711 A-law @ 64Kbps	117.6 Kbps
G711 Mu-law @ 64Kbps	117.6 Kbps
G723 @ 6.3Kbps	31.1 Kbps
G723 @ 5.3Kbps	29.6 Kbps
G729A @ 8Kbps	33.6 Kbps

- *Audio IP port number range* =

UDP Port Range
Min: 2048
Max: 65535

The G711 codecs use either an A-law or Mu-law companding algorithm. The Mu-law algorithm is used in the U.S. and Japan; the A-law is typically used in other countries.

Best Service Routing The call center Best Service Routing (BSR) feature can be implemented using H.323 trunks. You can use H.323 trunks for just the polling function or for both the polling and interflow functions. Since polling requires only a small amount of data exchange, the additional network traffic is insignificant. However, the interflow function requires a significant amount of bandwidth to carry the voice data. Depending on the other uses of the LAN/WAN and its overall utilization rate, the voice quality could be degraded to unacceptable levels.

Lucent recommends that if H.323 trunks are used for BSR interflow, this traffic should be routed to a low-occupancy or unshared LAN/WAN segment. Alternatively, you might want to route internal interflow traffic (which may have lower quality-of-service requirements) over H.323 trunks and route customer interflow traffic over circuit-switched tie trunks.

H.323 Trunk Administration — Task Summary

After the enabling administration is complete, you can administer the H.323 IP trunks. The screens and fields that need to be administered are listed below.

> **NOTE:** **This is only a list of screens and the fields that need to be administered. The values that need to be entered in these fields are described in the next section.**

Node names

A node name and IP address must be entered on the Node Names screen for each C-LAN and IP Interface board on the local switch. For each far-end node that the H.323 trunks on the local switch will connect to, a node name and IP address must be entered for the far-end gatekeeper, which is a C-LAN board if the far-end is a DEFINITY switch. Enter values in these fields:

- ~ Node Name
- ~ IP Address

IP Interfaces

Each DEFINITY switch in an IP network has one IP Interfaces screen. One line on this screen must be administered for each C-LAN and each IP Interface board. Enter values in these fields:

- ~ Network regions are interconnected?
- ~ Enable
- ~ Type
- ~ Slot
- ~ Code
- ~ Sfx
- ~ Node Name
- ~ Subnet Mask
- ~ Default Gateway Address
- ~ Region

Ethernet Data Module

A data module screen, type *ethernet*, must be administered for each C-LAN board on the switch. Enter values in these fields:

- ~ Type
- ~ Port
- ~ Link
- ~ Name
- ~ Network uses 1's for broadcast address?

Signaling Group　　　　　Each H.323 trunk must be assigned to a signaling group. Enter values in these fields:

page 1
- ~ Group Type
- ~ Trunk Group for Channel Selection
- ~ Near-end Node Name
- ~ Near-end Listen Port
- ~ Far-end Node Name (Optional)
- ~ Far-end Listen Port (Optional
- ~ LRQ Required?
- ~ Calls Share IP Signaling Connection?
- ~ Bypass If IP Threshold Exceeded?

Page 2 — Administered NCA TSC Assignment

NCA TSCs need to be administered only if this signaling group is to be used for DCS, AUDIX, MASI, or as Gateway. Administration of TSCs is the same as in previous releases.

Trunk Group　　　　　Each H.323 trunk must be assigned to a trunk group, which is assigned to a signaling group. Enter values in these fields:

page 1
- ~ Group Type
- ~ Carrier Medium
- ~ Service Type
- ~ Codeset to Send Display
- ~ TestCall ITC
- ~ TestCall BCC

page 2
- ~ Used for DCS?
- ~ PBX ID
- ~ DCS Signaling

page 4—trunk group members assignment
- ~ Port
- ~ Code
- ~ Name
- ~ Night
- ~ Sig Grp

IP Media Parameters	Each DEFINITY switch in an IP network has one IP Media Parameters screen. Use this screen to enter:

- ~ the types of codecs (for audio processing) available on this switch
- ~ the preferred order of use of the codec types
- ~ the range of port numbers available for audio connections

Network Regions	The Region field on the IP Interfaces screen allows you to set up segregated groups of C-LAN and IP Interface (Medpro) resources. This feature can be used in a variety of ways. For example, you could use regions to allocate specific C-LAN and IP Interface boards to H.323 trunks and others to stations; or you could use regions to avoid multimedia traffic over low bandwidth or high-latency network links.

H.323 Trunk Administration — Task Detail

This section describes the tasks that need to be completed to administer an H.323 trunk. Sample values are used to populate the fields to show the relationships between the screens and fields.

Task 1 — Assign Node Names

This task assigns node names and IP addresses to *each node in the network* that this switch communicates with via IP connections. A Node Names screen must be administered on *each DEFINITY switch in an IP network.*

A *node* is defined as any of the following — a C-LAN ethernet or ppp port, a bridge or router, a CMS ethernet port, or an Intuity AUDIX or other MSA network interface card. The AUDIX and MSA node name and IP address must be entered on page 1 of the screen. The data for all other node types must be entered on pages 2–6.

For H.323 connections, each MedPro ethernet port (IP interface) *on the local switch only* must also be assigned a node name and IP address on this form.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or from a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Task 1 Steps

Begin

> Open Node Names screen — enter **ch node-n**

> Go to page 2 of the screen

```
change node-names                                      Page 2 of 6
                          NODE NAMES

Name                IP Address        Name          IP Address
clan-a1             192.168.10 .31    _____   ___.___.___.___
clan-a2             192.168.20 .31    _____   ___.___.___.___
default             0  .0  .0  .0     _____   ___.___.___.___
medpro-a1    _      192.168.10 .81    _____   ___.___.___.___
medpro-a2    _      192.168.20 .81    _____   ___.___.___.___
medpro-a3    _      192.168.10 .82    _____   ___.___.___.___
medpro-b1    _      192.168.10 .83    _____   ___.___.___.___
             __     ___.___.___.__    _____   ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name	Enter unique node names for: • Each C-LAN ethernet port on the network • Each IP-Interface (Medpro) board on the local switch. The default node name and IP address is used to set up a default gateway, if desired. This entry is automatically present on the Node Names screen and cannot be removed. When the Node Names screen is saved, the system automatically alphabetizes the entries by node name.
IP Address	Enter a unique IP addresses for each node named in the previous field.

> Submit the screen

End

Task 2 — Define IP Interfaces

The IP interface for each C-LAN and MedPro board on the switch must be defined on the IP Interfaces form. Each DEFINITY switch in an IP network has one IP Interfaces form.

Task 2 Steps

Begin

> Open IP Interfaces form — enter **ch ip-i**

```
change ip-interfaces                                        Page   1 of   2

                            IP Interfaces

 Inter-region IP connectivity allowed?   n
Enable                                                                  Net
Eth Pt  Type    Slot   Code Sfx Node Name      Subnet Mask    Gateway Addr   Rgn
   y    C-LAN   01A10  TN799 B  clan-a1        255.255.255.0  192.168.10 .100 1
   y    MEDPRO  01A13  TN802 B  medpro-a1      255.255.255.0  192.168.10 .100 1
   y    MEDPRO  01A16  TN802 B  medpro-a2      255.255.255.0  192.168.20 .100 1
   y    C-LAN   01A09  TN799 B  clan-a2        255.255.255.0  192.168.20 .100 2
   y    MEDPRO  01B13  TN802 B  medpro-a3      255.255.255.0  192.168.10 .100 2
   y    MEDPRO  01B09  TN802 B  medpro-b1      255.255.255.0  192.168.10 .100 2
   n                                           255.255.255.0      .   .   .
```

> Enter values

Field	Conditions/Comments
Inter-region IP connectivity allowed?	Enter **y** to allow IP endpoints (phones and trunks) to use MedPro resources administered in regions that are different from the endpoints' regions.
Enable Eth Pt	The Ethernet port must be enabled (**y**) before it can be used. The port must be disabled (**n**) before changes can be made to its attributes on this screen.
Type	Enter **c-lan** or **medpro**.
Slot	Enter the slot location for the circuit pack.
Code	Display only. This field is automatically populated with TN799 for C-LAN or TN802 for MedPro.
Sfx	Display only. This field is automatically populated with B for the TN802 and TN799.
Node name	Enter the unique node name for the IP interface. The node name entered here must already be administered on the Node Names screen
	1 of 2

Field	Conditions/Comments
Subnet Mask	Enter the subnet mask associated with the IP address for this IP interface. (The IP address is associated with the node name on the Node Names screen).
Gateway Addr	Enter the address of a network node that will serve as the default gateway for the IP interface.
Net Rgn	Enter the region number for this IP interface.
	2 of 2

> Submit the screen

End

Task 3 — Assign Link via ethernet Data Module to the LAN

This task administers an ethernet data module for the connection between the C-LAN board's ethernet port (port 17) and the LAN. The data module associates a link number and extension number with the C-LAN ethernet port location. This association is used by the DEFINITY processor to set up and maintain signaling connections for multimedia call handling.

The C-LAN ethernet port is indirectly associated with the C-LAN IP address via the slot location (which is part of the port location) on the IP Interfaces screen and the node name, which is on both the IP Interfaces and Node Names screens.

Task 3 Steps

Begin

> Open Data Module form — enter **a da n**

```
add data-module next                                    Page 1 of X
                         DATA MODULE

     Data Extension: 2377         Name: ethernet on link 2
                Type: ethernet
                Port: 01c0817
                Link: 2

Network uses 1's for broadcast addresses?: y
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type (ethernet) for this link.
Port:	Ethernet connections must be assigned to port 17 on the C-LAN circuit pack.
Link:	The link number must be in the range 1 – 33 for G3r, or 1 – 25 for G3si and G3csi, and not previously assigned on this switch.
Name:	This field is information-only; it appears in lists generated by the "list data module" command.
Network uses 1's for broadcast addresses?	Leave the default (**y**) if the private network contains only DEFINITY switches and adjuncts. Set to **n** only if the network includes non-DEFINITY switches that use the 0's method of forming broadcast addresses. See Appendix A, "Data Module - type ethernet" for more information about this field.

> Submit the screen

End

Task 4 — Create a signaling group

This task creates a signaling group that will be associated with H.323 trunks that connect this switch to a far-end switch. One or more unique signaling groups must be established for each far-end node that this switch is connected to via H.323 trunks.

Note: The following steps address only those fields that are specifically related to H.323 trunks. The other fields are administered as for previous releases and are described in the Administrator's Guide.

Task 4 Steps

Begin

> Open new Signaling Group form — enter **a sig n**

```
add signaling-group n                                    Page   1 of   5
                            SIGNALING GROUP

 Group Number: 3                Group Type: h.323
                                                   Max number of NCA TSC: 0
                                                    Max number of CA TSC: 0
                                               Trunk Group for NCA TSC:
          Trunk Group for Channel Selection: __
             Supplementary Service Protocol: a


          Near-end Node Name: clan-a1          Far-end Node Name: clan-b1
          Near-end Listen Port: 1720           Far-end Listen Port: 1720


             LRQ Required? n           Calls Share IP Signaling Connection? n

                                       Bypass If IP Threshold Exceeded? n


                                       Internetworking Message: PROGress
```

> Enter values

Field	Conditions/Comments
Group Type:	Enter **h.323**
Trunk Group for Channel Selection:	Leave blank until you create a trunk group in the following task; then use the change command and enter the trunk group number in this field.
Near-end Node Name:	Enter the node name for the C-LAN IP interface on this switch. The node name must be administered on the Node Names screen and the IP Interfaces screen.
Near-end Listen Port:	Enter an unused port number from the range 1719, 1720 or 5000–9999. The number **1720** is recommended.
	Note: If the LRQ field is set to **y**, the near-end Listen Port must be **1719**.
	1 of 2

Field	Conditions/Comments
Far-end Node Name:	This is the node name for the far-end C-LAN IP Interface used for trunks assigned to this signaling group. The node name must be administered on the Node Names form on this switch. This field can be left blank if the signaling group is associated with an unspecified destination.
Far-end Listen Port:	The same number as entered in the Near-end Listen Port field is recommended; this number must match the number entered in the Near-end Listen Port field on the signaling group form for the far-end switch. This field can be left blank if the signaling group is associated with an unspecified destination.
LRQ Required?	Leave the default (**n**) if the far-end switch is a DEFINITY ECS. Set to **y** only if the far-end switch is a non-DEFINITY switch *and* requires a location request (to obtain a signaling address) in its signaling protocol.
Calls Share IP Signaling Connection?	Always enter **y** for inter-DEFINITY connections. If the local and/or remote switch is a non-DEFINITY switch, leave the default (**n**).
Bypass if IP Threshold Exceeded?	Set to **y** to automatically remove from service trunks assigned to this signaling group when IP transport performance falls below limits administered on the Maintenance-Related System Parameters (sys par maint) screen.

2 of 2

```
add signaling-group next                                    Page    2 of    5

                        ADMINISTERED NCA TSC ASSIGNMENT

Service/Feature:                        As-needed Inactivity Time-out (min):
 TSC   Local                                                        Mach.
Index   Ext.    Enabled Established   Dest. Digits Appl.            ID
  1:              n
  2:              n
  3:              n
  4:              n
  5:              n
  6:              n
  7:              n
  8:              n
```

If this signaling group will be used for DCS, enter NCA TSC information here. See Chapter 3, Configuration 4, for instructions.

> Submit the screen

End

Task 5 — Create a trunk group

This task creates a new trunk group for H.323 trunks. Each H.323 trunk must be a member of an ISDN trunk group and must be associated with an H.323 signaling group.

Note: The following steps address only those fields that are specifically related to H.323 trunks. The other fields are administered as for previous releases and are described in the Administrator's Guide.

Task 5 Steps

Begin

> Open new Trunk Group form — enter **a tr n**

```
add trunk-group n                                            Page   1 of  10

                            TRUNK GROUP

Group Number: 3                    Group Type: isdn        CDR Reports: y
  Group Name: TG 3 for H.323 trunks      COR: 1      TN: 1       TAC: 103
    Direction: two-way      Outgoing Display? n        Carrier Medium: IP
 Dial Access? n              Busy Threshold: 99          Night Service:
Queue Length: 0
Service Type: tie                     Auth Code? n         TestCall ITC: rest
                   Far End Test Line No:
TestCall BCC: 0
TRUNK PARAMETERS
         Codeset to Send Display: 0      Codeset to Send National IEs: 6
        Max Message Size to Send: 260    Charge Advice: none
  Supplementary Service Protocol: a      Digit Handling (in/out): enbloc/enbloc

           Trunk Hunt: cyclical              QSIG Value-Added Lucent? n
                                              Digital Loss Group: 13
Calling Number - Delete:     Insert:              Numbering Format:
            Bit Rate: 1200         Synchronization: async    Duplex: full
 Disconnect Supervision - In? y  Out? n
 Answer Supervision Timeout: 0
```

> Enter values

Field	Conditions/Comments
Group Type	Enter **isdn**.
Carrier Medium	Enter **ip**.
Service Type	Enter **tie**.
TestCall ITC:	Enter **unre** (unrestricted).
TestCall BCC:	Enter **0**.
Codeset to Send Display	Enter **0**.
Note: Outgoing Display	This field may need to be changed if the far-end is a non-DEFINITY switch.

> If using DCS, go to screen page 2

```
add trunk-group n                                              Page   2 of  10
                              TRUNK FEATURES
          ACA Assignment? n              Measured: none      Wideband Support? n
                                   Internal Alert? n       Maintenance Tests? y
                                Data Restriction? n     NCA-TSC Trunk Member:
                                     Send Name: n       Send Calling Number: n
            Used for DCS? y  PBX ID: 4
   Suppress # Outpulsing? n                              DCS Signaling: d-chan
 Outgoing Channel ID Encoding: exclusive     UUI IE Treatment: service-provider

                                          Replace Restricted Numbers? n
                                         Replace Unavailable Numbers? n
                                               Send Connected Number: n


             Send UCID? n
 Send Codeset 6/7 LAI IE? y
```

> Enter values

Field	Conditions/Comments
Used for DCS?	Enter **y**.
PBX ID:	Enter the switch ID. This is the value in the Destination Node Number field on the Dial Plan Record screen *of the remote switch*.
DCS Signaling:	Enter **d-chan**.
Note: • Send Name • Send Calling Number • Send Connected Number	These fields may need to be changed if the far-end is a non-DEFINITY switch.

> Go to page 4

```
add trunk-group 3                                              Page   4 of  10
                              TRUNK GROUP
                              Administered Members (min/max):   0/0
GROUP MEMBER ASSIGNMENTS                      Total Administered Members:   0

       Port     Code Sfx Name         Night           Sig Grp
  1: ip                  H.323 Tr 1                       3
  2: ip                  H.323 Tr 2                       3
  3: ip                  H.323 Tr 3                       3
  4:
  5:
```

Note: Each signaling group can support up to 31 trunks. If you need more than 31 trunks between the same two switches, add a second signaling group with different listen ports, and add a second trunk group. See Signaling group assignments (page 50) for more information about the relationship between signaling groups and H.323 trunk groups.

> Enter group members

Field	Conditions/Comments
Port	Enter **ip**. When the screen is submitted, this value will automatically be changed to a "T" number of the form Txxxxx.
Name	Enter a 10-character descriptive name for the trunk. The name is to help you identify the trunk – it is not used by the system.
Sig Grp	Enter the number of the signaling group that you set up for H.323 trunks.

>Submit the screen

When the screen is submitted, the Port field for the IP (H.323) trunks is changed to a Txxxxx number, as shown below.

```
display trunk-group 3                                          Page   4 of  10
                               TRUNK GROUP
                                  Administered Members (min/max):   1/3
GROUP MEMBER ASSIGNMENTS                      Total Administered Members:   3

      Port      Code Sfx Name           Night              Sig Grp
  1: T00004              H.323 Tr 1                            3
  2: T00005              H.323 Tr 2                            3
  3: T00006              H.323 Tr 3                            3
  4:
  5:
```

End

Task 6 — Modify signaling group

This task modifies the signaling group form to add a trunk group number to the Trunk Group for Channel Selection field.

Task 6 Steps

Begin

> Busy out the signaling group — enter **bu sig 3**

> Open the Signaling Group form — enter **ch sig 3**

```
change signaling-group 3                                    Page   1 of   5
                            SIGNALING GROUP

 Group Number: 3               Group Type: h.323
                                                     Max number of NCA TSC: 0
                                                      Max number of CA TSC: 0
                                                     Trunk Group for NCA TSC:
        Trunk Group for Channel Selection: 3
            Supplementary Service Protocol: a


        Near-end Node Name: clan-a1          Far-end Node Name: clan-b1
        Near-end Listen Port: 1720           Far-end Listen Port: 1720

              LRQ Required? n            Calls Share IP Signaling Connection? n

                                          Bypass If IP Threshold Exceeded? n
```

> Enter values

Field	Conditions/Comments
Trunk Group for Channel Selection	Enter the trunk group number. If there is more than one trunk group assigned to this signaling group, the group entered in this field will be the one that can accept incoming calls.

> Submit the screen

> Release the signaling group — enter **rel sig 3**.

End

Task 7 — Specify codecs

This task modifies the IP Media Parameters screen to specify the type of codecs available on this switch and the preferred order of use of the different types.

Task 7 Steps

Begin

> Open the IP Parameters screen — enter **ch ip-p**

```
change ip-parameters                              Page   1 of   1

                        IP Media Parameters

     Audio Codec
     Preferences

 1: G.711MU
 2: G.723-6.3K
 3: G.729A
 4:



     UDP Port Range

     Min: 2048
     Max: 65535 n
```

> Enter values

Field	Conditions/Comments
Audio Codec Preferences	Enter up to four codec types in the order of preference of use. Valid types are: G711A, G711Mu, G723-6.3k, G723-5.3k, G.729A.
	Note: The codec ordering *must be the same* on DEFINITY switches at both ends of an H.323 trunk connection. The set of codecs listed need not be the same, but the order of the listed codecs must be the same.
	See IP Parameters (page 34) for a description of the differences between codec types.
UDP Port Range	Enter a minimum and maximum port number to specify a block of port numbers to be used for audio connections. Valid values are 1 to 65535, with Min < Max.

> Submit the screen

End

Troubleshooting IP Solutions

This section provides solutions to some commonly encountered problems with H.323 trunks and IP Softphones.

H.323 Trunk Problem Solving

Signaling group assignments

Multiple H.323 trunk groups can be assigned to a single signaling group, as with standard trunk groups that use circuit-switched paths. However, when multiple H.323 trunk groups have different attributes, it is usually better to assign each H.323 trunk group to a separate signaling group. ***An H.323 signaling group directs all incoming calls to a single trunk group, regardless of how many trunk groups are assigned to that signaling group.*** This is specified in the field "Trunk Group for Channel Selection" on the H.323 signaling group screen.

In the example shown in Figure 2, two trunk groups are assigned to the same signaling group on each of two switches, A and B. Trunk groups A1 and B1 are set up to route calls over a private network. Trunk groups A2 and B2 are set up to route calls over the public network. The signaling group on switch B terminates all incoming calls on trunk group B1 as specified by the "Trunk Group for Channel Selection" field. Calls from switch A to switch B using trunk group A1 and the private NW are terminated on trunk group B1, as desired. However, calls from switch A to switch B using trunk group A2 and the public NW are also terminated on trunk group B1, not trunk group B2, which would be the desired outcome.

The solution to this problem is to set up a separate signaling group for each trunk group, as shown in Figure 3. More generally, set up a separate signaling group for each set of trunk groups that have common attributes.

Figure 2.   **Shared signaling group**
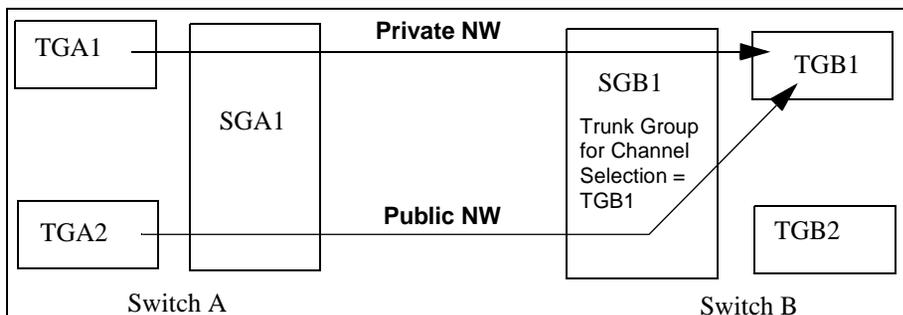
Figure 3.   **Separate signaling group**
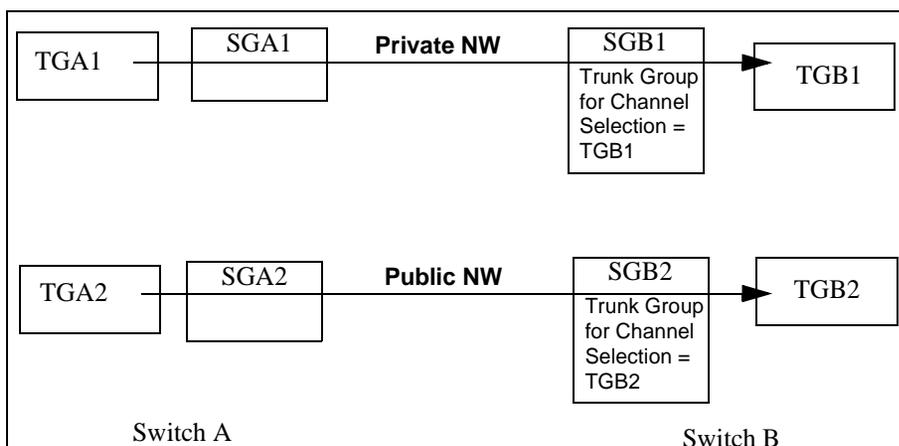
No MedPro resources available

If two switches are connected via an H.323 trunk and all MedPro resources are in use on the call-destination switch when a call is made, the call will fail even when a 2nd preference is administered in the routing pattern on the source switch. This can be avoided by setting the first preference look ahead routing (LAR) to "next" in the routing pattern.

C-LAN sharing

Depending on the network configuration, a single C-LAN board has the capacity to handle the signaling for multiple applications. For example, the call center Call Management System (CMS) would typically use a small portion of a C-LAN's capacity so the same C-LAN could easily handle the signaling for other IP endpoints at the same time. There are many variables that affect the number of C-LAN and TN802B (MedPro) circuit packs that you will need for your network configuration. To accurately estimate the C-LAN and MedPro resources needed, a network configuration tool is available from Lucent. See Appendix D, Capacities and Performance for a summary of this tool.

Traffic congestion is potentially a problem when multiple IP Interfaces (such as C-LAN, MedPro, PCs, CMS) share a network and some of the endpoints are heavily used. This problem can be minimized by using a switched network and assigning endpoints (such as CMS) to a separate LAN/WAN segment.

IP Softphone Problem Solving

Codecs used with Netmeeting

Voice quality for the road-warrior application of DEFINITY IP softphone will vary depending on several factors. Poor voice quality can be caused by the use of the high-compression codecs (G.723 or G.729) in situations where the low-compression codec (G.711) should be used. This can happen unexpectedly when using NetMeeting — when the G.711 is set as the preferred codec on the switch, NetMeeting may fail to use it. Since there is no way to monitor which codec is being used, the only way to determine that this is the problem is to disable all but the G.711 codecs. Then, if calls no longer work, it can be concluded that NetMeeting is failing to use the G.711. The solution to this problem is to reinstall NetMeeting.

Telecommuter use of phone lines

The telecommuter application of the IP Softphone requires the use of two phone lines: one for the IP connection to DEFINITY, which is used for softphone registration and call signaling, and the other for a PSTN connection, which DEFINITY uses as a callback number to establish the voice path. How you allocate your phone lines to these two functions may make a difference.

For example, assume that you have telephone services provided by the local phone company, such as voice mail, associated with one of your lines and not the other. In this case, you should use the line with the services to make the initial IP connection to register the softphone and use the line without the services as the POTS callback for the voice path. Otherwise, there could be undesirable interactions between the softphone and the local services. For example, if your telecommuter application is registered and you were using your POTS callback line for a personal call when a business associate dialed your work extension, the business associate would hear your home voice mail message.

NetMeeting drops unanswered calls

For calls made to a NetMeeting softphone, if the call is not answered or if coverage is not administered, after about 5 rings NetMeeting drops the call and the station stops ringing but the caller continues to hear ringback. To avoid this situation, make sure that coverage is administered for the NetMeeting softphone.

NetMeeting ignores out-of-band tones

NetMeeting ignores any H.323 digits received out-of-band, so it never hears DTMF from DEFINITY, which always strips DTMF from the audio path and plays it out-of-band with H.323.

For example, if you are on a call on a NetMeeting softphone and the calling party presses a number or character on their keypad, you will not hear the tone.

3 C-LAN Administration

This chapter describes how to administer TCP/IP data connections between DEFINITY ECS switches using the C-LAN circuit pack. This chapter does not cover the use of the IP Interface circuit pack for H.323 connectivity.

Overview

This chapter provides an update of the R7 administration procedures, which were described in Chapter 2, "DCS Administration," of issue 1 of this book. The R8 changes described in this chapter are:

- R8 administration procedures using the changed ethernet Data Module screen and the new IP Interfaces screen

- use of IP Routes, which, in some cases, are not needed in R8 when they were needed in R7

- additional procedures for administering CMS and Intuity AUDIX

TCP/IP connections (ppp or ethernet) require DEFINITY ECS Release 7 or later hardware and software. ISDN and BX.25 connections are supported on switches upgrading to R8 and pre-R7 switches can be connected to R8 switches via ISDN or BX.25. However, new systems are not sold with X.25 connections. Therefore, all switches in the configuration are assumed to be upgraded to release R7 or later.

Supported Switches and Adjuncts

Csi-model switches cannot have X.25 connections. New R8si and R8r switches cannot have new X.25 connections but pre-R7 switches with X.25 connections can be upgraded to R8 and keep the X.25 connections.

The vs model of DEFINITY ECS cannot be upgraded to R8 — R6.3 is the last release supported for the vs model. However, pre-R7 releases of the vs model will be supported (via X.25 and ISDN, not TCP/IP) in customer networks that include R8 versions of the csi, si, and r models.

The call management system (CMS) and Intuity adjuncts can be connected to the DEFINITY ECS R8csi with an ethernet connection and to the si and r models with either an ethernet or Bx.25 connection. Procedures for administering these connections are not covered in this book. They are documented in *CentreVu CMS Switch Connections and Administration* (585-215-876) for CMS and in *Intuity Messaging Solutions, LAN Integration with DEFINITY ECS* (585-313-602) for Intuity. CMS administration is covered in *Centre CMS Software Installation and Setup*, 585-215-866.

Checklist for Prerequisite Administration

This is a checklist of things that need to be completed before you can proceed with the network administration tasks. Review this checklist before starting the administration tasks.

✔	**Checklist Item**
	The prerequisite administration needed depends on whether the system is new or is being upgraded from an R7 or pre-R7 system to R8. Use the following map to determine which steps to perform. For more information about the checklist items, refer to Appendix A or the appropriate upgrades book in "References", page 56.
	UPGRADES ONLY: Steps 1–6 apply only to systems being upgraded to R8 from an R7 or pre-R7 release. For new systems, skip to step 7.
	1 Save translations on customer flash card (csi or si models) or tape (r model). For R7 systems, skip to step 5.

	2 This step is for the *si model only.* It preserves ISDN-PRI connections, which (for R7 and later) are carried on the NetPkt circuit pack instead of the PI or PACCON circuit packs. ISDN-PRI connections are preserved transparently on the csi and r models.
	
	If:
	
	the si switch has existing ISDN-PRI connections that the customer wants to keep, complete the following steps:
	
	  ~ De-administer the ISDN-PRI connections:
	    • busy the ISDN links
	    • remove comm-interface links of type ISDN
	    • remove comm-interface processor channels that use ISDN links
	    • remove data modules using those links
	  ~ Save translations on a "working" flash card
	
	Otherwise:
	
	  skip to step 3.

	1 of 3

✔	**Checklist Item**
	3 Remove old circuit packs: ~ Turn off the power. ~ For the *csi model*, remove the Processor (TN798) circuit pack (*Don't* remove the processor circuit pack if it is a TN798B). ~ For the *si model*, remove the Processor (TN790), PACCON (TN778), and NETCON (TN777) circuit packs. If there are X.25 connections that the customer wants to keep, leave the PI (TN765) circuit pack in the switch; otherwise remove it. ~ For the *r model*, if there are X.25 connections that the customer wants to keep, leave the PGATE (TN755) circuit pack in the switch; otherwise, remove it.
	4 Install new circuit packs on all switches upgrading from a pre-R7 software load to R8: ~ For *csi models*: install the TN798B (processor) and TN799B (C-LAN) circuit packs. ~ For *si models*: install the TN790B (processor), TN794 (NetPkt), and TN799B (C-LAN) circuit packs. For any PPN or EPN that will be carrying packet data, replace the TN776 (Expansion Interface) with the TN570B or TN570C circuit pack. ~ For *r models*: install TN799B (C-LAN.) The C-LAN circuit pack is required for TCP/IP (ppp and ethernet) connections. In all cases, the R8 software will run without the TN799B (C-LAN) circuit pack; all other new circuit packs are required for R8.
	5 Install the R8.1 Software on all switches upgrading to R8.1
	6 Copy translations from translations flash card or tape (G3r). Use the "working" flash card if step **3** was performed.
NEW and UPGRADE Systems — the following items apply to both new systems and systems being upgraded to R8 from a previous release. For more information about the checklist item, refer to the appropriate installation book in "References", .
	7 Established physical connections at each node.
	8 Set software version on the System Parameters Customer Options form.
	General Administration for new installations — the following translations should already be in place for existing systems and usually should not need to be changed for an upgrade to R8 unless new nodes are being added to the network. Refer to appendix A for more information about these tasks.
	9 DS1 circuit packs administered

2 of 3

✔	**Checklist Item**
	10 Signaling group administered
	~ page 1 — Trunk board address and Interface ID
	~ Page 2 — Administered NCA TSC assignment
	11 Synchronization plan administered
	12 Trunk groups assigned
	13 Dial plan administered
	14 Uniform dial plan administered
	15 AAR analysis administered
	16 Route pattern administered
	17 Hunt groups assigned
	3 of 3

Configurations

The task descriptions are presented in six relatively simple configurations. Each configuration describes how to administer either a 2-switch connection or a 3-switch gateway connection. The procedures for administering these configurations can be used either individually or in groups as "building blocks" for constructing most networks involving DEFINITY ECS R8 and pre-R7 switches.

The following table lists the configurations described in this chapter.

Config-uration	Switch 2	Connection 1	Switch 1	Connection 2	Switch 3	Page
1	R7si	ppp	R7r			page 60
2	R7csi	ethernet	R7r (+CMS)			page 73
3	si	bx.25	R7r	ethernet	R7si	page 99
4	csi	isdn	R7si	ppp	R7csi	page 124
5A	R7csi	ppp	R7r	ethernet	R7si	page 146
5B	R7csi	ppp	R7r (2 C-LAN boards)	ethernet	R7si	page 171

The first 2 configurations are simple 2-switch networks. The next two are 3-switch networks with Switch 1 serving as a gateway between different signaling types for connection 1 and connection 2. The last two configurations are ppp–ethernet networks; 5B, is the same as 5A except the Switch 1 has two C-LAN boards instead of one.

TCP/IP connections (ppp or ethernet) require DEFINITY ECS Release 7 or later hardware and software. ISDN and BX.25 connections are supported on switches upgrading to R8 and pre-R7 switches can be connected to R8 switches via ISDN or BX.25. However, new systems will not be sold with X.25 connections. Therefore, all switches in the five configurations are assumed to be upgraded to release R7 or later except the si connected via BX.25 and the csi connected via ISDN in configurations 3 and 4 — these 2 switches could be either R7 or pre-R7 versions.

Organization of this chapter

The descriptions of the configurations have a common format. Each configuration section has the following subsections:

- Configuration overview

- Task summary

- Checklist of prerequisite tasks

- Configuration diagram

- Administration tasks

The subsections are described below.

Configuration Overview Each of the configuration sections begins with a brief description of the network represented by the configuration. This section includes a high-level diagram and a description of the switches and their connections for each node in the network.

Task Summary Lists the tasks that need to be performed to administer this configuration.

1 Review checklist

2 Assign node names

3 Assign links

4 Assign processor channels

Procedures for completing each of these tasks are described in detail following this summary.

Configuration Diagram A detailed diagram of the configuration is shown after the task summary. The diagram is in two parts — one part showing the software-defined connections and the other part showing the hardware connections. The diagram shows many of the parameters that are entered on the administration screens

In the hardware part of the diagram, the paths for voice and signaling data are shown by dashed or dotted lines. The data for voice and call-setup signaling usually takes a different path through the switch hardware from the path for DCS and ISDN signaling data. These two types of data are distinguished in the hardware part of the diagram by the following convention.

A dashed line, "_ _ _ _ _ _", indicates voice and call-setup data.

A dotted line, " · · · · · · · · · · · · ", indicates DCS signaling data.

In the software part of the diagram, the virtual path from processor to processor between two nodes is traced by dashed lines. The path starts at a processor channel on one node, through the link/interface-channels on each node, to the processor channel on the connected node.

Administration tasks

This section gives the detailed steps for administering the connections between switches. For each configuration, there are several tasks and each task consists of several steps. All of the tasks needed to administer all the nodes in the network are included in each configuration.

The administration task sections list the steps for completing a screen (or "form") and show a representation of the filled-in screen. Many of the field values shown in the screens are examples — you will use different values that are appropriate for your system. Information about the fields and their values — when and why different values are used — is given for each screen. More detailed information about the screens and their fields is given in Appendix A.

Supported Switches and Adjuncts

Csi-model switches cannot have X.25 connections. New R8si and R8r switches cannot have new X.25 connections but pre-R7 switches with X.25 connections can be upgraded to R8 and keep the X.25 connections.

The vs model of DEFINITY ECS cannot be upgraded to R8 — R6.3 is the last release supported for the vs model. However, pre-R7 releases of the vs model will be supported (via X.25 and ISDN, not TCP/IP) in customer networks that include R8 versions of the csi, si, and r models.

The call management system (CMS) and Intuity adjuncts can be connected to the DEFINITY ECS R7csi with an ethernet connection and to the si and r models with either an ethernet or Bx.25 connection. Procedures for administering these connections are not covered in this book. They are documented in *CentreVu CMS Switch Connections and Administration* (585-215-876) for CMS and in *Intuity Messaging Solutions, LAN Integration with DEFINITY ECS* (585-313-602) for Intuity. CMS administration is covered in *Centre CMS Software Installation and Setup*, 585-215-866.

Intuity AUDIX LAN Setup Summary

The following list summarizes the steps for setting up an Intuity AUDIX on a LAN.

1 Assign node name and IP address

2 Assign UNIX machine name, IP address, configure LAN card.

   "Networking Administration, TCP/IP Administration"

3 Assign country and switch type

   "Switch Interface Administration, Switch Selection"

4 Assign extension length, Host Switch Number (switch node from dial plan), Audix Number, Switch Number IP address of the switch, and TCP Port.

   "Switch Interface Administration, Call Data Interface Administration, Switch Link Administration."

5 Reboot the Intuity AUDIX

   "Customer/Services Administration, System management, System Control, Shutdown System."

6 Set up the DCS Network Time Zones

7 "Audix Administration, change switch-time-zone."

CMS LAN Setup Summary

The following list summarizes the steps for setting up a CMS server.

1 Edit the /etc/hosts file to add switch names and IP addresses

2 Set up a second NIC

3 Add a default router

4 Set up the local/remote port

5 Choose between x.25 and TCP/IP signaling

6 For X.25, define which physical port is used on CMS

7 For TCP/IP, assign the switch host name or IP address and TCP port number

Configuration 1: R8r <—ppp—> R8si

Configuration 1 is a ppp connection between a DEFINITY ECS R8r and a DEFINITY ECS R8si switch in a DCS network.
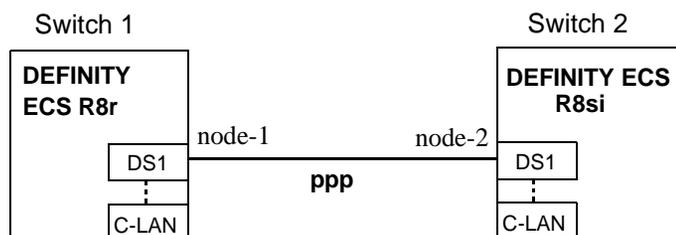
Task Summary

Complete the following tasks for Switch 1 and Switch 2:

1 Review prerequisite administration checklist

2 NODE 1 administration

   a Assign node names
   b Assign link (via a data module) to node-2
   c Assign processor channels

3 NODE 2 administration

   a Assign node names
   b Assign link to (via a data module) node-1
   c Assign processor channels

4 Enable links and processor channels

Prerequisite Administration

There are some system administration tasks that need to be completed before you can proceed with the connectivity administration described in this section.

Review the checklist of prerequisite administration tasks in Checklist for Prerequisite Administration (page 54), before proceeding with the connectivity administration in this section.

Configuration 1

cydfec1a EWS 052099

Switch 1 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network. This screen is administered on Switch 1. A Node Names screen must be administered on each switch in the network.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or from a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names screen — enter **ch node-n**

> Go to page 2 of the screen

```
change node-names                                            Page   2 of 6
                                   NODE NAMES

     Name                IP Address              Name              IP Address
default_____  0  .0  .0  .0___  _____   ___.___.___.___
node-1_____  192.168.10 .31___  _____   ___.___.___.___
node-2_____  192.168.10 .32___  _____   ___.___.___.___
_____  ___.___.___.___   _____   ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name	Enter unique node names for the following 2 nodes: • C-LAN PPP port on Switch 1 • C-LAN PPP port on Switch 2.
IP Address	The unique IP addresses of the nodes named in the previous field.

> Submit the screen

End

Switch 1 Task — Assign Link via ppp Data Module to Switch 2

This task administers a ppp data module on Switch 1 for the ppp connection to Switch 2. The data module defines a network interface — it associates a link number with a port address and node name for the C-LAN port on Switch 1. It also specifies the node name for the destination node, which is a C-LAN port on Switch 2.

Steps

Begin

> Open Data Module form — enter **ad da n**

```
add data-module next
                                                          Page 1 of x
                        DATA MODULE

     Data Extension: 2010            Name: _ppp on link 1 to node-2_    BCC: 2
               Type: ppp_____          COS: 1
               Port: 01b0115           COR: 1
               Link: 1_                 TN: 1
         Enable Link? n

         Node Name: node-1_____
        Subnet Mask: 255.255.255.0___

Establish Connection: y

DESTINATION
             Digits: 6113020_____
          Node Name: node-2_____
               CHAP? n
```

[The system assigns the extension 2010 to this data module. Instead of **n** (next) in the command line, you could specify any unused extension in the dial plan.]

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection (ppp).
Port:	In this example, the C-LAN circuit pack is in slot 01b01; the ppp connection is through port 15.
Link:	For G3r, the link number must be in the range 1 – 33, not previously assigned on this switch.
Enable Link?	If you need to add an IP route that uses this node as a gateway, this field must be set to **y** *before* adding the IP route. Otherwise leave this field set to **n** until the link administration is complete; that is, until after all data modules and the processor channels are assigned, then set to **y**.
Name:	Information-only; appears in list generated by the "list data module" command.
	1 of 2

Field	Conditions/Comments
COS	The values for these fields will be specified by the system administrator.
COR:	
TN:	
BCC:	Bearer Capability Class. This is a display-only field.
Node Name:	The node name for the interface (C-LAN port) defined by this data module. This must be a name previously entered on the Node Names screen.
Subnet Mask:	
Establish Connection?	**y** means that this switch will be responsible for the call setup for this connection. Enter **n** when administering the data module for Switch 2.
Destination Digits:	Trunk access code (611) plus extension of data module on node 2 (3020). If you use just the extension, then you must administer UDP and AAR route patterns to access the correct trunk group.
Destination Node Name:	Name of the node at the far end (Switch 2) of this connection. This must be a name entered on the Node Names screen (on both switches).
CHAP?	This field enables/disables the Challenge Handshake Authentication Protocol security mechanism on this link. If you enter **y**, another field will appear prompting for a CHAP secret (password).

2 of 2

> Submit the screen

End

Switch 1 Task — Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on Switch 1 and specifies the destination node and machine ID.

Steps

Begin

> Open the Processor Channel Assignment form — enter **ch com p**

```
change communications-interface processor-channels
                                                              Page 1 of X
                       PROCESSOR CHANNEL ASSIGNMENT

Proc                    Gtwy        Interface    Destination        Session      Mach
Chan Enable  Appl.   To  Mode   Link/Chan   Node          Port  Local/Remote  ID
  1:    n    _____      _     __  _____   _____    0____   ___   ___   __
  2:    n    _____      _     __  _____   _____    0____   ___   ___   __
  :
 12:    y    dcs_____      s     1   5003_   node-2____    0____   12_   21_   2_
  :
 64:    n    _____      _     __  _____   _____    0____   ___   ___   __
```

> Enter values for processor channel 12

Field	Conditions/Comments
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	node-1 is the "server" for this session. Set node-2 to "client" (**c**).
Interface Link	This must match the link number assigned on the node-1 data module screen in the previous task.
Interface Chan	For TCP/IP, interface channel numbers are in the range 5000 – 64500.
	The recommended values are: 5001 for CMS, 5002 for Intuity AUDIX, and 5003 for DCS connections that are not gateways. These three values should be reused for multiple instances of these applications; for example, if there are two Intuity AUDIX's, use 5002 for both; or if there are four DEFINITY ECS's, use 5003 for all four. The combination of Link, Interface Channel, and Mach ID must be unique.
	The recommended values for gateway switches is 6001–6099. The interface channel number must be unique for each gateway.
	This number must match the Destination Port number on the node-2 Processor Channel screen.

1 of 2

Field	Conditions/Comments
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen. For ppp connections, it must match the Destination Node Name entered on the ppp Data Module screen.
Destination Port	A value of **0** allows any available interface channel on the destination node to be used for this connection. The Interface Channel number for this connection on the Switch-2 Processor Channel screen must also be set to **0**.
Session - Local	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Session - Remote	
	It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	Destination switch ID identified on the dial plan of the destination switch (in the Local Node Number field).

2 of 2

>Submit the screen

End

Switch 2 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network. This screen is administered on Switch 2. A Node Names screen must be administered on each switch in the network.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or from a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names form — enter **ch node-n**

> Go to page 2 of the screen

```
change node names
                                                                  Page 2 of 6
                            NODE NAMES

    Name                  IP Address        Name                  IP Address
default_____     0  .0  .0  .0  _____     ___.___.___.___
node-1_____     192.168.10 .31  _____     ___.___.___.___
node-2_____     192.168.10 .32  _____     ___.___.___.___
_____     ___.___.___.___ _____     ___.___.___.___
_____     ___.___.___.___ _____     ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name	Enter unique node names for the following 2 nodes: • C-LAN PPP port on Switch 2 • C-LAN PPP port on Switch 1.
IP Address	The unique IP addresses of the nodes named in the previous field.

> Submit the screen

End

Switch 2 Task — Assign Link via ppp Data Module to Switch 1

This task administers a ppp data module on Switch 2 for the ppp connection to Switch 1. The data module defines a network interface — it associates a link number with a port address and node name for the C-LAN port on Switch 2. It also specifies the node name for the destination node, which is a C-LAN port on Switch 1.

Steps

Begin

>Open Data Module form — enter **ad da n**

```
add data-module next
                                                             Page 1 of x
                              DATA MODULE

    Data Extension: 3020                  Name: _ppp on link 3 to node-1___  BCC: 2
              Type: ppp_____                COS: 1
              Port: 01a1206                COR: 1
              Link: 3_                      TN: 1
       Enable Link? n

         Node Name: node-2_____
       Subnet Mask: 255.255.255.0___


Establish Connection: n

DESTINATION
            Digits: _____
         Node Name: node-1_____
             CHAP? n
```

[This data module is assigned the next available extension, 3020.]

>Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this link.
Port:	In this example, the C-LAN circuit pack is in slot 01a12; the ppp connection is through port 06.
Link:	The link number must be in the range 1 – 25, not previously assigned on this switch.
Enable Link?	If you need to add an IP route that uses this node as a gateway, this field must be set to **y** *before* adding the IP route. Otherwise leave this field set to **n** until the link administration is complete; that is, until after all data modules and the processor channels are assigned, then set to **y**.
Name:	Information-only; appears in list generated by the "list data module" command.
	1 of 2

Field	Conditions/Comments
COS	The values for these fields will be specified by the system administrator.
COR:	
TN:	
BCC:	This is a display-only field.
Node Name:	The node name for the interface (C-LAN port) defined by this data module. This must be a name entered on the Node Names screen.
Subnet Mask:	
Establish Connection?	**n** means that the switch at the remote end of this connection (Switch 1 in this case) will be responsible for the call setup. Enter **y** when administering the data module for Switch 1.
Destination Digits:	Not needed if the "Establish Connection?" field is set to **n**
Destination Node Name:	Name of the node at the far end (Switch 1) of this connection. Must be a name entered on the Node Names screen.
CHAP?	This field enables/disables the Challenge Handshake Authentication Protocol security mechanism on this link. If you enter **y**, the system will prompt for a CHAP secret (password).

2 of 2

>Press the ENTER/SAVE key to save and exit

End

Switch 2 Task — Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on Switch 2.

Steps

Begin

> Open the Processor Channel Assignment form — enter **ch com p**

```
change communications-interface processor-channels
                                                                Page 1 of X
                     PROCESSOR CHANNEL ASSIGNMENT

Proc                    Gtwy        Interface    Destination      Session        Mach
Chan Enable  Appl.   To  Mode   Link/Chan   Node          Port  Local/Remote   ID
  1:    n    _____      _     __  _____  _____   0____  ___   ___   __
  2:    n    _____      _     __  _____  _____   0____  ___   ___   __
  :
 21:    y    dcs____      c     3_  0____  node-1____   5003_  21_   12_   1_
  :
 64:    n    _____      _     __  _____  _____   0____  ___   ___   __
```

> Enter values

Field	Conditions/Comments
Processor Channel 21: (ppp connection to Switch 1)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-2 is the "client" for this session. Set node-1 to "server" (**s**).
Interface Link	This must match the link number on the node-2 data module screen in the previous task.
Interface Chan	A value of **0** allows any available interface channel to be used for this connection. The Destination Port number on the Switch-1 Processor Channel screen must also be set to **0**.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen. For ppp connections, it must match the Destination Node Name entered on the ppp Data Module screen.
Destination Port	This number must match the Interface Channel number assigned on the Switch-1 Processor Channel screen.
	1 of 2

Field	Conditions/Comments
Session - Local Session - Remote	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa. It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.

2 of 2

> Submit the screen

End

Enable links and processor channels

You must enable links and processor channels before the connections can be used.

To enable a link, open its data module screen (**ch da** [**ext**]) and set the Enable Link? field to **y**.

[note: to view a list of assigned data modules and their extensions, enter the "list data-module" command (**l da**)]

To enable the processor channels, open the processor channel screen (**ch com p**) and set the Enable field to **y** for each assigned processor channel.

Note: 1. You must disable a link or processor channel before you can change its parameters.

Note: 2. The **busy-out** command overrules the data module Enable Link? field.

Note: 3. On the C-LAN boards, low-level connectivity can remain intact when higher-level applications such as DCS are not functioning. For example, an external ping to a C-LAN's ethernet port could be successful even when the board is busied-out. When debugging connectivity problems, pinging only checks low-level connectivity.

Configuration 2: R7r (+CMS) <—ethernet—> R7csi

This configuration is a 10BaseT ethernet connection between a DEFINITY ECS R8r and a DEFINITY ECS R8csi switch in a DCS network, which includes routers between the switches. The R8r is connected to a CMS adjunct (the DEFINITY administration for Intuity AUDIX would be similar) via the LAN.
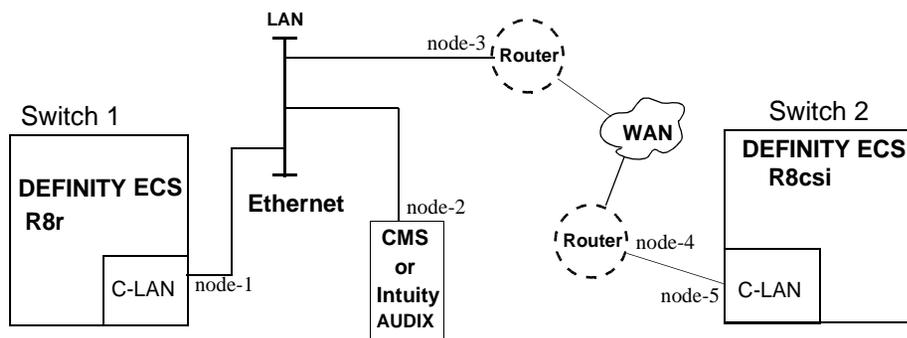
Note: This network has 5 IP nodes: 2 DCS nodes, 2 nodes on the router and one adjunct node. The router separates two subnets, so IP routes are needed from each switch to the nodes on the other side of the network.

Task Summary

The following tasks need to be completed for Switch 1 and Switch 2:

1 Review prerequisite administration checklist

2 Switch 1 administration

    a Assign node names
    b Assign IP Interfaces
    c Assign link (via a data module) to the LAN
    d Assign processor channels

3 Switch 2 administration

    a Enable bus bridge connectivity
    b Assign node names
    c Assign IP Interfaces
    d Assign link (via a data module) to the LAN
    e Assign IP routes
    f Assign processor channels

4 Intuity AUDIX administration

    a Administer the UNIX name and IP address
    b Administer the switch interface link
    c Administer extension numbers, channels, and services
    d Administer subscribers

5 CMS administration.

    See *CentreVu CMS Software Installation and Setup*, 585-215-866 and *CentreVu CMS Switch Connections and Administration*, 585-215-876 for details of CMS setup and administration. (For Intuity AUDIX connections, see *Intuity Messaging Solutions LAN Integration with DEFINITY ECS*, 585-313-602.)

6 Enable links and processor channels

Configuration 2

SWITCH 1

DEFINITY ECS R8r

Processor channels | Interface channels

software-defined connections

1	1
2	5000
•	5001
•	•
12	•
	•
	5003
•	•
•	•
384	64500

Link 2

SWITCH 2

DEFINITY ECS R8csi

Interface channels | Processor channels

1	1
5000	2
5001	•
•	•
•	21
x(any)	•
•	•
64500	256

Link 5

hardware connections

Processor UN331B

Processor bus

PktInt TN1655 | Network control UN332B | DS1 TN767/ TN464

Voice data

DS1 TN767/ TN464 | Processor TN798B

TDM bus

WAN

③ Router

④

⑤

TDM bus

C-LAN TN799

Ethernet data

①

②

Router

C-LAN TN799 | Bus bridge

Packet bus

LAN

CMS or Intuity AUDIX

Packet bus

| ① node-1 Ext 2377 loc 1co877 192.168.1.124 | ② node-2 192.168.1.125 | ③ node-3 192.168.1.97 | ④ node-4 192.168.1.39 | ⑤ Node-5 Ext 3201 loc 1a0517 192.168.1.51 |

cydfec2b KLC 101899

Switch 1 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network. This screen is administered on Switch 1. A Node Names screen must be administered on each switch in the network.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names form — enter **ch node-n**

> Go to page 2

```
change node names                                            Page 2 of 6
                             NODE NAMES

Name                IP Address          Name                IP Address
default_____ 0__.0__.0__.0__     _____  ___.___.___.___
node-1_____ 192.168.1__.124     _____  ___.___.___.___
node-2_____ 192.168.1__.125     _____  ___.___.___.___
node-3_____ 192.168.1__.97_     _____  ___.___.___.___
node-5_____ 192.168.1__.51_     _____  ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name:	Enter node names for the following 4 nodes: • *node-1*: C-LAN Ethernet port on Switch 1 • *node-2*: CMS node (for consistency, use the host name of the CMS computer assigned during the CMS setup procedure — see *CentreVu CMS Software Installation and Setup*, 585-215-866) • *node-3*: Interface on the router to the subnet of Switch 1. • *node-5*: C-LAN Ethernet port on Switch 2.
IP Address:	The unique IP addresses for the nodes named in the previous field. See the description of the Subnet Mask field in the next task for information on valid IP addresses.

> Submit the screen

End

Switch 1 Task — Assign IP Interfaces

The IP interface for each C-LAN and MedPro board on the switch must be defined on the IP Interfaces form. Each DEFINITY switch in an IP network has one IP Interfaces form.

Steps

Begin

> Open IP Interfaces form — enter **ch ip-i**

```
change ip-interfaces                                      Page   1 of    2

                            IP Interfaces

 Inter-region IP connectivity allowed?  n
Enable                                                                 Net
Eth Pt Type    Slot  Code Sfx Node Name      Subnet Mask     Gateway Addr   Rgn
   y   C-LAN   01c08 TN799 B  node-1         255.255.255.224 192.168.1_.97_  1
   n                                         255.255.255.0
   n                                         255.255.255.0
   n                                         255.255.255.0
```

> Enter values

Field	Conditions/Comments
Inter-region IP connectivity allowed?	Enter **y** to allow IP endpoints (phones and trunks) to use MedPro resources administered in regions that are different from the endpoints' regions.
Enable Eth Pt	The Ethernet port must be enabled (**y**) before it can be used. The port must be disabled (**n**) before changes can be made to its attributes on this screen.
Type	Enter c-lan or medpro.
Slot	Enter the slot location for the circuit pack.
Code	Display only. This field is automatically populated with TN799 for C-LAN or TN802 for MedPro.
Sfx	Display only. This field is automatically populated with B for the TN802 and TN799.
Node name	Enter the unique node name for the IP interface. The node name here must already be administered on the Node Names screen
	1 of 2

Field	Conditions/Comments
Subnet Mask	Enter the subnet mask associated with the IP address for this IP interface.
	The IP address for node-1, specified on the Node Names screen, is 192.168.1.124. The 192 in the first octet puts this address in the range of "Class C" addresses, which means the first 3 octets are used for the network ID and the fourth octet is used for host IDs.
	The subnet mask defines the network and host parts of the IP addresses. In the Subnet Mask for this example (192.168.1.224), the 224 in the fourth octet indicates that 3 high-order bits from the fourth octet are used to define subnets on the network 192.168.1 (224 = 128+64+32 = 11100000). The first 3 bits are used for subnet IDs and the last 5 bits are used for host IDs. Eight subnets can be defined with 3 bits and each subnet can have a maximum of 32 hosts, defined with the remaining 5 bits. Of these, only 6 subnets with 30 hosts each are usable.
	The usable IP addresses in the 6 subnets have the following ranges of values for the fourth octet: 33–62, 65–94, 97–126, 129–158, 161–190, and 193–222. The IP address for this (node-1) IP interface, 192.168.1.124, is on the third subnet because 124 lies in the range 97–126. Note that node 2 (adjunct, 192.168.1.125) and node 3 (router, 192.168.1.97) are both also on the third subnet. Node 4 (192.168.1.51) and node 5 (192.168.1.39) are both on the first subnet.
	The first and last IP addresses in each subnet are not usable as host addresses because they have all 0's or all 1's for host IDs. For example, in the third subnet, the fourth octet of the first IP address is 96 (= 011<u>00000</u>) and the fourth octet of the last IP address is 127 (= 011<u>11111</u>).
	The "network address" of a subnet is the first IP address (the all 0's host ID) of that subnet. In this example, the subnet addresses of the six subnets are — **1st:** 192.168.1.32 **2nd:** 192.168.1.64 **3rd:** 192.168.1.96 **4th:** 192.168.1.128 **5th:** 192.168.1.160 **6th:** 192.168.1.192.
	See Chapter 1 for more information on IP addresses and subnetting.
Gateway Addr	Enter the address of a network node that will serve as the default gateway for the IP interface.
Net Rgn	Enter the region number for this IP interface.

2 of 2

> Submit the screen

End

Switch 1 Task — Assign Link via ethernet Data Module to the LAN

This task administers an ethernet data module for the ethernet connection to the CMS adjunct and to Switch 2. The data module defines a network interface — it associates a link number with a port address and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **a da n**

```
add data-module next
                                                                  Page 1 of X
                              DATA MODULE

    Data Extension: 2377              Name: ethernet on link 2
              Type: ethernet
              Port: 01c0817
              Link: 2


Network uses 1's for broadcast addresses? y
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this link.
Port:	Ethernet connections must be assigned to port 17 on the C-LAN circuit pack.
Link:	The link number must be in the range 1 – 33 (for G3r), not previously assigned on this switch.
Name:	This field is information-only; it appears in lists generated by the "list data module" command.
Network uses 1's for broadcast addresses?	Leave the default (**y**) if the private network contains only DEFINITY switches and adjuncts. Set to **n** only if the network includes non-DEFINITY switches that use the 0's method of forming broadcast addresses. See Appendix A, "Data Module - type ethernet" for more information about this field.

> Submit the screen

End

Switch 1 Task — Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on the node 1 switch.

Steps

Begin

> Open the Processor Channel Assignment form — enter **ch com p**

```
change communications-interface processor-channels
                                                                    Page 1 of X
                      PROCESSOR CHANNEL ASSIGNMENT

Proc                    Gtwy         Interface     Destination        Session       Mach
Chan Enable  Appl.      To  Mode  Link/Chan    Node       Port  Local/Remote  ID
  1:    y     mis              s     2   5001    node-2      0      1     1      __
  2:    n     _____         _    __  _____   _____   0     ___   ___    __
  3:    n     _____         _    __  _____   _____   0     ___   ___    __
  4:    n     _____         _    __  _____   _____   0     ___   ___    __
  :
 12:    y     dcs              s     2   5003    node-5      0      12    21     2
  :
 64:    n     _____        _    __  _____               0     ___   ___    __
```

> Enter values

Field	Conditions/Comments
Processor Channel 1: (connection to CMS)	
Enable	Set to **y**.
Appl.	Enter **mis** for the CMS connection on Processor Channel 1.
Mode	Set the Mode to **s** ("server") on both switches for connections to CMS.
Interface Link	This must match the link number assigned on the node-1 data module screen.
Interface Chan	For TCP/IP, interface channel numbers are in the range 5000 – 64500.
	The recommended values are: 5001 for CMS, 5002 for Intuity AUDIX, and 5003 for DCS connections that are not gateways. These three values should be reused for multiple instances of these applications; for example, if there are two Intuity AUDIX's, use 5002 for both; or if there are four DEFINITY ECS's, use 5003 for all four. The combination of Link, Interface Channel, and Mach ID must be unique.
	The recommended values for gateway switches is 6001–6099. The interface channel number must be unique for each gateway.
	1 of 3

Field	Conditions/Comments
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.
Destination Port	A value of **0** allows any available interface channel on the destination node to be used for this connection. The Interface Channel number on the Switch-2 Processor Channel screen must also be set to **0**.
Session - Local Session - Remote	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa. It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	This field is not used for CMS.
Processor Channel 12: (ethernet connection to Switch 2)	
Enable	Set to **y**.
Appl.	Enter **dcs** for the DCS connection on Processor Channel 12.
Mode	Set the node-5 Mode field to **c** ("client") on the Processor Channel Assignment screen on Switch 2.
Interface Link	This must match the link number assigned on the node-1 data module screen.
Interface Chan	For TCP/IP, interface channel numbers are in the range 5000 – 64500. The recommended values are: 5001 for CMS, 5002 for Intuity AUDIX, and 5003 for DCS connections that are not gateways. These three values should be reused for multiple instances of these applications; for example, if there are two Intuity AUDIX's, use 5002 for both; or if there are four DEFINITY ECS's, use 5003 for all four. The combination of Link, Interface Channel, and Mach ID must be unique. The recommended values for gateway switches is 6001–6099. The interface channel number must be unique for each gateway.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.
Destination Port	A value of **0** allows any available interface channel on the destination node to be used for this connection. The Interface Channel number on the Switch-2 Processor Channel screen must also be set to **0**.

2 of 3

Field	Conditions/Comments
Session - Local Session - Remote	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa. It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	Destination switch ID. This is the Local Node Number on the dial plan of the destination switch.
	3 of 3

> Submit the screen

End

Switch 2 Task — Enable Bus Bridge Connectivity

This task enables the bus bridge functionality on the C-LAN circuit pack to provide a path between the packet bus and the processor.

Note: Bus Bridge Connectivity is used on the csi model only. This task may have been completed when the C-LAN circuit pack was installed.

Steps

Begin

> Open the Maintenance-Related System Parameters form — enter **ch sys ma**

> Go to page 2 and skip to the Packet Intf2? field near the bottom of the screen.

```
change system-parameters maintenance                          Page   2 of   3

                   MAINTENANCE-RELATED SYSTEM PARAMETERS

MINIMUM MAINTENANCE THRESHOLDS ( Before Notification )
        TTRs: 4          CPTRs: 1        Call Classifier Ports: 0
        MMIs: 0          VCs: 0

TERMINATING TRUNK TRANSMISSION TEST ( Extension )
   Test Type 100:          Test Type 102:          Test Type 105:

ISDN MAINTENANCE
   ISDN-PRI Test Call Extension:          ISDN-BRI Service SPID:

DS1 MAINTENANCE
   DS0 Loop-Around Test Call Extension:

LOSS PLAN ( Leave Blank if no Extra Loss is Required )
   Minimum Number of Parties in a Conference Before Adding Extra Loss:

SPE OPTIONAL BOARDS
                   Packet Intf1? y     Packet Intf2? y
        Bus Bridge: 01a05   Inter-Board Link Timeslots  Pt0: 6 Pt1: 1 Pt2: 1
```

> Enter values

Field	Conditions/Comments
Packet Intf2?	Enables the bus bridge.
Bus Bridge:	Location of the C-LAN circuit pack. If the system has two C-LANs, only one is administered for bus bridge.
Inter-Board Link Timeslots: Pt0, Pt1, Pt2	Specifies the bandwidth used on the 3 ports of the Inter-Board Link. The total number of timeslots assigned cannot exceed 11. Pt0 carries PPP traffic and can have 1–9 timeslots. Pt1 carries maintenance messages and can have 1–3 timeslots. Pt2 carries broadcast messages and can have 1–3 timeslots.

> Submit the screen

End

Switch 2 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network on the Node Names screen. This screen is administered on Switch 2. A Node Names screen must be administered on each switch in the network.

The node names and IP addresses in a network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names form — enter **ch node-n**

> Go to page 2

```
change node names                                          Page 2 of 6
                             NODE NAMES

Name                 IP Address          Name                 IP Address
default              0  .0  .0  .0       _____     ___.___.___.___
net-96               192.168.1  .96      _____     ___.___.___.___
node-1               192.168.1  .124     _____     ___.___.___.___
node-2               192.168.1  .125     _____     ___.___.___.___
node-4               192.168.1  .39      _____     ___.___.___.___
node-5               192.168.1  .51      _____     ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name:	Enter node names for the following 5 nodes: • *net-96*: the network address of the node-1 and node-2 subnet (this is described in the IP-Route task) • *node-1*: C-LAN Ethernet port on Switch 1 • *node-2*: CMS node (for consistency, use the host name of the CMS computer assigned during the CMS setup procedure — see *CentreVu CMS Software Installation and Setup*, 585-215-866) • *node-4*: Interface on the router to the subnet of Switch 2. • *node-5*: C-LAN Ethernet port on Switch 2.
IP Address:	The unique IP addresses of the nodes named in the previous field.

> Submit the screen

End

Switch 2 Task — Define IP Interfaces

The IP interface for each C-LAN and MedPro board on the switch must be defined on the IP Interfaces form. Each DEFINITY switch in an IP network has one IP Interfaces form.

Steps

Begin

> Open IP Interfaces form — enter `ch ip-i`

```
change ip-interfaces                                        Page   1 of   2

                           IP Interfaces

 Inter-region IP connectivity allowed?  n
Enable                                                                   Net
Eth Pt Type   Slot  Code Sfx Node Name      Subnet Mask     Gateway Addr Rgn
   y   C-LAN  01a05 TN799 B   node-5        255.255.255.224 ___.___.___.___ 1
   n                                        255.255.255.0
   n                                        255.255.255.0
   n                                        255.255.255.0
```

> Enter values

Field	Conditions/Comments
Inter-region IP connectivity allowed?	Enter **y** to allow IP endpoints (phones and trunks) to use MedPro resources administered in regions that are different from the endpoints' regions.
Enable Eth Pt	The Ethernet port must be enabled (**y**) before it can be used. The port must be disabled (**n**) before changes can be made to its attributes on this screen.
Type	Enter **c-lan**.
Slot	Enter the slot location for the circuit pack.
Code	Display only. This field is automatically populated with TN799 for C-LAN or TN802 for MedPro.
Sfx	Display only. This field is automatically populated with B for the TN802 and TN799.
Node name	Enter the unique node name for the IP interface. The node name here must already be administered on the Node Names screen
	1 of 2

Field	Conditions/Comments
Subnet Mask	Enter the subnet mask associated with the IP address for this IP interface. (The IP address is associated with the node name on the Node Names screen).
	Since the node-1 and node-5 IP interfaces are on the same network (192.168.1), they must be assigned the same subnet mask.
	In this example, the subnet mask 255.255.255.224 divides the network 192.168.10 into 6 (usable) subnets. This C-LAN IP Interface (node-5) is on the first subnet. See Switch 1 Task — Assign IP Interfaces (page 77) for an explanation of this subnet. See Subnetting (page 16) in Chapter 1 for a detailed description of subnetting.
Gateway Addr	Leaving this field blank adds a level of network security for this IP interface but requires that IP routes be administered to enable communication with nodes on different (sub)networks.
Net Rgn	Enter the region number for this IP interface.

2 of 2

Switch 2 Task— Assign Link via ethernet Data Module to the LAN

This task administers an ethernet data module on Switch 2 for the ethernet connection to Switch 1. The data module associates a link number with a port address, extension number, and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **ad da n**

```
add data next
                                                                Page 1 of X
                               DATA MODULE

    Data Extension: 3201               Name: ethernet on link 5
              Type: ethernet
              Port: 01a0517
              Link: 5


Network uses 1's for broadcast addresses? y
```

[This data module is assigned the next available extension, 3020.]

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this link.
Port:	Ethernet connections must be assigned to port 17 on the C-LAN circuit pack. In this example, the C-LAN circuit pack is in slot 1a05.
Link:	The link number must be in the range 1 – 25 (R8csi), not previously assigned on this switch.
Name:	Information-only; appears in list generated by the "list data module" command.
Network uses 1's for broadcast addresses?	Leave the default (**y**) if the private network contains only DEFINITY switches and adjuncts. Set to **n** only if the network includes non-DEFINITY switches that use the 0's method of forming broadcast addresses. See Appendix A, "Data Module - type ethernet" for more information about this field.

> Submit the screen

End

Switch 2 Task — Assign IP Route (to Switch 1)

This task specifies a route for packets sent by the node 5 IP interface (the ethernet port on the switch-2 C-LAN board) to the nodes 1 and 2. An IP route is required because node 5 is on a different subnetwork from nodes 1&2 (as defined in the Subnet Mask field on the IP Interfaces screen), *and* the Gateway Address field for node 5 on the IP Interfaces screen was left blank.

The Destination Node will be set to "net-96", which is associated with the network IP address of 192.168.1.96 on the Node Names screen. This will enable node 5 to communicate with any node on the 192.168.1.96 subnetwork.

Steps

Begin

> Open the IP Routing form — enter **a ip n**

```
add ip-route next                              Page   1 of   1
                         IP ROUTING


      Route Number: 2
   Destination Node: net-96
            Gateway: node-4
         C-LAN Board: 1c05
              Metric: 0
```

[The system assigns the route number 2.]

> Enter values

Field	Conditions/Comments
Destination Node:	The name of the node at the destination of this route. In this case, net-96 is associated with IP address 192.168.1.96 on the Node Names screen. This is the network IP address of the subnet that nodes 1 and 2 are on. See the description of the Subnet Mask field in Switch 1 Task — Assign IP Interfaces (page 77).
Gateway:	Node name of the IP-route gateway by which the destination node is reached for this route. In this case, it is the node name of the router port.
C-LAN Board:	The location of the C-LAN circuit pack that provides the interface for this route.
Metric:	Enter **0**. See IP Routing (page 251) in Appendix A for more information on the use of the Metric field.

> Submit the screen

End

Note: We could have defined 2 individual IP routes, one each to node-1 and node-2, instead of this IP route. However, the network route is easier because we need only one. The network route enables packets to get to *any* IP address on the 192.168.1.96 subnet (that is, addresses 192.168.1.97 through 192.168.1.126), so no other IP routes are needed.

No IP routes were needed on Switch-1 because a gateway address was assigned to the C-LAN on the IP Interfaces screen. IP routes are needed in only two cases: when a gateway address is not assigned for an ethernet interface, and when there are intermediate nodes between the endpoints of a ppp connection.

Switch 2 Task— Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on Switch 2.

Steps

Begin

> Open the Processor Channel Assignment form — enter **ch com p**

```
change communications-interface processor-channels
                                                                 Page 1 of X
                    PROCESSOR CHANNEL ASSIGNMENT

Proc                    Gtwy        Interface    Destination      Session      Mach
Chan Enable  Appl.      To  Mode    Link/Chan    Node       Port  Local/Remote  ID
  1:    y    mis              s      5   5001    node-2      0     1    1        __
  2:    n    _____          _      __  _____   _____  0     __   __       __
  3:    n    _____          _      __  _____   _____  0     __   __       __
  4:    n    _____          _      __  _____   _____  0     __   __       __
  :
 21:    y    dcs              c      5   0       node-1      5003  21   12       1
  :
 64:    n    _____          _      __  _____   _____  0     __   __       __
```

> Enter values

Field	Conditions/Comments
Processor Channel 1: (connection to CMS)	
Enable	Set to **y**.
Appl.	Enter **mis** for the CMS connection on Processor Channel 1.
Mode	Set the Mode to **s** ("server") on both switches for connections to CMS.
Interface Link	This must match the link number assigned on the node-5 data module screen on this switch.
Interface Chan	For TCP/IP, interface channel numbers are in the range 5000 – 64500.
	The recommended values are: 5001 for CMS, 5002 for Intuity AUDIX, and 5003 for DCS connections that are not gateways. These three values should be reused for multiple instances of these applications; for example, if there are two Intuity AUDIX's, use 5002 for both; or if there are four DEFINITY ECS's, use 5003 for all four. The combination of Link, Interface Channel, and Mach ID must be unique.
	The recommended values for gateway switches is 6001–6099. The interface channel number must be unique for each gateway.
	1 of 3

Field	Conditions/Comments
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.
Destination Port	A value of **0** allows any available interface channel on the destination node to be used for this connection. The Interface Channel number on the Switch-2 Processor Channel screen must also be set to **0**.
Session - Local Session - Remote	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa. It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	This field is not used for CMS.
Processor Channel 21: (ethernet connection to Switch 1)	
Enable	Set to **y**.
Appl.	**dcs** indicates that this connection will carry DCS data.
Mode	Node-5 will be the "client" on this session. Set node-1 (on Switch 1) to "server" (**s**).
Interface Link	This must match the link number assigned on the node-5 data module screen.
Interface Chan	A value of **0** allows any available interface channel to be used for this connection. The Destination Port number on the Switch-1 Processor Channel screen must also be set to **0**.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.
Destination Port	This number must match the Interface Channel number assigned on the Switch-1 Processor Channel screen.

2 of 3

Field	Conditions/Comments
Session - Local Session - Remote	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa. It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	Destination switch ID. This is the Local Node Number on the dial plan of the destination switch.

3 of 3

> Submit the screen

End

Intuity System Administration

Procedure Overview   The following is a checklist of procedures that must be completed to administer a DEFINITY ECS with a TCP/IP connection to a Lucent Intuity system. The DEFINITY administration procedures are described in *DEFINITY ECS Administrator's Guide*, 555-233-502 and in previous sections of this chapter. The Intuity system administration procedures are describe following the checklist.

For a complete description of the administration procedures for connecting an Intuity system to a DEFINTIY ECS, see *Intuity Messaging Solutions — Using a LAN to Integrate with DEFINTIY ECS*, 585-313-602 for Intuity R4.4 or 585-313-604 for Intuity R5.

DEFINITY ECS administration

The following procedures must be done on the host switch:

- Administer the local node number in the dial plan.

- Administer the Intuity system voice ports as stations, including Class of Restriction (COR) and Class of Service (COS).

- If the switch is a *csi* model, assign the bus bridge.

- Assign node names for the Intuity system and the switch.

- Administer a hunt group, and add the Intuity system voice ports to that hunt group.

- Add an ethernet data module.

- Administer a processor channel for the link from the switch to the Intuity system.

- Enable the link on the ethernet data module.

- Set up a coverage path for access to the voice port hunt group.

- Apply the coverage path to stations, and if the switch is an *r* model, specify the node name of the Intuity system for each station that has a voice mailbox on the Intuity system.

Intuity system administration

The following procedures must be done on the Intuity system:

- Administer the UNIX name and IP address for the Intuity system.

- Administer the switch interface link to the host switch. This includes the Extension Length, Host Switch Number, AUDIX Number, Switch Number, Switch IP Address, and TCP Port.

- Administer extension numbers, channels, and services.

- Administer subscribers.

Administer the TCP/IP Network Addressing

Do the following procedures to administer the Intuity system.

If not already done, you must set up the basic networking addressing for the Intuity system. Do the following:

1 Beginning at the Lucent INTUITY Main menu, select:

> > TCP/IP Administration
>
> > > Network Addressing

The system responds with the Network Addressing window.

```
+-------------------------------------------------------+
+                   Network Addressing              +
+-------------------------------------------------------+
|           TCP/IP Interface: eeE_0                     |
|                 Host Name: denaudix                   |
|                IP Address: 192.168.1.125              |
|               Subnet Mask: 192.168.1.224              |
|   Default Gateway IP Address: 192.168.1.97            |
+-------------------------------------------------------+
```

2 Use Worksheet A to enter the correct values in this window.

3 Press **F3** (Save).

4 Continue with the next procedure, "Administer Switch Interface."

Administer the Switch Interface	You must now administer the switch interface. Do the following.

1 Starting at the Lucent INTUITY Main menu, select:

> Switch Interface Administration

> Call Data Interface Administration

> Switch Link Administration
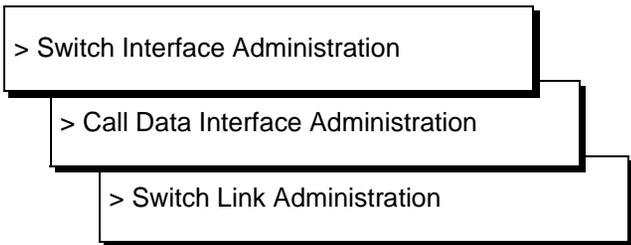
The system responds with the Switch Interface Administration window.

```
+---------------------------------------------------------------------------+
+                      Switch Interface Administration                      +
+---------------------------------------------------------------------------+
|  Switch Link Type: LAN                       Country: UNITED STATES       |
|  Extension Length: 4                         Switch: DEFINITY OVERLAN     |
|  Host Switch Number: 1                                                    |
|  AUDIX Number: 1                                                          |
|                                                                           |
| Switch     IP Address/      TCP      Switch     IP Address/      TCP      |
| Number     Host Name        Port     Number     Host Name        Port     |
|   1        192.168.1.124    5002                                          |
|                                                                           |
|                                                                           |
|                                                                           |
|                                                                           |
```

2 Use Worksheet B to enter the correct values in this window.

3 Press **F3** (Save).

4 Continue with the next procedure, "Administer Extension Numbers, Channels, and Services."

Administer Extension Numbers, Channels, and Services	To associate the switch voice ports, you must do the following on the Intuity system:

• Map channels to switch extensions

• Map services to channels

• Assign services to called numbers.

For more information on this, see "Administering Channels" in the *Lucent INTUITY Messaging Solutions Release 5* documentation.

Continue with the next procedure, "Administer Subscribers."

Administer Subscribers

Subscribers must be administered on the Intuity system. For more information on this, see the *Lucent INTUITY Messaging Solutions Release 5* documentation. The following screens show examples of subscriber screens on the Intuity system.

```
add subscriber 3066                                           Page 1 of 2
                             SUBSCRIBER

         Name: Jean Collins                           Locked? n
    Extension: 150                                    Password:
          COS: class00                           Miscellaneous:
Switch Number: 1                          Covering Extension: 161
 Community ID: 1                             Broadcast Mailbox? n
Secondary Ext:
 Account Code:
```

```
add subscriber 3066                                           Page 2 of 2
                SUBSCRIBER CLASS OF SERVICE PARAMETERS

Addressing Format: extension            Login Announcement Set: System
System Multilingual is ON         Call Answer Primary Annc. Set: System
Call Answer Language Choice? n  Call Answer Secondary Annc. Set: System

PERMISSIONS
       Type: call-answer    Announcement Control? y          Outcalling? n
       Priority Messages? n          Broadcast: none      IMAPI Access? y
 IMAPI Message Transfer? n       Fax Creation? n  Trusted Server Access? y

INCOMING MAILBOX          Order: fifo          Category Order: nuo
  Retention Times (days),   New: 10      Old: 10          Unopened: 10
OUTGOING MAILBOX          Order: fifo          Category Order: unfda
Retention Times(days), File Cab: 10      Delivered/Nondeliverable: 5

Voice Mail Message (seconds),  Maximum Length: 300  Minimum Needed: 32
Call Answer Message (seconds), Maximum Length: 120  Minimum Needed: 8
       End of Message Warning Time (seconds):
         Maximum Mailing Lists: 25    Total Entries in all Lists: 250
Mailbox Size (seconds), Maximum: 3600            Minimum Guarantee: 0
```

Worksheet A: Names and IP Addresses for Lucent Intuity System

Complete the information on this worksheet to collect information required to administer the Lucent INTUITY system for integration with the switch.

Field	Recommended	Your Entry
Intuity System TCP/IP Administration Screen (TCP/IP Administration, Network Addressing or Networking Administration, TCP/IP Administration)		
TCP/IP Interface	**eeE_0**	
Host Name (called UNIX Machine Name on R4.4) This information may already be administered. If not, enter the UNIX name for this machine. The name is case-sensitive.	**denaudix**	
IP Address IP address administered on the Lucent Intuity system	**192.168.1.125**	
Subnet Mask	**192.168.1.224**	
Default Gateway IP Address	192.168.1.97	

Worksheet B: LAN Data for the Lucent Intuity System

Complete the information on this worksheet to administer the Lucent INTUITY system for integration with the switch.

Field	Recommended	Your Entry
Lucent INTUITY System Switch Interface Administration Window		
Extension Length Use the extension length from the switch dial plan	4	
Host Switch Number Use **1** if the integration supports only one DEFINITY switch. If more than one DEFINITY system will be supported, use the number administered on the Local Node Number field in the host switch dial plan.	1	
AUDIX Number The number assigned to the Lucent INTUITY system on the DEFINITY ECS. For *r*-model switches, a number from **1** to **8**; for *csi* and *si*, **1**. This must match the Machine-ID field of the Processor Channels screen.	1	
Switch Number Enter the node number of the switch being administered. If there is only one switch, the value must be **1**. This must match the Local Node Number field in the switch dial plan.	1	
IP Address/Host Name Enter the IP address for the switch being administered.	192.168.1.124	
TCP Port Enter a TCP port number for each Intuity AUDIX for each switch being administered. This must match the Interface Channel field of the Processor Channels screen. You should use **5002** for every switch linked over the LAN in a DCS network. Use the numbers **6001-6999** for gateway TCP links to remote switches in a DCS network.	5002	

Enable links and processor channels

You must enable links and processor channels before the connections can be used.

To enable a link, open its data module screen (**ch da** [**ext**]) and set the Enable Link? field to **y**.

[note: to view a list of assigned data modules and their extensions, enter the "list data-module" command (**l da**)]

To enable the processor channels, open the processor channel screen (**ch com p**) and set the Enable field to **y** for each assigned processor channel.

Note: 1. You must disable a link or processor channel before you can change its parameters.

Note: 2. The **busy-out** command overrules the data module Enable Link? field.

Note: 3. On the C-LAN boards, low-level connectivity can remain intact when higher-level applications such as DCS are not functioning. For example, an external ping to a C-LAN's ethernet port could be successful even when the board is busied-out. When debugging connectivity problems, pinging only checks low-level connectivity.

Configuration 3: R8si<—x.25 —> R8r Gateway <—ethernet—> R8si

In this configuration, a DEFINITY ECS R8r acts as a gateway between two other nodes — one connected via X.25 to an R8si and the other via ethernet to another R8si.
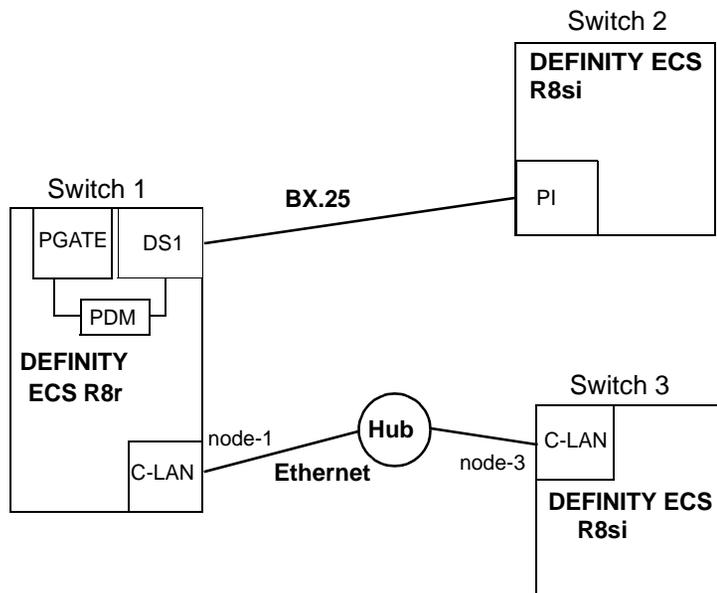
Task Summary

The following tasks need to be completed for Switch 1, Switch 2, and Switch 3:

1 Review checklist

2 Switch 1 administration

    a Assign node names
    b Assign pdm data module
    c Assign IP Interfaces
    d Assign link (via an x.25 data module) to Switch 2
    e Assign link (via an ethernet data module) to the LAN
    f Assign processor channels

3 Switch 2 administration

    a Assign link (via a proc-intf data module) to node 1
    b Assign processor channels

4 Switch 3 administration

    a Assign node names
    b Assign IP Interfaces
    c Assign link (via an ethernet data module) to the LAN
    d Assign processor channels

5 Enable links and processor channels

Prerequisite Administration

There are some system administration tasks that need to be completed before you can proceed with the connectivity administration described in this section.

Review the checklist of prerequisite administration tasks in Checklist for Prerequisite Administration (page 54), before proceeding with the connectivity administration in this section.

Configuration 3

Switch 1 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network. This screen is administered on Switch 1. A Node Names screen must be administered on each switch in the network.

A *node* is defined as any of the following — a C-LAN port, a bridge or router, a CMS ethernet port, or an Intuity AUDIX or other MSA network interface card. The Audix and MSA node name and IP address must be entered on page 1 of the screen. The data for all other node types must be entered on pages 2–6.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or from a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names form — enter **ch node-n**

> Go to page 2.

```
change node-names
                                                                Page 2 of 6
                                NODE NAMES

     Name                IP Address      Name                IP Address
  default_____    0__.0__.0__.0__    _____    ____.____.____.____
  node-1_____    192.168.10_.1__    _____    ____.____.____.____
  node-3_____    192.168.10_.3__    _____    ____.____.____.____
  _____ _   ____.____.____.____    _____    ____.____.____.____
```

> Enter values.

Field	Conditions/Comments
Name	Enter unique node names for the following 2 nodes: • C-LAN Ethernet port on Switch 1 • C-LAN Ethernet port on Switch 3.
IP Address	The unique IP addresses of the nodes named in the previous field.

> Submit the screen

End

Switch 1 Task — Assign pdm Data Module

This task administers a pdm data module for the connection between the PGATE board and the DS1 board for the connection to node-2. The data module associates a link number with a port address and extension number for the PGATE port used for this connection.

Steps

Begin

> Open the Data Module form — enter **a da n**

```
add data-module next                                              Page 1 of 2

                            Data Module

    Data Extension: 30          Name: pdm on port 1c0102              BCC:
              Type: pdm          COS: 1            Remote Loop-Around Test? n
              Port: 01C0102      COR: 1              Secondary data module? n
               ITC: restricted    TN: 1                     Connected to: dte

ABBREVIATED DIALING
  List1: ___

SPECIAL DIALING OPTION:

ASSIGNED MEMBER (Station with a data extension button for this data module)
          Ext      Name
      1: 1002      station name
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection.
Port:	This example means that the PGATE circuit pack is in slot 01c01 and link 5 uses port 02.
ITC:	Enter **restricted**. (**unrestricted** is used only for wideband transmission.)
Name:	Information-only; appears in list generated by the "list data module" command.
COS:	The values for these fields will be specified by the system administrator.
COR:	
TN:	
Remote Loop-Around Test?	Set to **n** unless testing.
	1 of 2

Field	Conditions/Comments
Secondary data modules?	Enter **n**.
Connected To	Enter **dte**.
Keep the default values for the rest of the fields.	
	2 of 2

Switch 1 Task — Assign Link via x.25 Data Module to Switch 2

This task administers an x.25 data module for the connection to node 2. The data module associates a link number with a port address and extension number for the PGATE port used for this connection.

Steps

Begin

> If a PGATE circuit pack is not already administered in slot 1c01, insert the circuit pack in the slot and enter **add pgate 1c01**, then fill in the PGATE screen.

>Open the Data Module form — enter **a da n**

```
add data-module next
                                                              Page 1 of 2
                              DATA MODULE

Data Extension: 2102                    Name: x.25 on link 5 to sw-2
         Type: x.25        COS: 1       Remote Loop-Around Test? n
         Port: 01C0102     COR: 1           Destination Number: external
    Baud Rate: 9600        TN: 1        Establish Connection? y
 Endpoint Type: adjunct    DTE/DCE: dte      Connected Data Module: 4121
         Link: 5    Enable Link? n                 Error Logging? n



 Permanent Virtual Circuit? y        Highest PVC Logical Channel: 64
  Switched Virtual Circuit? n
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection.
Port:	This example means that the PGATE circuit pack is in slot 01c01 and link 5 uses port 02.
Baud Rate:	Set to **9600** for DCS connections to vs or si models, or to an r model with an external 9600 baud data line.
	Set to **switched** for r-to-r connections with common channel signaling on DS1 trunks.
	Set to 9600 for connections to Intuity AUDIX.
	Set to either **9600** or **19200** for CMS, depending on the physical connectivity.
Endpoint Type:	For DCS, CMS, or Intuity AUDIX, set this field to **adjunct**.
Link:	The link number must be in the range 1 – 33 (for R8r), not previously assigned on this switch.
	1 of 2

Field	Conditions/Comments
Name:	Information-only; appears in list generated by the "list data module" command.
COS:	The values for these fields will be specified by the system administrator.
COR:	
TN:	
DTE/DCE:	The DTE/DCE assignments must be opposites on the two ends of the connection. Use **dce** for node 2.
Enable Link?	Set to **y** after the processor channels have been assigned.
Remote Loop-Around Test?	Set to **n** unless testing.
Destination Number:	**external** is used when connecting an r-model to an si-model. For an r-to-r connection, enter the TAC+extension.
Establish Connection?	**y** means that this switch will be responsible for the call setup for this connection. Enter **n** when administering the data module for Switch 2.
Connected Data Module	Extension of node-2 data module.
Error Logging?	Set to **n** for normal operations. Set to **y** for testing — logs all data module errors.
Permanent Virtual Circuit?	Always **y** for DCS, CMS, and Intuity AUDIX.
Switched Virtual Circuit?	Always **n** for DCS, CMS, and Intuity AUDIX.
Highest PVC Logical Channel:	Set to 64 (the default) for normal operations.
	2 of 2

> Submit the screen

End

Switch 1 Task — Assign IP Interfaces

The IP interface for each C-LAN board on the switch must be defined on the IP
Interfaces form. Each DEFINITY switch in an IP network has one IP Interfaces form.

Steps

Begin

> Open IP Interfaces form — enter **ch ip-i**

```
change ip-interfaces                                          Page   1 of   2

                              IP Interfaces

 Inter-region IP connectivity allowed?   n
Enable                                                                    Net
Eth Pt Type    Slot   Code Sfx Node Name      Subnet Mask      Gateway Addr  Rgn
   y   C-LAN   01b01  TN799 B  node-1_____   255.255.255.0   ___.___.___.___  1
   n   _____   _____  ____ _   _____  255.255.255.0   ___ ___ ___ ___ _
   n   _____   _____  ____ _   _____  255.255.255.0   ___ ___ ___ ___ _
   n   _____   _____  ____ _   _____  255.255.255.0   ___ ___ ___ ___ _
```

> Enter values

Field	Conditions/Comments
Inter-region IP connectivity allowed?	Enter **y** to allow IP endpoints (phones and trunks) to use MedPro resources administered in regions that are different from the endpoints' regions.
Enable Eth Pt	The Ethernet port must be enabled (**y**) before it can be used. The port must be disabled (**n**) before changes can be made to its attributes on this screen.
Type	Enter c-lan or medpro.
Slot	Enter the slot location for the circuit pack.
Code	Display only. This field is automatically populated with TN799 for C-LAN or TN802 for MedPro.
Sfx	Display only. This field is automatically populated with B for the TN802 and TN799.
Node name	Enter the unique node name for the IP interface. The node name here must already be administered on the Node Names screen
	1 of 2

Field	Conditions/Comments
Subnet Mask	Enter the subnet mask associated with the IP address for this IP interface. (The IP address is associated with the node name on the Node Names screen). In this example, leave the default subnet mask, 255.255.255.0, which indicates no subnetting for a Class C IP address. See the discussion of subnetting, Subnetting (page 16), in Chapter 1 and Configuration 1: R8r <—ppp—> R8si (page 60) in this chapter for details about subnet masks.
Gateway Addr	Leave blank for this configuration. The only connection to this IP interface is node-3 on Switch 3. Node-3 is on the same subnetwork as this IP interface, so no gateway is needed. In general, for connectivity to other (sub)networks, enter the address of a network node that will serve as the default gateway to the other (sub)networks.
Net Rgn	Enter the region number for this IP interface.
	2 of 2

Switch 1 Task — Assign Link via ethernet Data Module to the LAN

This task administers an ethernet data module for ethernet connections. The data module associates a link number with a port address, extension number, and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **a da n**

```
add data module next                                               Page 1 of x
                           DATA MODULE

Data Extension: 3391                        Name: ethernet on link 3    BCC: 2
              Type: ethernet
              Port: 01b0117
              Link: 3


Network uses 1's for broadcast addresses? y
```

> Enter values.

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection.
Port:	In this example, the C-LAN circuit pack is in slot 01b01; the ethernet connection is through port 17.
Link:	The link number must be in the range 1 – 33 (for R8r).
Name:	Information-only; appears in list generated by the "list data module" command.
Network uses 1's for broadcast addresses?	Leave the default (**y**) if the private network contains only DEFINITY switches and adjuncts. Set to **n** only if the network includes non-DEFINITY switches that use the 0's method of forming broadcast addresses. See Appendix A, "Data Module - type ethernet" for more information about this field.

> Submit the screen

End

Switch 1 Task — Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on the node-1 switch.

Steps>

Begin

> Open Processor Channel Assignment form — enter **ch com p**

```
change communications-interface processor-channels
                                                            Page 1 of X
                        PROCESSOR CHANNEL ASSIGNMENT

Proc                 Gtwy         Interface    Destination      Session      Mach
Chan Enable  Appl.   To   Mode  Link/Chan   Node        Port  Local/Remote  ID
  1:    n    _____      _     __ _____  _____   0____  __  __      __
  2:    n    _____      _     __ _____  _____   0____  __  __      __
   :
 21:    y    dcs____       _     5  21___  _____   0____  21  21      2_
   :
 23:    y    gtwy-tcp 32_  _     5  23___  _____   0____  23  23      __
   :
 31:    y    dcs____       s     3  5003_  node-3____   0 ___  31  31      3_
   :
 32:    y    gtwy-tcp 23_  s     3  6002_  node-3____   0____  32  32      __
   :
256:    n    _____      _     __ _____  _____   0____  __  __      __
```

Note: The Processor Channel number, the Interface Channel number, and the Local and Remote Session numbers do not need to be the same number but they should be made the same whenever possible to simplify network "bookkeeping" and diagnostics.

> Enter values

Field	Conditions/Comments
Processor Channel 21: (X.25 connection to Switch 2)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Used for TCP/IP connections only.
Interface Link	This must match the link number assigned on the x.25 data module screen.
Interface Chan	The interface channel number must be in the range 1 – 64 for an X.25 link.
Destination Node	Used for TCP/IP connections only.
Destination Port	Used for TCP/IP connections only.
	1 of 4

Field	Conditions/Comments
Session - Local Session - Remote	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
	It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.
Processor Channel 23: (The X.25 side of the gateway)	
Enable	Set to **y**.
Appl.	Use **gtwy-tcp** for conversion between X.25 and TCP/IP.
Gateway To	Indicates a software connection between processor channels 23 and 32.
Mode	Used for TCP/IP connections only.
Interface Link	This must match the link number assigned on the x.25 data module screen.
Interface Chan	The interface channel number must be in the range 1 – 64 for an X.25 link.
Destination Node	Used for TCP/IP connections only.
Destination Port	Used for TCP/IP connections only.
Session - Local Session - Remote	For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Mach ID	Leave blank for **gtwy-tcp**.
Processor Channel 31: (ethernet connection to Switch 3)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-1 is the "server" for this session. Set node-3 to "client" (**c**).
Interface Link	This must match the link number assigned on the node-1 data module screen.

2 of 4

Field	Conditions/Comments
Interface Chan	For TCP/IP, interface channel numbers are in the range 5000 – 64500.
	The recommended values are: 5001 for CMS, 5002 for Intuity AUDIX, and 5003 for DCS connections that are not gateways. These three values should be reused for multiple instances of these applications; for example, if there are two Intuity AUDIX's, use 5002 for both; or if there are four DEFINITY ECS's, use 5003 for all four. The combination of Link, Interface Channel, and Mach ID must be unique.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.
Destination Port	A value of **0** allows any available interface channel on the destination node to be used for this connection. The Interface Channel number on the Switch-3 Processor Channel screen must also be set to **0**.
Session - Local	For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Session - Remote	
Mach ID	Destination switch ID identified on the dial plan of the destination switch.
Processor Channel 32: (The Ethernet side of the gateway)	
Enable	Set to **y**.
Appl.	Use **gtwy-tcp** for conversion between X.25 and TCP/IP.
Gateway To	Indicates a software connection between processor channels 32 and 23.
Mode	Node-1 is the "server" for this session. Set node-3 to "client" (**c**).
Interface Link	This must match the link number assigned on the data module screen.
Interface Chan	For TCP/IP, interface channel numbers are in the range 5000 – 64500.
	The recommended values are: 5001 for CMS, 5002 for Intuity AUDIX, and 5003 for DCS connections that are not gateways. The combination of Link, Interface Channel, and Mach ID must be unique.
	The recommended values for gateway switches is 6001–6099. The interface channel number must be unique for each gateway.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.

3 of 4

Field	Conditions/Comments
Destination Port	A value of **0** allows any available interface channel on the destination node to be used for this connection. The Interface Channel number on the Switch-3 Processor Channel screen must also be set to **0**.
Session - Local	For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Session - Remote	
Mach ID	Leave blank for **gtwy-tcp**.

4 of 4

> Submit the screen

End

Switch 2 Task — Assign Link via procr-intf Data Module to Switch 1

This task administers a processor-interface data module for the x.25 connection to node 1. The data module associates a link number with a physical channel number and extension number for the PI port used for this connection.

Steps

Begin

> Open Data Module form — enter **a da n**

```
add data-module next
Page 1 of 1
                             DATA MODULE

  Data Extension: 4121                   Name:  x.25 on link 2 to node-1
            Type: procr-intf      COS: 1      Maintenance Extension: 4191
Physical Channel: 02              COR: 1          Destination Number: 8122102
             ITC: Restricted       TN: 1         Establish Connection? n
            Link: 2           DTE/DCE: dce     Connected Data Module: _____
                          Enable Link: n
ABBREVIATED DIALING
  List1: _____

SPECIAL DIALING OPTION: _____

ASSIGNED MEMBER (Station with a data extension button for this data module)

        Ext              Name
    1.
```

> Enter values.

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection.
Physical Channel:	This must be the same as the link number.
ITC:	Enter **restricted**. (**unrestricted** is used only for wideband transmission.)
Link:	The link number must be in the range 1 –25 (for R8si), not previously assigned on this switch.
Name:	Information-only; appears in list generated by the "list data module" command.
COS:	The values for these fields will be specified by the system administrator.
COR:	
TN:	
DTE/DCE:	The DTE/DCE assignments must be opposites on the two ends of the connection. Use **dte** for node 1.

1 of 2

Field	Conditions/Comments
Enable Link?:	Set to **y** after the processor channels have been assigned.
Maintenance Extension:	Specified on dial plan.
Destination Number:	TAC (812) + extension (2102) of the data module on the far end that will establish the connection.
Establish Connection?	**n** means that the switch at the remote end of this connection (Switch 1 in this case) will be responsible for the call setup. Enter **y** when administering the data module for Switch 1.
Connected Data Module:	This is an information-only field.
Keep the default values for the rest of the fields.	
	2 of 2

Switch 2 Task — Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on Switch 2.

Steps

Begin

> Open Processor Channel Assignment form — enter **ch com p**

```
change communications-interface processor-channels
                                                              Page 1 of X
                      PROCESSOR CHANNEL ASSIGNMENT

Proc                  Gtwy        Interface    Destination      Session      Mach
Chan Enable  Appl.    To   Mode   Link/Chan    Node       Port  Local/Remote  ID
  1:    n    _____       _      __  _____    _____    0    ___   ___    __
  2:    n    _____       _      __  _____    _____    0    ___   ___    __
   :
 21:    y    dcs____       _      2   21___    _____    0    21    21     1
 23:    y    dcs____       _      2   23___    _____    0     23    23     3
   :
256:    n    _____       _      __  _____    _____    0    ___   ___    __
```

Note: The Processor Channel number, the Interface Channel number, and the Local and Remote Session numbers do not need to be the same number but they should be made the same whenever possible to simplify network "bookkeeping" and diagnostics.

> Enter values

Field	Conditions/Comments
Processor Channel 21: (X.25 connection to Switch 1)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Used for TCP/IP connections only.
Interface Link	This must match the link number assigned on the procr-intf data module screen.
Interface Chan	The interface channel number must be in the range 1 – 64 for an X.25 link.
Destination Node	Used for TCP/IP connections only.
Destination Port	Used for TCP/IP connections only.
	1 of 2

Field	Conditions/Comments
Session - Local Session - Remote	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.

It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections. |
Mach ID	Destination switch ID identified on the dial plan of the destination switch. This is usually called the "node number."
`Processor Channel 23`: (connection to Switch 1 for gateway to Switch 3)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Used for TCP/IP connections only.
Interface Link	This must match the link number assigned on the procr-intf data module screen.
Interface Chan	The interface channel number must be in the range 1 – 64 for an X.25 link.
Destination Node	Used for TCP/IP connections only.
Destination Port	Used for TCP/IP connections only.
Session - Local Session - Remote	For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.

2 of 2

> Submit the screen

End

Switch 3 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network. This screen is administered on Switch 3. A Node Names screen must be administered on each switch in the network.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or from a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names form — enter **ch node-n**

> Go to page 2.

```
change node-names
                                                              Page 2 of 6
                              NODE NAMES

   Name                 IP Address          Name              IP Address
default_____       0__.0__.0__.0__   _____   ___.___.___.___
node-1_____       192.168.10_.1__   _____   ___.___.___.___
node-3_____       192.168.10_.3__   _____   ___.___.___.___
_____     ___.___.___.___   _____   ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name	Enter unique node names for the following 2 nodes: • C-LAN Ethernet port on Switch 3 • C-LAN Ethernet port on Switch 1.
IP Address	The unique IP addresses of the nodes named in the previous field.

> Submit the screen

End

Switch 1 Task — Assign IP Interfaces

The IP interface for each C-LAN board on the switch must be defined on the IP Interfaces form. Each DEFINITY switch in an IP network has one IP Interfaces form.

Steps

Begin

> Open IP Interfaces form — enter **ch ip-i**

```
change ip-interfaces                                          Page   1 of   2

                              IP Interfaces

 Inter-region IP connectivity allowed?   n
Enable                                                                      Net
Eth Pt Type    Slot   Code Sfx Node Name     Subnet Mask       Gateway Addr Rgn
   y   C-LAN   01a10  TN799 B  node-1_____   255.255.255.0    ___.___.___.___  1
   n   _____   _____  ____ _   _____   255.255.255.0    ___ ___ ___ ___ _
   n   _____   _____  ____ _   _____   255.255.255.0    ___ ___ ___ ___ _
   n   _____   _____  ____ _   _____   255.255.255.0    ___ ___ ___ ___ _
```

> Enter values

Field	Conditions/Comments
Inter-region IP connectivity allowed?	Enter **y** to allow IP endpoints (phones and trunks) to use MedPro resources administered in regions that are different from the endpoints' regions.
Enable Eth Pt	The Ethernet port must be enabled (**y**) before it can be used. The port must be disabled (**n**) before changes can be made to its attributes on this screen.
Type	Enter c-lan or medpro.
Slot	Enter the slot location for the circuit pack.
Code	Display only. This field is automatically populated with TN799 for C-LAN or TN802 for MedPro.
Sfx	Display only. This field is automatically populated with B for the TN802 and TN799.
Node name	Enter the unique node name for the IP interface. The node name here must already be administered on the Node Names screen
	1 of 2

Field	Conditions/Comments
Subnet Mask	Enter the subnet mask associated with the IP address for this IP interface. (The IP address is associated with the node name on the Node Names screen). In this example, leave the default subnet mask, 255.255.255.0, which indicates no subnetting for a Class C IP address. See the discussion of subnetting, Subnetting (page 16), in Chapter 1 and Configuration 1: R8r <—ppp—> R8si (page 60) in this chapter for details about subnet masks.
Gateway Addr	Leave blank for this configuration. The only connection to this IP interface is node-1 on Switch 1. Node-1 is on the same subnetwork as this IP interface, so no gateway is needed. In general, for connectivity to other (sub)networks, enter the address of a network node that will serve as the default gateway to the other (sub)networks.
Net Rgn	Enter the region number for this IP interface.
	2 of 2

Switch 3 Task — Assign Link via ethernet Data Module to the LAN

This task administers an ethernet data module on Switch 3 for the ethernet connection to Switch 1. The data module associates a link number with a port address, extension number, and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **a da n**

```
add data module next                                Page 1 of x
                          DATA MODULE

Data Extension: 4531          Name: ethernet on link 3    BCC: 2
            Type: ethernet
            Port: 01a1017
            Link: 3

Network uses 1's for broadcast addresses? y
```

> Enter values.

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection.
Port:	In this example, the C-LAN circuit pack is in slot 01a10; the ethernet connection is through port 17.
Link:	The link number must be in the range 1 – 25 (for R8si), not previously assigned on this switch.
Name:	Information-only; appears in the "list data module" command list.
Network uses 1's for broadcast addresses?	Leave the default (**y**) if the private network contains only DEFINITY switches and adjuncts. Set to **n** only if the network includes non-DEFINITY switches that use the 0's method of forming broadcast addresses. See Appendix A, "Data Module - type ethernet" for more information about this field.

> Submit the screen

End

Switch 3 Task — Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on Switch 3.

Steps

Begin

> Open Processor Channel Assignment form — enter **ch com p**

```
change communications-interface processor-channels
                                                          Page 1 of X
                         PROCESSOR CHANNEL ASSIGNMENT

Proc                Gtwy      Interface        Destination      Session       Mach
Chan Enable Appl.   To  Mode  Link/Chan      Node        Port  Local/Remote   ID
  1:   n    _____ _   __ _____  _____  0____  ___  ___   __
  2:   n    _____ _   __ _____  _____  0____  ___  ___   __
  :
 31:   y    dcs____ c   3  0____  node-1_____  5003_  31_  31_   1_
  :
 32:   y    dcs____ c   3  0____  node-1_____  6002_  32_  32_   2_
  :
256:   n    _____ _   __ _____  _____  0____  ___  ___   __
```

Note: The Processor Channel number, the Interface Channel number, and the Local and Remote Session numbers do not need to be the same number but they should be made the same whenever possible to simplify network "bookkeeping" and diagnostics.

> Enter values

Field	Conditions/Comments
For Processor Channel 31: (ethernet connection to Switch 1)	
Enable	Set to **y**.
Appl.	Indicates that this connection will carry DCS data.
Mode	Node-3 is the "client" for this session. Set node-1 to "server" (**s**).
Interface Link	This must match the link number assigned on the node-3 data module screen.
Interface Chan	A value of **0** allows any available interface channel to be used for this connection. This number must match the Destination Port number on the Switch-1 Processor Channel screen.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.
	1 of 2

Field	Conditions/Comments
Destination Port	The Destination Port number must match the Interface Channel number for this connection on the Switch-1 Processor Channel screen.
Session - Local Session - Remote	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa. It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.
Processor Channel 32: (connection to Switch 1 for gateway to Switch 2)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-3 is the "client" for this session. Set node-1 to "server" (**s**).
Interface Link	This must match the link number assigned on the node-3 data module screen.
Interface Chan	A value of **0** allows any available interface channel to be used for this connection. This number must match the Destination Port number on the Switch-1 Processor Channel screen.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.
Destination Port	The Destination Port number must match the Interface Channel number for this connection on the Switch-1 Processor Channel screen.
Session - Local Session - Remote	For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.

2 of 2

> Submit the screen the screen

End

Enable links and processor channels

You must enable links and processor channels before the connections can be used.

To enable a link, open its data module screen (**ch da** [**ext**]) and set the Enable Link? field to **y**.

[note: to view a list of assigned data modules and their extensions, enter the "list data-module" command (**l da**)]

To enable the processor channels, open the processor channel screen (**ch com p**) and set the Enable field to **y** for each assigned processor channel.

Note: 1. You must disable a link or processor channel before you can change its parameters.

Note: 2. The **busy-out** command overrules the data module Enable Link? field.

Note: 3. On the C-LAN boards, low-level connectivity can remain intact when higher-level applications such as DCS are not functioning. For example, an external ping to a C-LAN's ethernet port could be successful even when the board is busied-out. When debugging connectivity problems, pinging only checks low-level connectivity.

Configuration 4: R8csi <—ISDN—> R8si Gateway <—ppp—> R8csi

In this configuration, a DEFINITY ECS R8r provides gateway conversion between
ISDN and TCP/IP.
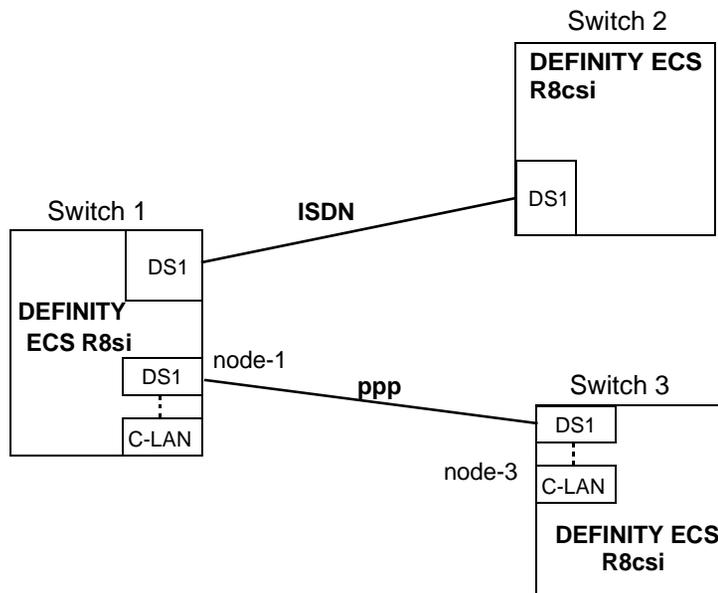
Task Summary

The following tasks need to be completed for Switch 1, Switch 2, and Switch 3:

1 Review checklist

2 Switch 1 administration

    a Assign node names
    b Assign signaling group and administered NCA TSC
    c Assign ISDN-TSC Gateway Channel
    d Assign link (via a data module) to node 3
    e Assign processor channels

3 Switch 2 administration

    a Assign signaling group and administered NCA TSC

4 Switch 3 administration

    a Enable bus bridge connectivity
    b Assign node names
    c Assign link (via a data module) to node 1
    d Assign processor channels

5 Enable links and processor channels

Prerequisite Administration

There are some system administration tasks that need to be completed before you can proceed with the connectivity administration described in this section.

Review the checklist of prerequisite administration tasks in Checklist for Prerequisite Administration (page 54), before proceeding with the connectivity administration in this section.

Configuration 4

cydfec4a EWS 052099

Switch 1 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network. This screen is administered on Switch 1. A Node Names screen must be administered on each switch in the network.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or from a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names form — enter **ch node-n**

> Go to page 2.

```
change node-names
                                                            Page 2 of 6
                             NODE NAMES

    Name                IP Address          Name                IP Address
default            0  .0  .0  .0    _____    ___.___.___.___
node-1             192.168.10 .101    _____    ___.___.___.___
node-3             192.168.10 .103    _____    ___.___.___.___
_____   ___.___.___.___     _____    ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name	Enter unique node names for the following 2 nodes: • C-LAN PPP port on Switch 1 • C-LAN PPP port on Switch 3.
IP Address	The unique IP addresses of the nodes named in the previous field.

> Submit the screen

End

Switch 1 Task — Assign Link via ppp Data Module to Switch 3

This task administers a ppp data module for the ppp connection to node 3. The data module associates a link number with a port address, extension number, and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **ad da 5803**

```
add data-module 5803
                                                            Page 1 of x
                         DATA MODULE

    Data Extension: 5803              Name: _ppp on link 1 to node-3___  BCC: 2
               Type: ppp_____         COS: 1
               Port: 01b1115          COR: 1
               Link: 1_               TN: 1
        Enable Link? n

          Node Name: node-1_____
        Subnet Mask: 255.255.255.0___


Establish Connection: y

DESTINATION
             Digits: 792801_____
          Node Name: node-3_____
              CHAP? n
```

[This data module is assigned the extension 5803; you can assign any unused extension in the dial plan]

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection.
Port:	In this example, the C-LAN circuit pack is in slot 01b11; the ppp connection is through port 15.
Link:	The link number must be in the range 1 – 25 (for R8si), not previously assigned on this switch.
Enable Link?	If you need to add an IP route that uses this node as a gateway, this field must be set to **y** *before* adding the IP route. Otherwise leave this field set to **n** until the link administration is complete; that is, until after all data modules and the processor channels are assigned, then set to **y**.
Name:	Information-only; appears in list generated by the "list data module" command.
	1 of 2

Field	Conditions/Comments
BCC:	Bearer Capability Class. This is a display-only field.
COS	The values for these fields will be specified by the system administrator.
COR:	
TN:	
Node Name:	The node name for the interface defined by this data module. This must be a name entered on the Node Names screen.
Establish Connection?	**y** means that this switch will be responsible for call setup for this connection. Enter **n** when administering the data module for Switch 3.
Destination Digits:	Trunk access code (79) plus extension of data module on node-3 (2801).
Destination Node Name:	Name of the node at the far end of this connection. This must be a name entered on the Node Names screen
CHAP?	This field enables/disables the Challenge Handshake Authentication Protocol security mechanism on this link. If you enter **y**, the system will prompt for a CHAP secret (password).
	2 of 2

> Submit the screen

End

Switch 1 Task — Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on the node 1 switch.

Steps

Begin

> Open the Processor Channel Assignment form — enter **ch com p**

```
change communications-interface processor-channels
                                                                   Page 1 of X
                        PROCESSOR CHANNEL ASSIGNMENT

Proc                    Gtwy        Interface     Destination       Session       Mach
Chan Enable  Appl.   To  Mode   Link/Chan    Node          Port  Local/Remote    ID
  1:    n    _____      _     __  _____   _____     0____   ___   ___      __
  2:    n    _____      _     __  _____   _____     0____   ___   ___      __
  :
 13:    y    dcs____      s     1_  5003_   node-3____     0____   13__  31__     3_
 14:    y    gateway      s     1_  6002_   node-3____     0____   14__  32__     __
  :
 64:    n    _____      _     __  _____   _____     0____   ___   ___      __
```

> Enter values

Field	Conditions/Comments
Processor Channel 13: (ppp connection to Switch 3)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-1 is the "server" for this session. Set node-3 to "client" (**c**).
Interface Link	This must match the link number assigned on the node-1 data module screen.
Interface Chan	For TCP/IP, interface channel numbers are in the range 5000 – 64500.
	The recommended values are: 5001 for CMS, 5002 for Intuity AUDIX, and 5003 for DCS connections that are not gateways. These three values should be reused for multiple instances of these applications; for example, if there are two Intuity AUDIX's, use 5002 for both; or if there are four DEFINITY ECS's, use 5003 for all four. The combination of Link, Interface Channel, and Mach ID must be unique.
	This number must match the Destination Port number on the node-3 Processor Channel screen.
	1 of 3

Field	Conditions/Comments
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen. For ppp connections, it must match the Destination Node Name entered on the ppp Data Module screen.
Destination Port	A value of **0** allows any available interface channel on the destination node to be used for this connection. The Interface Channel number for this connection on the Switch-3 Processor Channel screen must also be set to **0**.
Session - Local Session - Remote	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa. It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.
Processor Channel 14: (Gateway between Switch 2 and Switch 3)	
Enable	Set to **y**.
Appl.	Set to **gateway** for conversion between ISDN and TCP/IP.
Mode	Node-1 is the "server" for this session. Set node-3 to "client" (**c**).
Interface Link	This must match the link number assigned on the node- 1 data module screen.
Interface Chan	For TCP/IP, interface channel numbers are in the range 5000 – 64500. The recommended values are: 5001 for CMS, 5002 for Intuity AUDIX, and 5003 for DCS connections that are not gateways. These three values should be reused for multiple instances of these applications; for example, if there are two Intuity AUDIX's, use 5002 for both; or if there are four DEFINITY ECS's, use 5003 for all four. The combination of Link, Interface Channel, and Mach ID must be unique. The recommended values for gateway switches is 6001–6099. The interface channel number must be unique for each gateway. This number must match the Destination Port number on the node-3 Processor Channel screen.

2 of 3

Field	Conditions/Comments
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen. For ppp connections, it must match the Destination Node Name entered on the ppp Data Module screen.
Destination Port	A value of **0** allows any available interface channel on the destination node to be used for this connection. The Interface Channel number for this connection on the Switch-2 Processor Channel screen must also be set to **0**.
Session - Local	For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Session - Remote	
Mach ID	Leave blank for gateway applications.

3 of 3

> Submit the screen

End

Switch 1 Task — Assign Signaling Group and administered NCA TSC

This task assigns a signaling group and an administered NCA TSC for the ISDN connection to Switch 2.

Steps>

Begin

> Open the Signaling Groups form — enter **ch sig n**

```
change signaling-group next
                                                                  Page 1 of 5
                          SIGNALING GROUP
Group Number: 1
                      Associated Signaling? y          Max number of NCA TSC: 5
                         Primary D-Channel: 01b0924      Max number of CA TSC: 23
                                                       Trunk Group for NCA TSC: 12
        Trunk Group for Channel Selection: 12
           Supplementary Service Protocol: a
```

> Enter values

Field	Conditions/Comments
Associated Signaling?	Specifies Facility-Associated Signaling (FAS) — the D-channel carries signaling only for the B-channels on the same DS1 interface.
Primary D-Channel	Specifies D-Channel signaling on port 24 of the DS1 circuit pack located at 01b09.
Max number of NCA TSC	Maximum number of simultaneous non-call-associated Temporary Signaling Connections. The TSCs carry signaling for features not associated with a specific call; for example, signals to turn on Leave Word Calling.
Max number of CA TSC	Maximum number of simultaneous call-associated TSCs that can exist in the signaling group. Typically, this is the number of ISDN-PRI trunk group members controlled by this signaling group.
Trunk Group for NCA TSC	The ISDN-PRI trunk group number whose incoming call-handling table will be used to handle incoming NCA-TSCs through this signaling group.
Trunk Group for Channel Selection	
Supplementary Service Protocol	**a** indicates AT&T protocol; **b** indicates QSIG protocol.

> Press the Next Page key

```
                                                          Page 2 of 5
                      ADMINISTERED NCA TSC ASSIGNMENT

 Service/Feature: _____            As-needed Inactivity Time-out (min): __

  TSC   Local                                                        Mach.
 Index   Ext.  Enabled Established   Dest. Digits    Appl.            ID
   1:   2951_     y     permanent    1701_____   dcs____         2_
   2:   2952_     y     permanent    1702_____   gateway         __
   3:   _____     _     _____   _____ _____         __
   :
```

> Enter values

Field	Conditions/Comments
TSC Index 1: (for DCS connection to Switch 2)	
Local Ext.	Extension number of the ISDN interface on the Switch-1DS1 circuit pack.
Enabled	**y** enables the administered NCA-TSC.
Established	Used to indicate the strategy for establishing this administered NCA-TSC.
	permanent means that the administered NCA-TSC can be established by either the near end or the far end.
	as-needed means the administered NCA-TSC will be established the first time the administered NCA-TSC is needed; it can be set up either by the near end or far end switch.
Dest. Digits	Extension number of the ISDN interface on the Switch-2 DS1 circuit pack.
Appl. 1	TSC #1 carries the DCS signaling between node 1 and node 2.
Mach ID 1	Destination is node 2.
TSC Index 2: (for connection to Switch 2 for gateway to Switch 3)	
Local Ext.	Extension number of the ISDN interface on the Switch-1 DS1 circuit pack.
Enabled	**y** enables the administered NCA-TSC.
Established	Used to indicate the strategy for establishing this administered NCA-TSC.
	permanent means that the administered NCA-TSC can be established by either the near end or the far end.
	as-needed means the administered NCA-TSC will be established the first time the administered NCA-TSC is needed; it can be set up either by the near end or far end switch.
	1 of 2

Field	Conditions/Comments
Dest. Digits	Extension number of the ISDN interface on the Switch-2 DS1 circuit pack.
Appl.	Specifies that TSC #2 will carry signaling that will be converted in Switch-1 to another protocol (TCP/IP), which will then be forwarded to Switch-3.
Mach ID	Leave blank for gateway
	2 of 2

> Submit the screen

End

Switch 1 Task — Assign ISDN-TSC Gateway

This task assigns the ISDN TSC gateway channels needed for ISDN signaling between node 1 and node2

Steps

Begin

> Open the ISDN TSC Gateway Channel Assignment form — enter **ch isdn tsc**

```
change isdn tsc-gateway                                     Page   1 of   2
                    ISDN TSC GATEWAY CHANNEL ASSIGNMENT

   Sig   Adm'd NCA  Processor  Appli-     Sig   Adm'd NCA  Processor  Appli-
  Group  TSC Index   Channel   cation    Group  TSC Index   Channel   cation
 1: 1       2          14       dcs      17: __     __         ___      ____
 2: __      __         ___      ____     18: __     __         ___      ____
 3: __      __         ___      ____     19: __     __         ___      ____
 4: __      __         ___      ____     20: __     __         ___      ____
 5: __      __         ___      ____     21: __     __         ___      ____
 6: __      __         ___      ____     22: __     __         ___      ____
 :
```

> Enter values

Field	Conditions/Comments
For Gateway Channel 1: (ISDN connection to Switch 2)	
Sig Group	Signaling group number assigned on the Signaling Group screen.
Adm'd NCA TSC Index	TSC Index assigned on page 2 of the Signaling Group screen (Administered NCA TSC Assignment).
Processor Channel	This is the Processor Channel number specified as a **gateway** application on the Processor Channel Assignment screen.
Application	The application that this TSC is used for.

> Submit the screen

End

Switch 2 Task — Assign Signaling Group and administered NCA TSC

This task assigns a signaling group and an administered NCA TSC for the ISDN connection to Switch 1.

Steps

Begin

> Open the Signaling Groups form — enter **ch sig n**

```
change signaling-group next
                                                          Page 1 of 5
                        SIGNALING GROUP
Group Number: 1
                    Associated Signaling? y         Max number of NCA TSC: 5
                       Primary D-Channel: 01a1024     Max number of CA TSC: 23
                                                   Trunk Group for NCA TSC: 12
        Trunk Group for Channel Selection: 21
            Supplementary Service Protocol: a
```

> Enter values

Field	Conditions/Comments
Associated Signaling?	Specifies Facility-Associated Signaling (FAS) — the D-channel carries signaling only for the B-channels on the same DS1 interface.
Primary D-Channel	Specifies D-Channel signaling on port 24 of the DS1 circuit pack located at 1a10.
Max number of NCA TSC	Maximum number of simultaneous non-call-associated Temporary Signaling Connections that can exist in the signaling group. This number includes all NCA-TSCs that are administered on this screen and those that tandem through the switch in-route to another switch in the network. The TSCs carry signaling for features not associated with a specific call; for example, signals to turn on Leave Word Calling.
Max number of CA TSC	Maximum number of simultaneous call-associated TSCs that can exist in the signaling group. Typically, this is the number of ISDN-PRI trunk group members controlled by this signaling group. If the connection is using the public network (SDN), the total NCA + CA TSCs cannot exceed the number ordered.
Trunk Group for NCA TSC	The trunk group used by the NCA-TSCs.
Trunk Group for Channel Selection	Leave blank — this field is currently not used.
Supplementary Service Protocol	**a** indicates AT&T protocol; **b** indicates QSIG protocol.

> Press the Next Page key

```
                                                          Page 2 of 5
                        ADMINISTERED NCA TSC ASSIGNMENT

Service/Feature: _____        As-needed Inactivity Time-out (min): __

 TSC   Local                                                        Mach.
Index   Ext.   Enabled Established   Dest. Digits     Appl.          ID
  1:   1701_     y      permanent    2951_____    dcs____        1_
  2:   1702_     y      permanent    2952_____    dcs____        3_
  3:   _____     _      _____    _____    _____        __
  :
```

> Enter values

Field	Conditions/Comments
TSC Index 1: (for DC S connection to Switch 1)	
Local Ext.	Extension number of the ISDN interface for TSC #1 on the Switch-2 DS1 circuit pack.
Enabled	**y** enables the administered NCA-TSC.
Established	Used to indicate the strategy for establishing this administered NCA-TSC. **permanent** means that the administered NCA-TSC can be established by either the near end or the far end. **as-needed** means the administered NCA-TSC will be established the first time the administered NCA-TSC is needed; it can be set up either by the near end or far end switch.
Dest. Digits	Extension number of the ISDN interface for TSC #1 on the Switch-1 DS1 circuit pack.
Appl.	TSC #1 carries DCS signaling between node 2 and node 1.
Mach ID	Destination is node 1.
TSC Index 2: (for DCS connection to Switch 1)	
Local Ext.	Extension number of the ISDN interface for TSC #2 on the Switch-2 DS1 circuit pack.
Enabled	**y** enables the administered NCA-TSC.
Established	Used to indicate the strategy for establishing this administered NCA-TSC. **permanent** means that the administered NCA-TSC can be established by either the near end or the far end. **as-needed** means the administered NCA-TSC will be established the first time the administered NCA-TSC is needed; it can be set up either by the near end or far end switch.

1 of 2

Field	Conditions/Comments
Dest. Digits	Extension number of the ISDN interface for TSC #2on the Switch-1 DS1 circuit pack.
Appl.	TSC #2 carries DCS signaling between Switch 2 and Switch 1. As specified on the Switch-1 NCA TSC Assignment screen, TSC #2 is administered as a gateway on Switch 1, where the ISDN signals are converted to TCP/IP.
Mach ID	Destination is node 3.

2 of 2

> Submit the screen

End

Switch 3 Task — Enable Bus Bridge Connectivity

This task enables the bus bridge functionality on the C-LAN circuit pack to provide a path between the packet bus and the processor.

Note: Bus Bridge Connectivity is used on the csi model only. This task may have been complete when the C-LAN circuit pack was installed.

Steps

Begin

> Open the Maintenance-Related System Parameters form — enter **ch sys ma**

> Go to page 2 and skip to the Packet Intf2? field near the bottom of the screen

```
change system-parameters maintenance                            Page   2 of   3

                   MAINTENANCE-RELATED SYSTEM PARAMETERS

MINIMUM MAINTENANCE THRESHOLDS ( Before Notification )
        TTRs: 4          CPTRs: 1          Call Classifier Ports: 0
        MMIs: 0           VCs: 0

TERMINATING TRUNK TRANSMISSION TEST ( Extension )
   Test Type 100:           Test Type 102:           Test Type 105:

ISDN MAINTENANCE
   ISDN-PRI Test Call Extension:           ISDN-BRI Service SPID:

DS1 MAINTENANCE
   DS0 Loop-Around Test Call Extension:

LOSS PLAN ( Leave Blank if no Extra Loss is Required )
   Minimum Number of Parties in a Conference Before Adding Extra Loss:

SPE OPTIONAL BOARDS
                   Packet Intf1? y    Packet Intf2? y
         Bus Bridge: 01a09  Inter-Board Link Timeslots  Pt0: 6 Pt1: 1 Pt2: 1
```

> Enter values

Field	Conditions/Comments
Packet Intf2?	Enables the bus bridge.
Bus Bridge:	Location of the C-LAN circuit pack. If the system has two C-LANs, only one is administered for bus bridge.
Inter-Board Link Timeslots: Pt0, Pt1, Pt2	Specifies the bandwidth used on the 3 ports of the Inter-Board Link. The total number of timeslots assigned cannot exceed 11. Pt0 carries PPP traffic and can have 1–9 timeslots. Pt1 carries maintenance messages and can have 1–3 timeslots. Pt2 carries broadcast messages and can have 1–3 timeslots.

> Submit the screen

End

Switch 3 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network. This screen is administered on Switch 3. A Node Names screen must be administered on each switch in the network.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or from a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names form — enter **ch node-n**

> Go to page 2.

```
change node-names
                                                            Page 2 of 6
                              NODE NAMES

   Name                 IP Address          Name              IP Address
default_____      0 .0 .0 .0 __    _____    ___.___.___.___
node-1_____     192.168.10 .101   _____    ___.___.___.___
node-3_____     192.168.10 .103   _____    ___.___.___.___
_____     ___.___.___.___   _____    ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name	Enter unique node names for the following 2 nodes: • C-LAN PPP port on Switch 3 • C-LAN PPP port on Switch 1.
IP Address	The unique IP addresses of the nodes named in the previous field.

> Submit the screen

End

Switch 3 Task — Assign Link via ppp Data Module to Switch 1

This task administers a ppp data module on Switch 3 for the ppp connection to Switch 1. The data module associates a link number with a port address, extension number, and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **ad da n**

```
add data-module next
                                                               Page 1 of x
                         DATA MODULE

    Data Extension: 2801              Name: _ppp on link 1 to node-1___   BCC: 2
              Type: ppp____           COS: 1
              Port: 01a0906           COR: 1
              Link: 1_                 TN: 1
       Enable Link? n

         Node Name: node-3_____
       Subnet Mask: 255.255.255.0___


Establish Connection: n

DESTINATION
            Digits: _____
         Node Name: node-1_____
             CHAP? n
```

[This data module is assigned the extension 2801; you can assign any unused extension in the dial plan.]

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection.
Port:	In this example, the C-LAN circuit pack is in slot 01a09; the ppp connection is through port 06.
Link:	The link number must be in the range 1 – 25 (for R8csi), not previously assigned on this switch.
Enable Link?	If you need to add an IP route that uses this node as a gateway, this field must be set to **y** *before* adding the IP route. Otherwise leave this field set to **n** until the link administration is complete; that is, until after all data modules and the processor channels are assigned, then set to **y**.
Name:	Information-only; appears in list generated by the "list data module" command.
	1 of 2

Field	Conditions/Comments
BCC:	Bearer Capability Class. This is a display-only field.
COS	The values for these fields will be specified by the system administrator.
COR:	
TN:	
Node Name:	The node name for the interface defined by this data module. This must be a name entered on the Node Names screen.
Subnet Mask:	
Establish Connection?	**n** means that the switch at the remote end of this connection (Switch 1 in this case) will be responsible for the call setup. Enter **y** when administering the data module for Switch 1.
Destination Digits:	Not needed if the "Establish Connection?" field is set to **n**
Destination Node Name:	Name of the node at the far end of this connection. This must be a name entered on the Node Names screen.
CHAP?	This field enables/disables the Challenge Handshake Authentication Protocol security mechanism on this link. If you enter **y**, the system will prompt for a CHAP secret (password).

2 of 2

> Submit the screen

End

Switch 3 Task — Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on Switch 3.

Steps

Begin

> Open the Processor Channel Assignment form — enter **ch com p**.

```
change communications-interface processor-channels
                                                                Page 1 of X
                    PROCESSOR CHANNEL ASSIGNMENT

Proc                     Gtwy       Interface      Destination   Session     Mach
Chan Enable  Appl.   To  Mode   Link/Chan      Node      Port  Local/Remote  ID
  1:    n    _____      _      __  _____  _____   0____   ___   ___   __
  2:    n    _____      _      __  _____  _____   0____   ___   ___   __
  :
 31:    y    dcs____      c      1_  0____  node-1____  5003_   31_   13_   1_
 32:    y    dcs____      c      1_  0____  node-1____  6002_   32_   14_   2_
  :
 64:    n    _____      _      __  _____  _____   0____   ___   ___   __
```

> Enter values

Field	Conditions/Comments
Processor Channel 31: (ppp connection to Switch 1)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-3 is the "client" for this session. Set node-1 to "server" (**s**).
Interface Link	This must match the link number assigned on the node-3 data module screen.
Interface Chan	A value of **0** allows any available interface channel to be used for this connection. This number must match the Destination Port number on the Switch-1 Processor Channel screen.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen. For ppp connections, it must match the Destination Node Name entered on the ppp Data Module screen.
Destination Port	This must match the Interface Channel number assigned on the Switch-1 Processor Channel screen.
	1 of 2

Field	Conditions/Comments
Session - Local Session - Remote	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa. It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.
Processor Channel 32: (connection to Switch 1 for gateway to Switch 2)	
Enable	Set to **y**.
Appl.:	Set to **dcs** for DCS signaling.
Mode	Node-3 is the "client" for this session. Set node-1 to "server" (**s**).
Interface Link	This must match the link number assigned on the data module screen.
Interface Chan	A value of **0** allows any available interface channel to be used for this connection. This number must match the Destination Port number on the Switch-1 Processor Channel screen.
Destination Node	Node name for the gateway through which the destination is reached. This must be a name entered on the Node Names screen. For ppp connections, it must match the Destination Node Name entered on the ppp Data Module screen.
Destination Port	This must match the Interface Channel number assigned on the Switch-1 Processor Channel screen.
Session - Local Session - Remote	For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.

2 of 2

> Submit the screen

End

Enable links and processor channels

You must enable links and processor channels before the connections can be used.

To enable a link, open its data module screen (**ch da** [**ext**]) and set the Enable Link? field to **y**.

[note: to view a list of assigned data modules and their extensions, enter the "list data-module" command (**l da**)]

To enable the processor channels, open the processor channel screen (**ch com p**) and set the Enable field to **y** for each assigned processor channel.

Note: 1. You must disable a link or processor channel before you can change its parameters.

Note: 2. The **busy-out** command overrules the data module Enable Link? field.

Note: 3. On the C-LAN boards, low-level connectivity can remain intact when higher-level applications such as DCS are not functioning. For example, an external ping to a C-LAN's ethernet port could be successful even when the board is busied-out. When debugging connectivity problems, pinging only checks low-level connectivity.

Configuration 5A: R8csi <—ppp—> R8r (one C-LAN) <—ethernet—> R8si

In this configuration, a DEFINITY ECS R8r acts as a gateway between two other nodes — one connected via ppp to an R8csi and the other via ethernet to another R8si.
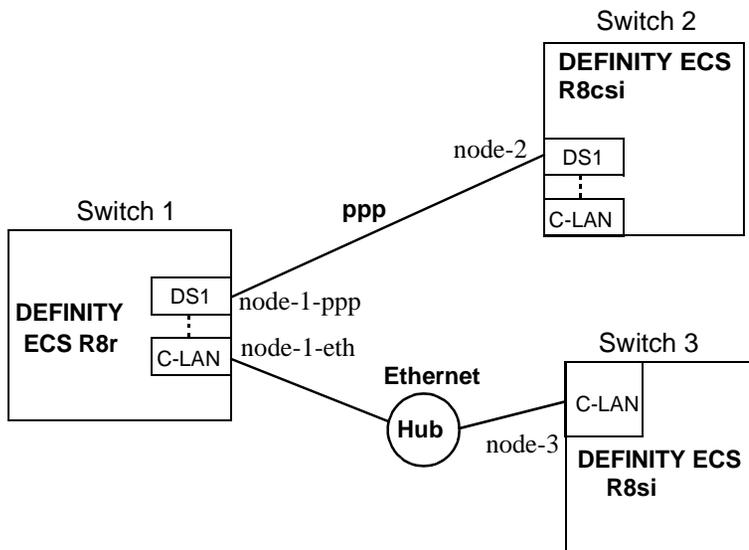
Task Summary

The following tasks need to be completed for Switch 1, Switch 2, and Switch 3:

1 Review checklist

2 Switch 1 administration

   a Assign node names
   b Assign link (via a data module) to Switch 2
   c Assign link (via a data module) to the LAN
   d Assign processor channels

3 Switch 2 administration

   a Enable bus bridge connectivity
   b Assign node names
   c Assign link (via a data module) to Switch 1
   d Assign processor channels
   e Assign IP Route

4 Switch 3 administration

   a Assign node names
   b Assign link (via a data module) to Switch 1
   c Assign processor channels

5 Enable links and processor channels

Prerequisite Administration

There are some system administration tasks that need to be completed before you can proceed with the connectivity administration described in this section.

Review the checklist of prerequisite administration tasks in the , before proceeding with the connectivity administration in this section.

Configuration 5A

SWITCH 2	SWITCH 1	SWITCH 3
DEFINITY ECS R7csi	DEFINITY ECS R7r	DEFINITY ECS R7si

software-defined connections

Processor channels	Interface channels	Interface channels	Processor channels	Interface channels	Interface channels	Processor channels
1	1	1	1	1	1	1
2	5000	5000	•	5000	500	2
•	•	•	•	•	•	•
•	•	•	12	•	•	•
21	x₁(any)	5003	13	5003	x(any)	31
23	x₂(any)	•	•	•	6004	32
•	•	•	•	•	•	•
128	64500	64500	384	64500	64500	256
	Link 1	Link 1		Link 2	Link 1	

hardware connections

①	②	③	④
node-2	node-1-ppp	node-1-eth	node-3
Ext 3020	Ext 2376	Ext 2377	Ext 3901
loc 1a0413	loc 1c0815	loc 1c0817	loc 1a0517
192.168.10.12	192.168.10.130	192.168.10.128	192.168.10.129

cydfec5a KLC 081999

Switch 1 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network. This screen is administered on Switch 1. A Node Names screen must be administered on each switch in the network.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or from a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names form — enter **ch node-n**

> Go to page 2

```
change node-names
                                                           Page 2 of 6
                          NODE NAMES

   Name                 IP Address        Name              IP Address
default_____       0  .0  .0  .0  __ _____   ___.___.___.___
node-1-ppp_____      192.168.10 .130    _____   ___.___.___.___
node-1-eth_____      192.168.10 .128    _____   ___.___.___.___
node-2_____      192.168.10 .12__   _____   ___.___.___.___
node-3_____      192.168.10 .129    _____   ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name	Enter unique node names for the following 4 nodes: • C-LAN PPP port on Switch 1 • C-LAN Ethernet port on Switch 1. • C-LAN PPP port on Switch 2 • C-LAN Ethernet port on Switch 3
IP Address	The unique IP addresses of the nodes named in the previous field.

> Submit the screen

End

Switch 1 Task — Assign Link via ppp Data Module to Switch 2

This task administers a ppp data module on Switch 1 for the ppp connection to Switch 2. The data module associates a link number with a port address, extension number, and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **ad da 2376**

```
add data-module 2376
                                                              Page 1 of x
                         DATA MODULE

    Data Extension: 2376              Name: _ppp on link 1 to node-2__   BCC: 2
               Type: ppp____          COS: 1
               Port: 01c0815          COR: 1
               Link: 1_                TN: 1
       Enable Link? n

         Node Name: node-1-ppp___
       Subnet Mask: 255.255.255.0__


Establish Connection: y

DESTINATION
             Digits: 8993020_____
         Node Name: node-2_____
             CHAP? n
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection.
Port:	In this example, the C-LAN circuit pack is in slot 01c08; the ppp connection is through port 15.
Link:	The link number must be in the range 1 – 33 (for R8r), not previously assigned on this switch.
Enable Link?	If you need to add an IP route that uses this node as a gateway, this field must be set to **y** *before* adding the IP route. Otherwise leave this field set to **n** until the link administration is complete; that is, until after all data modules and the processor channels are assigned, then set to **y**.
Name:	Information-only; appears in list generated by the "list data module" command.
BCC:	Bearer Capability Class. This is a display-only field.

1 of 2

Field	Conditions/Comments
COS	The values for these fields will be specified by the system administrator.
COR:	
TN:	
Node Name:	The node name for the interface defined by this data module. This must be a name entered on the Node Names screen.
Subnet Mask:	
Establish Connection?	**y** means that this switch will be responsible for call setup for this connection. Enter **n** when administering the data module for Switch 2.
Destination Digits:	Trunk access code (899) plus extension of data module on node-2 (3020).
Destination Node Name:	Name of the node at the far end of this connection. This must be a name entered on the Node Names screen.
CHAP?	This field enables/disables the Challenge Handshake Authentication Protocol security mechanism on this link. If you enter **y**, the system will prompt for a CHAP secret (password).

2 of 2

> Submit the screen

End

Switch 1 Task — Assign IP Interfaces

The IP interface for each C-LAN board on the switch must be defined on the IP
Interfaces form. Each DEFINITY switch in an IP network has one IP Interfaces form.

Steps

Begin

> Open IP Interfaces form — enter **ch ip-i**

```
change ip-interfaces                                        Page   1 of   2

                              IP Interfaces

 Inter-region IP connectivity allowed?   n
Enable                                                                    Net
Eth Pt Type    Slot   Code Sfx Node Name      Subnet Mask     Gateway Addr Rgn
   y    C-LAN   01c08  TN799 B  node-1-eth_    255.255.255.0_  ___.___.___.___  1
   n    _____   _____  ____ _   _____   255.255.255.0_  __ __ __ __   _
   n    _____   _____  ____ _   _____   255.255.255.0_  __ __ __ __   _
   n    _____   _____  ____ _   _____   255.255.255.0_  __ __ __ __   _
```

> Enter values

Field	Conditions/Comments
Inter-region IP connectivity allowed?	Enter **y** to allow IP endpoints (phones and trunks) to use MedPro resources administered in regions that are different from the endpoints' regions.
Enable Eth Pt	The Ethernet port must be enabled (**y**) before it can be used. The port must be disabled (**n**) before changes can be made to its attributes on this screen.
Type	Enter c-lan or medpro.
Slot	Enter the slot location for the circuit pack.
Code	Display only. This field is automatically populated with TN799 for C-LAN or TN802 for MedPro.
Sfx	Display only. This field is automatically populated with B for the TN802 and TN799.
Node name	Enter the unique node name for the IP interface. The node name here must already be administered on the Node Names screen
	1 of 2

Field	Conditions/Comments
Subnet Mask	Enter the subnet mask associated with the IP address for this IP interface. (The IP address is associated with the node name on the Node Names screen).
	In this example, leave the default subnet mask, 255.255.255.0, which indicates no subnetting for a Class C IP address.
	See the discussion of subnetting, Subnetting (page 16), in Chapter 1 and Configuration 1: R8r <—ppp—> R8si (page 60) in this chapter for details about subnet masks.
Gateway Addr	Leave blank for this configuration. The only IP connection to this IP interface is node-3 on Switch 3. Node-3 is on the same subnetwork as this IP interface, so no gateway is needed.
	In general, for connectivity to other (sub)networks, enter the address of a network node that will serve as the default gateway to the other (sub)networks.
Net Rgn	Enter the region number for this IP interface.
	2 of 2

Switch 1 Task — Assign Link via ethernet Data Module to Ethernet

This task administers an ethernet data module for the ethernet connection to node 3. The data module associates a link number with a port address, extension number, and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **a da n**

```
add data next
                                                            Page 1 of X
                          DATA MODULE

    Data Extension: 2377                 Name: ethernet on link 2          BCC: 2
               Type: ethernet
               Port: 01c0817
               Link: 2


Network uses 1's for broadcast addresses? y
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection.
Port:	Ethernet connections must be assigned to port 17 on the C-LAN circuit pack.
Link:	The link number must be in the range 1 – 33 (for R8r), not previously assigned on this switch.
Name:	Information-only; appears in list generated by the "list data module" command.
Network uses 1's for broadcast addresses?	Leave the default (**y**) if the private network contains only DEFINITY switches and adjuncts. Set to **n** only if the network includes non-DEFINITY switches that use the 0's method of forming broadcast addresses. See Appendix A, "Data Module - type ethernet" for more information about this field.

> Submit the screen

End

Switch 1 Task — Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on the
Switch 1.

Steps

Begin

> Open the Processor Channel Assignment form — enter **ch com p**.

```
change communications-interface processor-channels
                                                                   Page 1 of X
                           PROCESSOR CHANNEL ASSIGNMENT

Proc                    Gtwy        Interface      Destination        Session       Mach
Chan Enable  Appl.      To   Mode   Link/Chan      Node       Port  Local/Remote    ID
  1:    n    _____    _    __  _____  _____    0____   ___  ___  ___
  2:    n    _____    _    __  _____  _____    0____   ___  ___  ___
  3:    n    _____    _    __  _____  _____    0____   ___  ___  ___
  :
 12:    y    dcs___     s    1   5003   node-2       0____   12   21   2_
 13:    y    dcs___     s    2   5003   node-3       0____   13   31   3_
  :
384:    n    _____    _    __  _____  _____    0____   ___  ___  ___
```

> Enter values

Field	Conditions/Comments
Processor Channel 12: (ppp connection to Switch 2)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-1-ppp is the "server" for this session. Set node-2 to "client" (**c**).
Interface Link	This must match the link number assigned on the node-1a data module screen.
Interface Chan	or TCP/IP, interface channel numbers are in the range 5000 – 64500.
	The recommended values are: 5001 for CMS, 5002 for Intuity AUDIX, and 5003 for DCS connections that are not gateways. These three values should be reused for multiple instances of these applications; for example, if there are two Intuity AUDIX's, use 5002 for both; or if there are four DEFINITY ECS's, use 5003 for all four. The combination of Link, Interface Channel, and Mach ID must be unique.
	This number must match the Destination Port number on the Switch-2 Processor Channel screen.
	1 of 3

Field	Conditions/Comments
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen. For ppp connections, it must match the Destination Node Name entered on the ppp Data Module screen.
Destination Port	A value of **0** allows any available interface channel on the destination node to be used for this connection. The Interface Channel number for this connection on the Switch-2 Processor Channel screen must also be set to **0**.
Session - Local	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Session - Remote	
	It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.
Processor Channel 13: (ethernet connection to Switch 3)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-1-eth is the "server" for this session. Set node-3 to "client" (**c**).
Interface Link	This must match the link number assigned on the node-1b data module screen.
Interface Chan	For TCP/IP, interface channel numbers are in the range 5000 – 64500. The value 5003 is recommended for the DCS connections. This number must match the Destination Port number on the Switch-2 Processor Channel screen. (Note that **5003** can be used for the connections to both Switch 2 and 3 because they are on different links).
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen. For ppp connections, it must match the Destination Node Name entered on the ppp Data Module screen.
Destination Port	A value of **0** allows any available interface channel on the destination node to be used for this connection. The Interface Channel number on the Switch-3 Processor Channel screen must also be set to **0**.

2 of 3

Field	Conditions/Comments
Session - Local	For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Session - Remote	
Mach ID	Destination switch ID identified on the dial plan of the destination switch.

3 of 3

> Submit the screen

End

Switch 2 Task — Enable Bus Bridge Connectivity

This task enables the bus bridge functionality on the C-LAN circuit pack to provide a path between the packet bus and the processor.

Note: Bus Bridge Connectivity is used on the csi model only. This task may have been complete when the C-LAN circuit pack was installed.

Steps

Begin

> Open the Maintenance-Related System Parameters form — enter `ch sys ma`

> Go to page 2 and skip to the Packet Intf2? field near the bottom of the screen

```
change system-parameters maintenance                          Page   2 of   3

                  MAINTENANCE-RELATED SYSTEM PARAMETERS

MINIMUM MAINTENANCE THRESHOLDS ( Before Notification )
        TTRs: 4          CPTRs: 1         Call Classifier Ports: 0
        MMIs: 0           VCs: 0

TERMINATING TRUNK TRANSMISSION TEST ( Extension )
   Test Type 100:          Test Type 102:          Test Type 105:

ISDN MAINTENANCE
   ISDN-PRI Test Call Extension:          ISDN-BRI Service SPID:

DS1 MAINTENANCE
   DS0 Loop-Around Test Call Extension:

LOSS PLAN ( Leave Blank if no Extra Loss is Required )
   Minimum Number of Parties in a Conference Before Adding Extra Loss:

SPE OPTIONAL BOARDS
                   Packet Intf1? y     Packet Intf2? y
         Bus Bridge: 01a04   Inter-Board Link Timeslots  Pt0: 6 Pt1: 1 Pt2: 1
```

> Enter values

Field	Conditions/Comments
Packet Intf2?	Enables the bus bridge.
Bus Bridge:	Location of the C-LAN circuit pack. If the system has two C-LANs, only one is administered for bus bridge.
Inter-Board Link Timeslots: Pt0, Pt1, Pt2	Specifies the bandwidth used on the 3 ports of the Inter-Board Link. The total number of timeslots assigned cannot exceed 11. Pt0 carries PPP traffic and can have 1–9 timeslots. Pt1 carries maintenance messages and can have 1–3 timeslots. Pt2 carries broadcast messages and can have 1–3 timeslots.

> Submit the screen

End

Switch 2 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network. This screen is administered on Switch 2. A Node Names screen must be administered on each switch in the network.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or from a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names form — enter **ch node-n**

> Go to page 2

```
change node-names
                                                              Page 2 of 6
                             NODE NAMES

     Name                IP Address         Name              IP Address
  default            0   .0  .0  .0    _____    ___.___.___.___
  node-1-ppp         192.168.10 .130    _____    ___.___.___.___
  node-2             192.168.10 .12     _____    ___.___.___.___
  node-3             192.168.10 .129    _____    ___.___.___.___
  _____   ___.___.___.___    _____    ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name	Enter unique node names for the following 3 nodes: • C-LAN PPP port on Switch 2 • C-LAN PPP port on Switch 1. • C-LAN Ethernet port on Switch 3
IP Address	The unique IP addresses of the nodes named in the previous field.

> Submit the screen

End

Switch 2 Task — Assign Link via ppp Data Module to Switch 1

This task administers a ppp data module on Switch 2 for the ppp connection to Switch 1. The data module associates a link number with a port address, extension number, and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **ad da 3020**

```
add data-module 3020
                                                         Page 1 of x
                          DATA MODULE

    Data Extension: 3020              Name: _ppp on link 1 to node-1-ppp_   BCC: 2
             Type: ppp____            COS: 1
             Port: 01a0413            COR: 1
             Link: 1_                  TN: 1
      Enable Link? n

        Node Name: node-2_____
      Subnet Mask: 255.255.255.0__


Establish Connection: n

DESTINATION
           Digits: _____
        Node Name: node-1-ppp_____
            CHAP? n
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection.
Port:	In this example, the C-LAN circuit pack is in slot 01a04; the ppp connection is through port 13.
Link:	The link number must be in the range 1 – 25 (for R8csi), not previously assigned on this switch
Enable Link?	If you need to add an IP route that uses this node as a gateway, this field must be set to **y** *before* adding the IP route. Otherwise leave this field set to **n** until the link administration is complete; that is, until after all data modules and the processor channels are assigned, then set to **y**.
Name:	Information-only; appears in list generated by the "list data module" command.
BCC:	Bearer Capability Class. This is a display-only field.
	1 of 2

Field	Conditions/Comments
COS: COR: TN:	The values for these fields will be specified by the system administrator.
Node Name:	The node name for the interface defined by this data module. This must be a name
Establish Connection?	**n** means that the switch at the remote end of this connection (Switch 1 in this case) will be responsible for the call setup. Enter **y** when administering the data module for Switch 1.
Destination Digits:	Not needed if the "Establish Connection?" field is set to **n**
Destination Node Name:	Name of the node at the far end of this connection. This must be a name entered on the Node Names screen.
CHAP?	This field enables/disables the Challenge Handshake Authentication Protocol security mechanism on this link. If you enter **y**, the system will prompt for a CHAP secret (password).

2 of 2

> Submit the screen

End

Switch 2 Task — Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on the Switch 2.

Steps

Begin

> Open the Processor Channel Assignment form — enter **ch com p**

```
change communications-interface processor-channels
                                                            Page 1 of X
                      PROCESSOR CHANNEL ASSIGNMENT

Proc                     Gtwy       Interface       Destination        Session      Mach
Chan Enable  Appl.   To  Mode   Link/Chan          Node        Port  Local/Remote  ID
  1:    n    _____      _    __  _____   _____    0___  ___   ___   ___
  2:    n    _____      _    __  _____   _____    0___  ___   ___   ___
  3:    n    _____      _    __  _____   _____    0___  ___   ___   ___
  4:    n    _____      _    __  _____   _____    0___  ___   ___   ___
  :
 21:    y    dcs_         c    1   0____   node-1-ppp_____  5003_  21_   12_   1_
 23:    y    dcs_         c    1   0____   node-3_____  5003_  23_   32_   3_
  :
 64:    n    _____      _    __  _____   _____    0___  ___   ___   ___
```

> Enter values

Field	Conditions/Comments
For Processor Channel 21: (ppp connection to Switch 1)	
Enable	Set to **y** after the link administration is complete.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-2 is the "client" for this session. Set node-1-ppp on Switch 1 to "server" (**s**).
Interface Link	This must match the link number assigned on the node-2 data module screen.
Interface Chan	A value of **0** allows any available interface channel to be used for this connection. The Destination Port number on the Switch-1 Processor Channel screen must also be set to **0**.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen. For ppp connections, it must match the Destination Node Name entered on the ppp Data Module screen.
Destination Port	This number must match the Interface Channel number assigned on the Switch-1 Processor Channel screen
	1 of 2

Field	Conditions/Comments
Session - Local Session - Remote	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa. It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.
For Processor Channel 23: (connection to Switch 3 through Switch 1)	
Enable	Set to **y** after the link administration is complete.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-2 is the "client" for this session. Set node-3 to "server" (**s**).
Interface Link	This must match the link number assigned on the node-2 data module screen.
Interface Chan	A value of **0** allows any available interface channel to be used for this connection. The Destination Port number on the Switch-1 Processor Channel screen must also be set to **0**.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen. For ppp connections, it must match the Destination Node Name entered on the ppp Data Module screen.
Destination Port	This number must match the Interface Channel number assigned on the Switch-1 Processor Channel screen
Session - Local Session - Remote	For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.

2 of 2

> Submit the screen

End

Switch 2 Task — Assign IP Route to node-3

This task specifies an initial route for messages handled by node-2 that are destined for node-3. An IP route is required for this route because there are intermediate nodes between node-2 and node-3.

Steps

Begin

> Enable the ppp link on the node-2 data module screen:

    ch da 3020, set Enable Link? to **y**.

>Open the IP Routing form — enter **a ip n**

```
add ip-route next                                  Page   1 of   1
                         IP ROUTING


      Route Number: 1
  Destination Node: node-3
           Gateway: node-1-ppp
        C-LAN Board: 1a04
            Metric: 0
```

[The system assigns the route number 1.]

> Enter values

Field	Conditions/Comments
Destination Node:	The name of the node at the destination of this route.
Gateway:	Node name of the gateway by which the destination node is reached for this route.
C-LAN Board:	The location of the C-LAN circuit pack that provides the interface for this route.
Metric:	Enter **0**. See IP Routing (page 251) in Appendix A for more information on the use of the Metric field.

> Submit the screen

End

Switch 3 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network. This screen is administered on Switch 3. A Node Names screen must be administered on each switch in the network.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or from a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names form — enter **ch node-n**

> Go to page 2

```
change node-names
                                                          Page 2 of 6
                        NODE NAMES

    Name              IP Address        Name              IP Address
default_____   0 .0 .0 .0 __   _____   ___.___.___.___
node-1-eth_____   192.168.10 .128   _____   ___.___.___.___
node-2_____   192.168.10 .12_   _____   ___.___.___.___
node-3_____   192.168.10 .129   _____   ___.___.___.___
_____   ___.___.___.___   _____   ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name	Enter unique node names for the following 3 nodes: • C-LAN Ethernet port on Switch 3 • C-LAN Ethernet port on Switch 1. • C-LAN PPP port on Switch 2
IP Address	The unique IP addresses of the nodes named in the previous field.

> Submit the screen

End

Switch 3 Task — Assign IP Interfaces

The IP interface for each C-LAN board on the switch must be defined on the IP Interfaces form. Each DEFINITY switch in an IP network has one IP Interfaces form.

Steps

Begin

> Open IP Interfaces form — enter **ch ip-i**

```
change ip-interfaces                                      Page   1 of   2

                            IP Interfaces

 Inter-region IP connectivity allowed?  n
Enable                                                                 Net
Eth Pt Type    Slot  Code Sfx Node Name      Subnet Mask      Gateway Addr   Rgn
   y    C-LAN  01a05 TN799 B  node-3         255.255.255.0    192.168.10 .128 ._1
   n                                         255.255.255.0
   n                                         255.255.255.0
   n                                         255.255.255.0
```

> Enter values

Field	Conditions/Comments
Inter-region IP connectivity allowed?	Enter **y** to allow IP endpoints (phones and trunks) to use MedPro resources administered in regions that are different from the endpoints' regions.
Enable Eth Pt	The Ethernet port must be enabled (**y**) before it can be used. The port must be disabled (**n**) before changes can be made to its attributes on this screen.
Type	Enter c-lan or medpro.
Slot	Enter the slot location for the circuit pack.
Code	Display only. This field is automatically populated with TN799 for C-LAN or TN802 for MedPro.
Sfx	Display only. This field is automatically populated with B for the TN802 and TN799.
Node name	Enter the unique node name for the IP interface. The node name here must already be administered on the Node Names screen

1 of 2

Field	Conditions/Comments
Subnet Mask	Enter the subnet mask associated with the IP address for this IP interface. (The IP address is associated with the node name on the Node Names screen). In this example, leave the default subnet mask, 255.255.255.0, which indicates no subnetting for a Class C IP address. See the discussion of subnetting, Subnetting (page 16), in Chapter 1 and Configuration 1: R8r <—ppp—> R8si (page 60) in this chapter for details about subnet masks.
Gateway Addr	Leave blank for this configuration. The only connection to this IP interface is node-1 on Switch 1. Node-1 is on the same subnetwork as this IP interface, so no gateway is needed. In general, for connectivity to other (sub)networks, enter the address of a network node that will serve as the default gateway to the other (sub)networks.
Net Rgn	Enter the region number for this IP interface.
	2 of 2

Switch 3 Task — Assign Link via ethernet Data Module to the LAN

This task administers an ethernet data module on Switch 3 for the ethernet connection. The data module associates a link number with a port address, extension number, and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **a da n**

```
add data next                                               Page 1 of X
                            DATA MODULE

Data Extension: 3901           Name: ethernet on link 1            BCC: 2
               Type: ethernet
               Port: 01a0517
               Link: 1

Network uses 1's for broadcast addresses? y
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this link.
Port:	Ethernet connections must be assigned to port 17 on the C-LAN circuit pack.
Link:	The link number must be in the range 1 – 25, not previously assigned on this switch.
Name:	Information-only; appears in "list data module" list.
Network uses 1's for broadcast addresses?	Leave the default (**y**) if the private network contains only DEFINITY switches and adjuncts. Set to **n** only if the network includes non-DEFINITY switches that use the 0's method of forming broadcast addresses. See Appendix A, "Data Module - type ethernet" for more information about this field.

> Submit the screen

End

Switch 3 Task — Assign Processor Channels

This task associates data links with processor channels on Switch 3.

Steps

Begin

> Open the Processor Channel Assignment form — enter **ch com p**

```
change communications-interface processor-channels
                                                              Page 1 of X
                    PROCESSOR CHANNEL ASSIGNMENT

Proc                    Gtwy        Interface    Destination        Session     Mach
Chan Enable   Appl.     To  Mode    Link/Chan    Node        Port  Local/Remote  ID
  1:    n     _____   _   __  _____  _____   0____  ___  ___   __
  2:    n     _____   _   __  _____  _____   0____  ___  ___   __
  :
 31:    y     dcs____   c   1   0____  node-1-eth 5003_   31_  13_   1_
 32:    y     _dcs___   s   1   5003_  node-2___   0___   32_  23_   2_
 64:    n     _____   _   __  _____  _____   0____  ___  ___   __
```

> Enter values

Field	Conditions/Comments
Processor Channel 31: (ethernet connection to Switch 1)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-3 is the "client" for this session. Set node-1-eth to "server" (**s**).
Interface Link	This must match the link number assigned on the node-3 data module screen.
Interface Chan	A value of **0** allows any available interface channel to be used for this connection. The Destination Port number on the Switch-1 Processor Channel screen must also be set to **0**.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.
Destination Port	This number must match the Interface Channel number assigned on the Switch-1 Processor Channel screen.
	1 of 2

Field	Conditions/Comments
Session - Local Session - Remote	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa. It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.
For Processor Channel 32: (connection to Switch 2 through Switch 1)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-3 is the "server." Set node-2 to "client" (**c**).
Interface Link	This must match the link number assigned on the node-3 data module screen.
Interface Chan	This must match the Destination Port number on the Switch-1 Processor Channels screen.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.
Destination Port	or TCP/IP, interface channel numbers are in the range 5000 – 64500. The recommended values are: 5001 for CMS, 5002 for Intuity AUDIX, and 5003 for DCS connections that are not gateways. These three values should be reused for multiple instances of these applications. The combination of Link, Interface Channel, and Mach ID must be unique. This number must match the Destination Port number on the Switch-2 Processor Channel screen.
Session - Local Session - Remote	For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.

2 of 2

> Submit the screen

End

Enable links and processor channels

You must enable links and processor channels before the connections can be used.

To enable a link, open its data module screen (**ch da** [**ext**]) and set the Enable Link? field to **y**.

[note: to view a list of assigned data modules and their extensions, enter the "list data-module" command (**l da**)]

To enable the processor channels, open the processor channel screen (**ch com p**) and set the Enable field to **y** for each assigned processor channel.

Note: 1. You must disable a link or processor channel before you can change its parameters.

Note: 2. The **busy-out** command overrules the data module Enable Link? field.

Note: 3. On the C-LAN boards, low-level connectivity can remain intact when higher-level applications such as DCS are not functioning. For example, an external ping to a C-LAN's ethernet port could be successful even when the board is busied-out. When debugging connectivity problems, pinging only checks low-level connectivity.

Configuration 5B: R8csi <—ppp—> R8r (2 C-LANs) <—ethernet—> R8si

In this configuration, a DEFINITY ECS R8r acts as a gateway between two other nodes — one connected via ppp to an R8csi and the other via ethernet to another R8si. This configuration is the same as configuration 5A except that Switch 1 has two C-LAN circuit packs instead of one. One C-LAN handles the ppp connection and the other handles the ethernet connection.
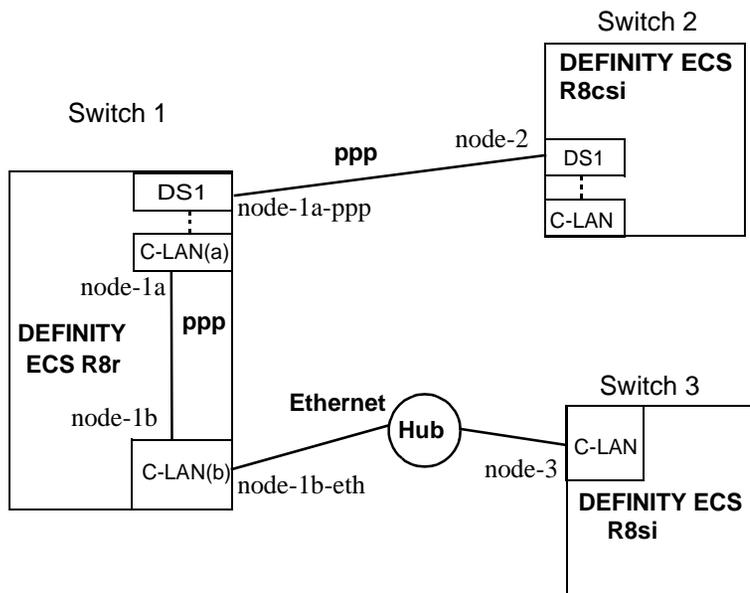
Task Summary

The following tasks need to be completed for Switch 1, Switch 2, and Switch 3:

1 Review checklist

2 Switch 1 administration

   a Assign node names
   b Assign link to (via a data module) to node-2
   c Assign link to (via a data module) to the LAN
   d Assign link (via a data module) from C-LAN(a) to C-LAN(b)
   e Assign link (via a data module) from C-LAN(b) to C-LAN(a)
   f Assign processor channels
   g Assign IP Route: C-LAN(a) to node-3
   h Assign IP Route: C-LAN(b) to node-2

3 Switch 2 administration

   a Enable bus bridge connectivity
   b Assign node names
   c Assign link (via a data module) to node-1a-ppp
   d Assign processor channels
   e Assign IP Route to node-3

    4 Switch 3 administration

       a Assign node names
       b Assign link (via a data module) to the LAN
       c Assign processor channels

    5 Enable links and processor channels

Prerequisite Administration

There are some system administration tasks that need to be completed before you can proceed with the connectivity administration described in this section.

Review the checklist of prerequisite administration tasks in the Checklist for Prerequisite Administration (page 54), before proceeding with the connectivity administration in this section.

Configuration 5B

SWITCH 2 | *SWITCH 1* | *SWITCH 3*

DEFINITY ECS R7csi | **DEFINITY ECS R7r** | **DEFINITY ECS R7si**

software-defined connections

Processor channels	Interface channels	Interface channels	Processor channels	Interface channels	Interface channels	Processor channels
1	1	1	1	1	1	1
2	5000	5000	•	5000	500	2
•	•	•	•	•	•	•
•	•	•	12	•	•	•
21	x_1(any)	5003	13	5003	x(any)	31
23	x_2(any)		•		6004	32
•	•	•	•	•	•	•
128	64500	64500	384	64500	64500	256

Link 1 | Link 1 | Link 12 | Link 21 | Link 2 | Link 1

hardware connections

Processor UN331B

Processor TN790B

Processor bus

Processor bus

Processor TN798B

DS1 TN767/ TN464

Voice data

ppp data

DS1 TN767/ TN464

Network control UN332B

DS1 TN767/ TN464

Voice data

DS1 TN767/ TN464

NetPkt TN794

TDM bus

TDM bus

TDM bus

ppp

10BaseT ethernet

Bus bridge

C-LAN TN799 ①

C-LAN(a) TN799 ② ③

PktInt TN1655

C-LAN(b) TN799 ④

C-LAN TN799

⑤ ⑥

Packet bus | Packet bus | Packet bus

①	②	③	④	⑤	⑥
node-2	node-1a-ppp	node-1a	node-1b	node-1b-eth	node-3
Ext 3020	Ext 2010	Ext 2013	Ext 2378	Ext 2377	Ext 3901
loc 1a0413	loc 1c0709	loc 1c0713	loc 1c0815	loc 1c0817	loc 1a0517
192.168.10.12	192.168.10.11	192.168.10.13	192.168.10.130	192.168.10.128	192.168.10.129

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Switch 1 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network. This screen is administered on Switch 1. A Node Names screen must be administered on each switch in the network.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names form — enter **ch node-n**

> Go to page 2

```
change node-names                                         Page 2 of 6
                           NODE NAMES
Name                 IP Address      Name                 IP Address
default              0  .0  .0  .0   _____       ___.___.___.___
node-1a-ppp          192.168.10 .11  _____       ___.___.___.___
node-1a              192.168.10 .13  _____       ___.___.___.___
node-1b              192.168.10 .130 _____       ___.___.___.___
node-1b-eth          192.168.10 .128 _____       ___.___.___.___
node-2               192.168.10 .12  _____       ___.___.___.___
node-3               192.168.10 .129 _____       ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name	Enter unique node names for the following 6 nodes: • C-LAN(a) PPP port on Switch 1 for the connection to Switch 2 • C-LAN(a) PPP port on Switch 1 for the connection to C-LAN(b) • C-LAN(b) PPP port on Switch 1 for the connection to C-LAN(a) • C-LAN(b) Ethernet port on Switch 1 • C-LAN PPP port on Switch 2. • C-LAN Ethernet port on Switch 3
IP Address	The unique IP addresses of the nodes named in the previous field.

> Submit the screen1

End

Switch 1 Task — Assign Link via ppp Data Module to Switch 2

This task administers a ppp data module on Switch 1 for the ppp connection to Switch 2. The data module associates a link number with a port address, extension number, and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **ad da 2010**

```
add data-module 2010
                                                            Page 1 of x
                          DATA MODULE

    Data Extension: 2010               Name: _ppp on link 1 to node 2___   BCC: 2
               Type: ppp_____         COS: 1
               Port: 01c0709          COR: 1
               Link: 1_                TN: 1
        Enable Link? n

          Node Name: node-1a-ppp___
        Subnet Mask: 255.255.255.0___


Establish Connection: y

DESTINATION
             Digits: 8993020_____
          Node Name: node-2_____
              CHAP? n
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this link.
Port:	In this example, the C-LAN(a) circuit pack is in slot 01c07; the ppp connection is through port 09.
Link:	The link number must be in the range 1 – 33 (for R8r), not previously assigned on this switch.
Enable Link?	If you need to add an IP route that uses this node as a gateway, this field must be set to **y** *before* adding the IP route. Otherwise leave this field set to **n** until the link administration is complete; that is, until after all data modules and the processor channels are assigned, then set to **y**.
Name:	Information-only; appears in list generated by the "list data module" command.
BCC:	Bearer Capability Class. This is a display-only field.
	1 of 2

Field	Conditions/Comments
COS	The values for these fields will be specified by the system administrator.
COR:	
TN:	
Node Name:	The node name for the interface defined by this data module. This must be a name entered on the Node Names screen.
Establish Connection?	**y** means that this switch will be responsible for the call setup. Enter **n** when administering the data module for Switch 2.
Destination Digits:	Trunk access code (899) plus extension of data module on node-2 (3020).
Destination Node Name:	Name of the node at the far end of this connection. Must be a name entered on the Node Names screen
CHAP?	This field enables/disables the Challenge Handshake Authentication Protocol security mechanism on this link. If you enter **y**, the system will prompt for a CHAP secret (password).

2 of 2

> Submit the screen

End

Switch 1 Task — Assign IP Interfaces

The IP interface for each C-LAN board on the switch must be defined on the IP Interfaces form. Each DEFINITY switch in an IP network has one IP Interfaces form.

Steps

Begin

> Open IP Interfaces form — enter **ch ip-i**

```
change ip-interfaces                                        Page   1 of   2

                             IP Interfaces

 Inter-region IP connectivity allowed?  n
Enable                                                                   Net
Eth Pt Type    Slot  Code Sfx Node Name      Subnet Mask      Gateway Addr   Rgn
  y    C-LAN   01c08 TN799 B  node-1b-eth    255.255.255.0    ___.___.___.___  1
  n    _____   _____ ____ _   _____ 255.255.255.0    ___ ___ ___ ___ _
  n    _____   _____ ____ _   _____ 255.255.255.0    ___ ___ ___ ___ _
  n    _____   _____ ____ _   _____ 255.255.255.0    ___ ___ ___ ___ _
```

> Enter values

Field	Conditions/Comments
Inter-region IP connectivity allowed?	Enter **y** to allow IP endpoints (phones and trunks) to use MedPro resources administered in regions that are different from the endpoints' regions.
Enable Eth Pt	The Ethernet port must be enabled (**y**) before it can be used. The port must be disabled (**n**) before changes can be made to its attributes on this screen.
Type	Enter c-lan or medpro.
Slot	Enter the slot location for the circuit pack.
Code	Display only. This field is automatically populated with TN799 for C-LAN or TN802 for MedPro.
Sfx	Display only. This field is automatically populated with B for the TN802 and TN799.
Node name	Enter the unique node name for the IP interface. The node name here must already be administered on the Node Names screen
	1 of 2

Field	Conditions/Comments
Subnet Mask	Enter the subnet mask associated with the IP address for this IP interface. (The IP address is associated with the node name on the Node Names screen).
	In this example, leave the default subnet mask, 255.255.255.0, which indicates no subnetting for a Class C IP address.
	See the discussion of subnetting , Subnetting (page 16), in Chapter 1 and Configuration 1: R8r <—ppp—> R8si (page 60) in this chapter for details about subnet masks.
Gateway Addr	Leave blank for this configuration. The only connection to this IP interface is node-3 on Switch 3, which is on the same subnetwork as this IP interface, so no gateway is needed.
	In general, for connectivity to other (sub)networks, enter the address of a network node that will serve as the default gateway to the other (sub)networks.
Net Rgn	Enter the region number for this IP interface.
	2 of 2

Switch 1 Task — Assign Link via ethernet Data Module to the LAN

This task administers an ethernet data module on Switch 1 for the ethernet connection. The data module associates a link number with a port address, extension number, and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **a da n**

```
add data next
                                                            Page 1 of X
                        DATA MODULE

    Data Extension: 2377              Name: ethernet on link 2          BCC: 2
              Type: ethernet
              Port: 01c0817
              Link: 2


Network uses 1's for broadcast addresses? y
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection.
Port:	Ethernet connections must be assigned to port 17 on the C-LAN(b) circuit pack.
Link:	The link number must be in the range 1 – 33 (for R8r), not previously assigned on this switch.
Name:	Information-only; appears in list generated by the "list data module" command.
Network uses 1's for broadcast addresses?	Leave the default (**y**) if the private network contains only DEFINITY switches and adjuncts. Set to **n** only if the network includes non-DEFINITY switches that use the 0's method of forming broadcast addresses. See Appendix A, "Data Module - type ethernet" for more information about this field.

> Submit the screen

End

Switch 1 Task — Assign Link via ppp Data Module to C-LAN(a)

This task administers a ppp data module on Switch 1 for the ppp connection from the C-LAN(b) circuit pack to the C-LAN(a) circuit pack.

Steps

Begin

> Open Data Module form — enter **ad da 2378**

```
add data-module 2378
                                                               Page 1 of x
                              DATA MODULE

    Data Extension: 2378                 Name: _ppp on link 21 to clan(a)_  BCC: 2
               Type: ppp                  COS: 1
               Port: 01c0815              COR: 1
               Link: 21                    TN: 1
       Enable Link? n

          Node Name: node-1b
        Subnet Mask: 255.255.255.0


Establish Connection: n

DESTINATION
             Digits: _____
          Node Name: node-1a
              CHAP? n
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this link.
Port:	In this example, the C-LAN(b) circuit pack is in slot 01c08; the ppp connection is through port 15.
Link:	The link number must be in the range 1 – 33 (for R8r), not previously assigned on this switch
Enable Link?	If you need to add an IP route that uses this node as a gateway, this field must be set to **y** *before* adding the IP route. Otherwise leave this field set to **n** until the link administration is complete; that is, until after all data modules and the processor channels are assigned, then set to **y**.
Name:	Information-only; appears in list generated by the "list data module" command.
BCC:	Bearer Capability Class. This is a display-only field.
	1 of 2

Field	Conditions/Comments
COS	The values for these fields will be specified by the system administrator.
COR:	
TN:	
Node Name:	The node name for the interface defined by this data module. This must be a name entered on the Node Names screen.
Subnet Mask:	
Establish Connection?	**n** means that the node at the remote end of this connection (node-1b in this case) will be responsible for the call setup. Enter **y** when administering the data module for node-1b.
Destination Digits:	Not needed if the "Establish Connection?" field is set to **n**
Destination Node Name:	Name of the node at the far end of this connection. Must be a name entered on the Node Names screen.
CHAP?	This field enables/disables the Challenge Handshake Authentication Protocol security mechanism on this link. If you enter **y**, the system will prompt for a CHAP secret (password).

2 of 2

> Submit the screen

End

Switch 1 Task — Assign Link via ppp Data Module to C-LAN(b)

This task administers a ppp data module on Switch 1 for the ppp connection from the C-LAN(a) circuit pack to the C-LAN(b) circuit pack.

Steps

Begin

> Open Data Module form — enter **ad da 2013**

```
add data-module 2013
                                                              Page 1 of x
                          DATA MODULE

    Data Extension: 2013              Name: _ppp on link 12 to clan(b)__  BCC: 2
              Type: ppp_____          COS: 1
              Port: 01c0713           COR: 1
              Link: 12                 TN: 1
       Enable Link? n

         Node Name: node-1a_____
       Subnet Mask: 255.255.255.0___


Establish Connection: y

DESTINATION
            Digits: 2378_____
         Node Name: node-1b_____
             CHAP? n
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this link.
Port:	In this example, the C-LAN(a) circuit pack is in slot 01a07; the ppp connection is through port 13.
Link:	The link number must be in the range 1 – 33 (for R8r), not previously assigned on this switch.
Enable Link?	If you need to add an IP route that uses this node as a gateway, this field must be set to **y** *before* adding the IP route. Otherwise leave this field set to **n** until the link administration is complete; that is, until after all data modules and the processor channels are assigned, then set to **y**.
Name:	Information-only; appears in list generated by the "list data module" command.
BCC:	Bearer Capability Class. This is a display-only field.
	1 of 2

Field	Conditions/Comments
COS	The values for these fields will be specified by the system administrator.
COR:	
TN:	
Node Name:	The node name for the interface defined by this data module. This must be a name entered on the Node Names screen.
Subnet Mask:	
Establish Connection?	**y** means that this node is responsible for the call setup for the link to node-1c. Enter **n** when administering the data module for node-1c.
Destination Digits:	Extension (2378) of data module on node-1c.
Destination Node Name:	Name of the node at the far end of this connection. Must be a name entered on the Node Names screen.
CHAP?	This field enables/disables the Challenge Handshake Authentication Protocol security mechanism on this link. If you enter **y**, the system will prompt for a CHAP secret (password).

2 of 2

> Submit the screen

End

Switch 1 Task — Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on Switch 1. Note that there are no processor channels or interface channels associated with the ppp connection between the two C-LAN circuit packs.

Steps

Begin

> Open the Processor Channel Assignment form — enter **ch com p**.

```
change communications-interface processor-channels
                                                                    Page 1 of X
                         PROCESSOR CHANNEL ASSIGNMENT

Proc                    Gtwy      Interface     Destination       Session      Mach
Chan Enable  Appl.   To  Mode   Link/Chan     Node       Port  Local/Remote   ID
  1:    n    _____     _       __  _____    _____   0    ___  ___      ___
  2:    n    _____     _       __  _____    _____   0    ___  ___      ___
  3:    n    _____     _       __  _____    _____   0    ___  ___      ___
  :
 12:    y    dcs         s       1   5003     node-2       0    12   21        2
 13:    y    dcs         s       2   5003     node-3       0    13   31        3
  :
384:    n    _____     _       __  _____    _____   0    ___  ___      ___
```

> Enter values

Field	Conditions/Comments
Processor Channel 12: (ppp connection to Switch 2)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-1a is the "server" for this session. Set node-2 to "client" (**c**).
Interface Link	This must match the link number assigned on the node-1a data module screen.
Interface Chan	For TCP/IP, interface channel numbers are in the range 5000 – 64500.
	The recommended values are: 5001 for CMS, 5002 for Intuity AUDIX, and 5003 for DCS connections that are not gateways. These three values should be reused for multiple instances of these applications; for example, if there are two Intuity AUDIX's, use 5002 for both; or if there are four DEFINITY ECS's, use 5003 for all four. The combination of Link, Interface Channel, and Mach ID must be unique.
	This number must match the Destination Port number on the Switch-2 Processor Channel screen
	1 of 3

Field	Conditions/Comments
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen. For ppp connections, it must match the Destination Node Name entered on the ppp Data Module screen.
Destination Port	A value of **0** allows any available interface channel on the destination node to be used for this connection. The Interface Channel number on the Switch-2 Processor Channel screen must also be set to **0**.
Session - Local	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Session - Remote	
	It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.
Processor Channel 13: (ethernet connection to Switch 3)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-1d is the "server" for this session. Set to node-3 to "client" (**c**).
Interface Link	This must match the link number assigned on the node -1d data module screen.
Interface Chan	or TCP/IP, interface channel numbers are in the range 5000 – 64500.
	The recommended values are: 5001 for CMS, 5002 for Intuity AUDIX, and 5003 for DCS connections that are not gateways. These three values should be reused for multiple instances of these applications. The combination of Link, Interface Channel, and Mach ID must be unique.
	This number must match the Destination Port number on the Switch-3 Processor Channel screen
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.
Destination Port	A value of **0** allows any available interface channel on the destination node to be used for this connection. The Interface Channel number on the Switch-3 Processor Channel screen must also be set to **0**.

2 of 3

Field	Conditions/Comments
Session - Local	For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Session - Remote	
Mach ID	Destination switch ID identified on the dial plan of the destination switch.
	3 of 3

> Submit the screen

End

Switch 1 Task — Assign IP Route: C-LAN(a) to node-3

This task specifies a route for packets handled by C-LAN(a) destined for node-3. This route is needed because node-1a and node-3 are connected via ppp and there are intermediate nodes between them.

Steps

Begin

> Enable the ppp link on the node-1a data module screen:

   ch da 2013, set Enable Link? to **y**.

> Open the IP Routing form — enter **a ip n**

```
add ip-route next                                Page   1 of   1
                          IP ROUTING


      Route Number: 1
  Destination Node: node-3
           Gateway: node-1b
        C-LAN Board: 1c07
             Metric: 1
```

[The system assigns the route number 1.]

> Enter values

Field	Conditions/Comments
Destination Node:	The name of the node at the destination of this route.
Gateway:	Node name of the gateway by which the destination node is reached for this route.
C-LAN Board:	The location of the C-LAN circuit pack that provides the interface for this route.
Metric:	Enter **1**, which indicates a complex route involving two C-LAN boards. See IP Routing (page 251) in Appendix A for more information on the use of the Metric field.

> Submit the screen

End

Switch 1 Task — Assign IP Route: C-LAN(b) to node-2

This task specifies a route for packets handled by C-LAN(b) destined for node-2. This route is needed because node-1b and node-2 are connected via ppp and there are intermediate nodes between them.

Steps

Begin

> Enable the ppp link on the node-1b data module screen:

    ch da 2378, set Enable Link? to **y**.

> Open the IP Routing form — enter **a ip n**

```
add ip-route next                              Page   1 of   1
                          IP ROUTING


      Route Number: 3
   Destination Node: node-2
            Gateway: node-1a
        C-LAN Board: 1c08
             Metric: 1
```

[The system assigns the route number 3.]

> Enter values

Field	Conditions/Comments
Destination Node:	The name of the node at the destination of this route.
Gateway:	Node name of the gateway by which the destination node is reached for this route.
C-LAN Board:	The location of the C-LAN circuit pack that provides the interface for this route.
Metric:	Enter **1**, which indicates a complex route involving two C-LAN boards.
	See IP Routing (page 251) in Appendix A for more information on the use of the Metric field.

> Submit the screen

End

Switch 2 Task — Enable Bus Bridge Connectivity

This task enables the bus bridge functionality on the C-LAN circuit pack to provide a path between the packet bus and the processor.

Note: Bus Bridge Connectivity is used on the csi model only. This task may have been complete when the C-LAN circuit pack was installed.

Steps

Begin

> Open the Maintenance-Related System Parameters form — enter **ch sys ma**

> Go to page 2 and skip to the Packet Intf2? field near the bottom of the screen

```
change system-parameters maintenance                        Page   2 of   3

                MAINTENANCE-RELATED SYSTEM PARAMETERS

MINIMUM MAINTENANCE THRESHOLDS ( Before Notification )
        TTRs: 4         CPTRs: 1         Call Classifier Ports: 0
        MMIs: 0          VCs: 0

TERMINATING TRUNK TRANSMISSION TEST ( Extension )
   Test Type 100:          Test Type 102:          Test Type 105:

ISDN MAINTENANCE
   ISDN-PRI Test Call Extension:          ISDN-BRI Service SPID:

DS1 MAINTENANCE
   DS0 Loop-Around Test Call Extension:

LOSS PLAN ( Leave Blank if no Extra Loss is Required )
   Minimum Number of Parties in a Conference Before Adding Extra Loss:

SPE OPTIONAL BOARDS
                   Packet Intf1? y     Packet Intf2? y
         Bus Bridge: 01a04  Inter-Board Link Timeslots  Pt0: 6 Pt1: 1 Pt2: 1
```

> Enter values

Field	Conditions/Comments
Packet Intf2?	Enables the bus bridge.
Bus Bridge:	Location of the C-LAN circuit pack. If the system has two C-LANs, only one is administered for bus bridge.
Inter-Board Link Timeslots: Pt0, Pt1, Pt2	Specifies the bandwidth used on the 3 ports of the Inter-Board Link. The total number of timeslots assigned cannot exceed 11. Pt0 carries PPP traffic and can have 1–9 timeslots. Pt1 carries maintenance messages and can have 1–3 timeslots. Pt2 carries broadcast messages and can have 1–3 timeslots.

> Submit the screen

End

Switch 2 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network. This screen is administered on Switch 2. A Node Names screen must be administered on each switch in the network.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or from a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names form — enter **ch node-n**

> Go to page 2

```
change node-names
                                                          Page 2 of 6
                          NODE NAMES

   Name                 IP Address         Name              IP Address
default_____     0  .0  .0  .0  ___   _____   ___.___.___.___
node-1a-ppp_____    192.168.10 .11  ___   _____   ___.___.___.___
node-2_____    192.168.10 .12  ___   _____   ___.___.___.___
node-3_____    192.168.10 .129      _____   ___.___.___.___
_____    ___.___.___.___       _____   ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name	Enter unique node names for the following 3 nodes: • C-LAN(a) PPP port on Switch 1 for the connection to Switch 2 • C-LAN PPP port on Switch 2 • C-LAN Ethernet port on Switch 3
IP Address	The unique IP addresses of the nodes named in the previous field.

> Submit the screen

End

Switch 2 Task — Assign Link via ppp Data Module to Switch 1

This task administers a ppp data module on Switch 2 for the ppp connection to Switch 1. The data module associates a link number with a port address, extension number, and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **ad da 3020**

```
add data-module 3020
                                                              Page 1 of x
                            DATA MODULE

    Data Extension: 3020                 Name: _ppp on link 1 to node-1a-ppp BCC: 2
             Type: ppp                   COS: 1
             Port: 01a0413               COR: 1
             Link: 1                      TN: 1
      Enable Link? n

         Node Name: node-2
       Subnet Mask: 255.255.255.0

Establish Connection: n

DESTINATION
           Digits: _____
        Node Name: node-1a-ppp
            CHAP? n
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection.
Port:	In this example, the C-LAN circuit pack is in slot 01a04; the ppp connection is through port 13.
Link:	The link number must be in the range 1 – 25 (for R8csi), not previously assigned on this switch
Enable Link?	If you need to add an IP route that uses this node as a gateway, this field must be set to **y** *before* adding the IP route. Otherwise leave this field set to **n** until the link administration is complete; that is, until after all data modules and the processor channels are assigned, then set to **y**.
Name:	Information-only; appears in list generated by the "list data module" command.
BCC:	Bearer Capability Class. This is a display-only field.

1 of 2

Field	Conditions/Comments
COS:	The values for these fields will be specified by the system administrator.
COR:	
TN:	
Node Name:	The node name for the interface defined by this data module. This must be a name entered on the Node Names screen.
Subnet Mask:	
Establish Connection?	**n** means that the switch at the remote end of this connection (Switch 1 in this case) will be responsible for the call setup. Enter **y** when administering the data module for Switch 1.
Destination Digits:	Not needed if the "Establish Connection?" field is set to **n**
Destination Node Name:	Name of the node at the far end of this connection. This must be a name entered on the Node Names screen.
CHAP?	This field enables/disables the Challenge Handshake Authentication Protocol security mechanism on this link. If you enter **y**, the system will prompt for a CHAP secret (password).

2 of 2

> Submit the screen

End

Switch 2 Task — Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on
Switch 1.

Steps

Begin

> Open the Processor Channel Assignment form — enter **ch com p**

```
change communications-interface processor-channels
                                                              Page 1 of X
                     PROCESSOR CHANNEL ASSIGNMENT

Proc                  Gtwy        Interface      Destination      Session      Mach
Chan Enable  Appl.    To  Mode  Link/Chan         Node      Port Local/Remote  ID
  1:    n     _____     _    __  _____   _____  0     ___   ___   __
  2:    n     _____     _    __  _____   _____  0     ___   ___   __
  3:    n     _____     _    __  _____   _____  0     ___   ___   __
  4:    n     _____     _    __  _____   _____  0     ___   ___   __
  :
 21:    y     dcs         c    1   0       node-1a-ppp    5003    21    12     1
 23:    y     dcs         c    1   0       node-3         5003    23    32     3
  :
 64:    n     _____     _    __  _____   _____  0     ___   ___   __
```

> Enter values

Field	Conditions/Comments
For Processor Channel 21: (ppp connection to Switch 1)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-2 is the "client" for this session. Set node-1a to "server" (**s**).
Interface Link	Must match the link number assigned on the node-2 data module screen.
Interface Chan	A value of **0** allows any available interface channel to be used for this connection. The Destination Port number on the Switch-1 Processor Channel screen must also be set to **0**.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen. For ppp connections, it must match the Destination Node Name entered on the ppp Data Module screen.
Destination Port	This number must match the Interface Channel number assigned on the Switch-1 Processor Channel screen.
	1 of 2

Field	Conditions/Comments
Session - Local Session - Remote	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
	It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. It is allowed, but not recommended, to use the same Session numbers for two or more connections.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.
For Processor Channel 23: (connection to Switch 3 through Switch 1)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-2 is the "client" for this session. Set node-3 to "server" (**s**).
Interface Link	This must match the link number assigned on the node-2 data module screen.
Interface Chan	A value of **0** allows any available interface channel to be used for this connection. The Destination Port number on the Switch-3 Processor Channel screen must also be set to **0**.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.
Destination Port	This number must match the Interface Channel number assigned on the Switch-3 Processor Channel screen.
Session - Local Session - Remote	For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.

2 of 2

> Submit the screen

End

Switch 2 Task — Assign IP Route to node-3

This task specifies a route for packets handled by node-2 that are destined for node-3. An IP route is required for this route because there are intermediate nodes between node-2 and node-3.

Steps

Begin

> Enable the ppp link on the node-2 data module screen:

    ch da 3020, set Enable Link? to **y**.

> Open the IP Routing form — enter **a ip n**

```
add ip-route next                                   Page   1 of   1
                         IP ROUTING


      Route Number: 4
   Destination Node: node-3
           Gateway: node-1a-ppp
        C-LAN Board: 1a04
             Metric: 0
```

[The system assigns the route number 4.]

> Enter values

Field	Conditions/Comments
Destination Node:	The name of the node at the destination of this route.
Gateway:	Node name of the gateway by which the destination node is reached for this route.
C-LAN Board:	The location of the C-LAN circuit pack that provides the interface for this route. For simple routes, the gateway node is on this circuit pack.
Metric:	Enter **0**. See IP Routing (page 251) in Appendix A for more information on the use of the Metric field.

> Submit the screen

End

Switch 3 Task — Assign Node Names

This task assigns node names and IP addresses to each node in the network. This screen is administered on Switch 3. A Node Names screen must be administered on each switch in the network.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or from a Lucent representative.

Note: Enter node names for Intuity AUDIX and MSA adjuncts on *page 1*. Enter node names for switches, routers, and CMS starting on *page 2*.

Steps

Begin

> Open Node Names form — enter **ch node-n**

> Go to page 2

```
change node-names
                                                              Page 2 of 6
                           NODE NAMES

    Name                IP Address           Name                IP Address
default_____    0  .0  .0  .0  __    _____    ___.___.___.___
node-1b-eth_____    192.168.10 .128       _____    ___.___.___.___
node-2_____    192.168.10 .12        _____    ___.___.___.___
node-3_____    192.168.10 .129       _____    ___.___.___.___
_____    ___.___.___.___       _____    ___.___.___.___
```

> Enter values.

Field	Conditions/Comments
Name	Enter unique node names for the following 3 nodes: • C-LAN(b) Ethernet port on Switch 1 • C-LAN PPP port on Switch 2 • C-LAN Ethernet port on Switch 3
IP Address	The unique IP addresses of the nodes named in the previous field.

> Submit the screen

End

Switch 3 Task — Assign IP Interfaces

The IP interface for each C-LAN board on the switch must be defined on the IP Interfaces form. Each DEFINITY switch in an IP network has one IP Interfaces form.

Steps

Begin

> Open IP Interfaces form — enter **ch ip-i**

```
change ip-interfaces                                         Page    1 of    2

                             IP Interfaces

 Inter-region IP connectivity allowed?   n
 Enable                                                                    Net
 Eth Pt Type    Slot   Code Sfx Node Name      Subnet Mask      Gateway Addr   Rgn
    y    C-LAN   01a05  TN799 B  node-3         255.255.255.0    192.168.1  .128 1
    n    _____   _____  ____ _   _____  255.255.255.0    __ __ __ __ _
    n    _____   _____  ____ _   _____  255.255.255.0    __ __ __ __ _
    n    _____   _____  ____ _   _____  255.255.255.0    __ __ __ __ _
```

> Enter values

Field	Conditions/Comments
Inter-region IP connectivity allowed?	Enter **y** to allow IP endpoints (phones and trunks) to use MedPro resources administered in regions that are different from the endpoints' regions.
Enable Eth Pt	The Ethernet port must be enabled (**y**) before it can be used. The port must be disabled (**n**) before changes can be made to its attributes on this screen.
Type	Enter c-lan or medpro.
Slot	Enter the slot location for the circuit pack.
Code	Display only. This field is automatically populated with TN799 for C-LAN or TN802 for MedPro.
Sfx	Display only. This field is automatically populated with B for the TN802 and TN799.
Node name	Enter the unique node name for the IP interface. The node name here must already be administered on the Node Names screen
	1 of 2

Field	Conditions/Comments
Subnet Mask	Enter the subnet mask associated with the IP address for this IP interface. (The IP address is associated with the node name on the Node Names screen).
	In this example, leave the default subnet mask, 255.255.255.0, which indicates no subnetting for a Class C IP address.
	See the discussion of subnetting, Subnetting (page 16), in Chapter 1 and Configuration 1: R8r <—ppp—> R8si (page 60) in this chapter for details about subnet masks.
Gateway Addr	Leave blank for this configuration. The only connection to this IP interface is node-1b on Switch 1, which is on the same subnetwork as this IP interface, so no gateway is needed.
	In general, for connectivity to other (sub)networks, enter the address of a network node that will serve as the default gateway to the other (sub)networks.
Net Rgn	Enter the region number for this IP interface.
	2 of 2

Switch 3 Task — Assign Link via ethernet Data Module to the LAN

This task administers an ethernet data module on Switch 3 for the ethernet connection to Switch 1. The data module associates a link number with a port address, extension number, and node name for the C-LAN port used for this connection.

Steps

Begin

> Open Data Module form — enter **a da n**

```
add data next
                                                              Page 1 of X
                            DATA MODULE

    Data Extension: 3901            Name: ethernet on link 1            BCC: 2
                Type: ethernet
                Port: 01a0517
                Link: 1


Network uses 1's for broadcast addresses? y
```

> Enter values

Field	Conditions/Comments
Type:	This indicates the data-module type for this connection.
Port:	Ethernet connections must be assigned to port 17 on the C-LAN circuit pack.
Link:	The link number must be in the range 1 – 25 (for R8si), not previously assigned on this switch.
Name:	Information-only; appears in list generated by the "list data module" command.
Network uses 1's for broadcast addresses?	Leave the default (**y**) if the private network contains only DEFINITY switches and adjuncts. Set to **n** only if the network includes non-DEFINITY switches that use the 0's method of forming broadcast addresses. See Appendix A, "Data Module - type ethernet" for more information about this field.

> Submit the screen

End

Switch 3 Task — Assign Processor Channels

This task associates data links (hardware) with processor channels (software) on Switch 3.

Steps

Begin

> Open the Processor Channel Assignment form — enter **ch com p**

```
change communications-interface processor-channels
                                                             Page 1 of X
                    PROCESSOR CHANNEL ASSIGNMENT

Proc                    Gtwy         Interface     Destination        Session        Mach
Chan Enable  Appl.   To  Mode   Link/Chan     Node          Port  Local/Remote   ID
  1:    n    _____       _    __  _____   _____ _  _    0___  ___   ___    __
  2:    n    _____       _    __  _____   _____ _  _    0___  ___   ___    __
  3:    n    _____       _    __  _____   _____ _  _    0___  ___   ___    __
  4:    n    _____       _    __  _____   _____ _  _    0___  ___   ___    __
  :
 31:    y    dcs           c    1   0____   node-1b-eth   5003  31    13     1
 32:    y    dcs           s    1   5003_   node-2        0     32    23     2
  :
 64:    n    _____       _    __  _____   _____  _   0___  ___   ___    __
```

> Enter values

Field	Conditions/Comments
Processor Channel 31: (ethernet connection to Switch 1)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-3 is the "client" for this session. Set node-1 to "server" (**s**).
Interface Link	This must match the link number assigned on the node-3 data module screen.
Interface Chan	A value of **0** allows any available interface channel to be used for this connection. The Destination Port number on the Switch-1 Processor Channel screen must also be set to **0**.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.
Destination Port	This number must match the Interface Channel number assigned on the Switch-1 Processor Channel screen.
	1 of 2

Field	Conditions/Comments
Session - Local	The Local and Remote Session numbers can be any value between 1 and 256 (si model) or 384 (r model), but they must be consistent between endpoints. For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Session - Remote	
	It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers.
Mach ID	Destination switch ID identified on the dial plan of the destination switch.
For Processor Channel 32: (connection to Switch 2 through Switch 1)	
Enable	Set to **y**.
Appl.	Set to **dcs** for DCS signaling.
Mode	Node-3 is the "server". Set node-2 to "client" (**c**).
Interface Link	This must match the link number assigned on the node-3 data module screen.
Interface Chan	For TCP/IP, interface channel numbers are in the range 5000 – 64500. This number must match the Destination Port number on the Switch-3 Processor Channel screen.
Destination Node	Name of the far-end node for this channel. This must be a name entered on the Node Names screen.
Destination Port	For TCP/IP, interface channel numbers are in the range 5000 – 64500.
	The recommended values are: 5001 for CMS, 5002 for Intuity AUDIX, and 5003 for DCS connections that are not gateways. These three values should be reused for multiple instances of these applications. The combination of Link, Interface Channel, and Mach ID must be unique.
	This number must match the Destination Port number on the Switch-2 Processor Channel screen.
Session - Local	For each connection, the Local Session number on this switch must equal the Remote Session number on the remote switch and vice versa.
Session - Remote	
Mach ID	Destination switch ID identified on the dial plan of the destination switch.

2 of 2

> Submit the screen

End

Enable links and processor channels

You must enable links and processor channels before the connections can be used.

To enable a link, open its data module screen (**ch da** [**ext**]) and set the Enable Link? field to **y**.

[note: to view a list of assigned data modules and their extensions, enter the "list data-module" command (**l da**)]

To enable the processor channels, open the processor channel screen (**ch com p**) and set the Enable field to **y** for each assigned processor channel.

Note: 1. You must disable a link or processor channel before you can change its parameters.

Note: 2. The **busy-out** command overrules the data module Enable Link? field.

Note: 3. On the C-LAN boards, low-level connectivity can remain intact when higher-level applications such as DCS are not functioning. For example, an external ping to a C-LAN's ethernet port could be successful even when the board is busied-out. When debugging connectivity problems, pinging only checks low-level connectivity.

4 **Networking Example**

This chapter provides an example of a complex network. It describes procedures for administering trunk groups, dial plans, signaling groups, and data links for a four-switch network with an Intuity AUDIX and a CMS.

The network example is unchanged from the example in Issue 1 (for R7) of this book. The screens have been updated for R8.

Overview

This section shows a high-level diagram of the example network and lists the administration tasks that need to be completed for each node to set up the network.

NOTE: The term *node* is used in this chapter, as in the other chapters, to mean a network interface such as a port on the C-LAN board. Traditionally, in a DCS network of DEFINITY switches, *node* has been used to refer to a switch.

In this chapter a "DCS node" is referred to as a "Switch Node." Thus, a Switch Node (a switch) can have many nodes (network interfaces).

The Dial Plan and AAR Digit Analysis Table screens both have fields that still use *node* to refer to a switch.

Network Diagram

The following diagram shows a high-level view of the example network.

```
  ┌──────────────┐                                    ┌──────────────┐
  │ Switch Node 2│   X.25              ISDN           │ Switch Node 3│
  │              │────────────┐    ┌────────────      │              │
  │ DEFINITY ECS │            │    │                  │ DEFINITY ECS │
  │     R6si     │            │    │                  │     R7si     │
  └──────────────┘            │    │                  └──────────────┘
                              │    │
                         ┌────────────────┐
                         │  Switch Node 1 │           ┌──────────────┐
                         │                │           │              │
                         │  DEFINITY ECS  │           │ Intuity AUDIX│
                         │       R7r      │           │              │
                         │     Gateway    │           └──────────────┘
  ┌──────────────┐       │                │
  │ Switch Node 4│  ppp  │                │  Ethernet   ╭──────╮
  │              │───────│                │─────────────│10BaseT│
  │ DEFINITY ECS │       │                │             │ Hub   │
  │     R7csi    │       └────────────────┘             ╰──────╯
  └──────────────┘                                        
                         ╭──────────╮        ╭────╮     ┌──────────────┐
                         │ Customer │        │Router│    │              │
                         │   Data   │────────│      │────│     CMS      │
                         │ Network  │        ╰────╯      │              │
                         ╰──────────╯                    └──────────────┘
```
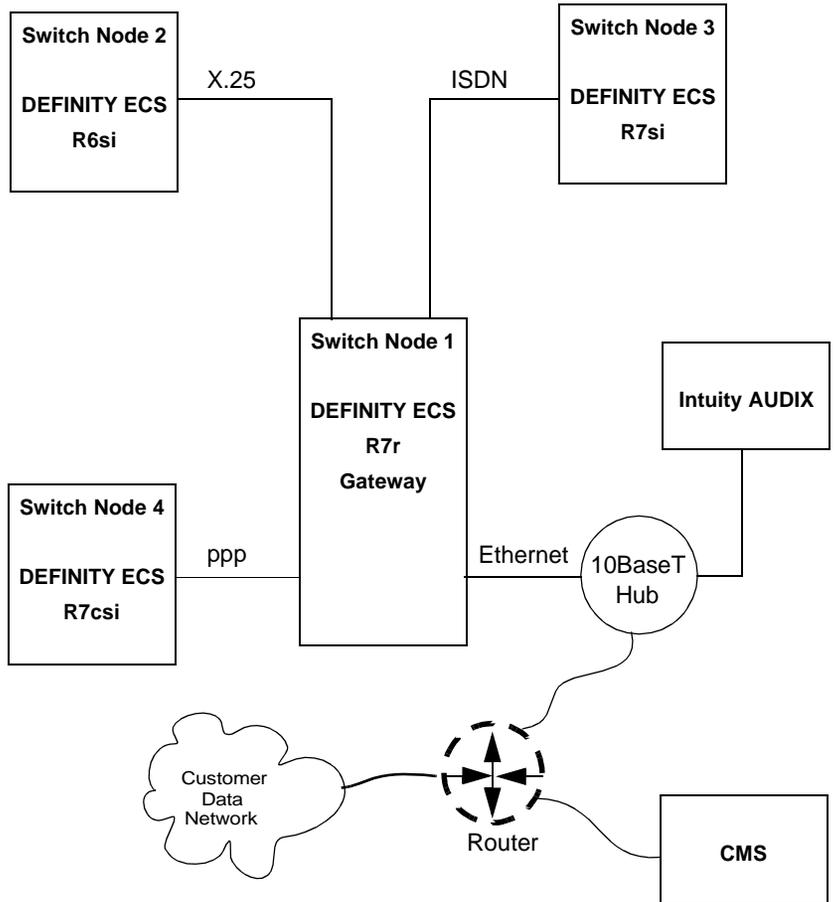
Task Summary

The following matrix summarizes the administration tasks required to set up this network.

Administration Task	Switch Node 1 R7r	Switch Node 2 R6si	Switch Node 3 R7csi	Switch Node 4 R7si	CMS	Intuity AUDIX
DS1 Circuit Pack	X	X	X	X		
Synchronization Plan	X	X	X	X		
Trunk Groups	X	X	X	X		
Dial Plan	X	X	X	X		
Uniform Dialing Plan	X	X	X	X		
AAR Digit Analysis	X	X	X	X		
Signaling Group	X		X			
Hunt Group		X	X	X		
ISDN TSC Gateway Channel Assignment	X					
Interface Links		X				
Node Names	X			X	X	X
IP Route	X			X	X	X
Data Modules	X	X	X	X		
Processor Channel Assignments	X	X	X	X	X	X
Routing Patterns	X	X	X	X		
Bus Bridge			X			
Intuity Translations for DCS Audix						X
CMS Server Translations					X	

Link/Channel/TSC Map

The link/channel/TSC map shows the link, processor channel, and temporary signaling connection numbers, and the connection types for each Switch Node in the network.

cydfec8b KLC 101999
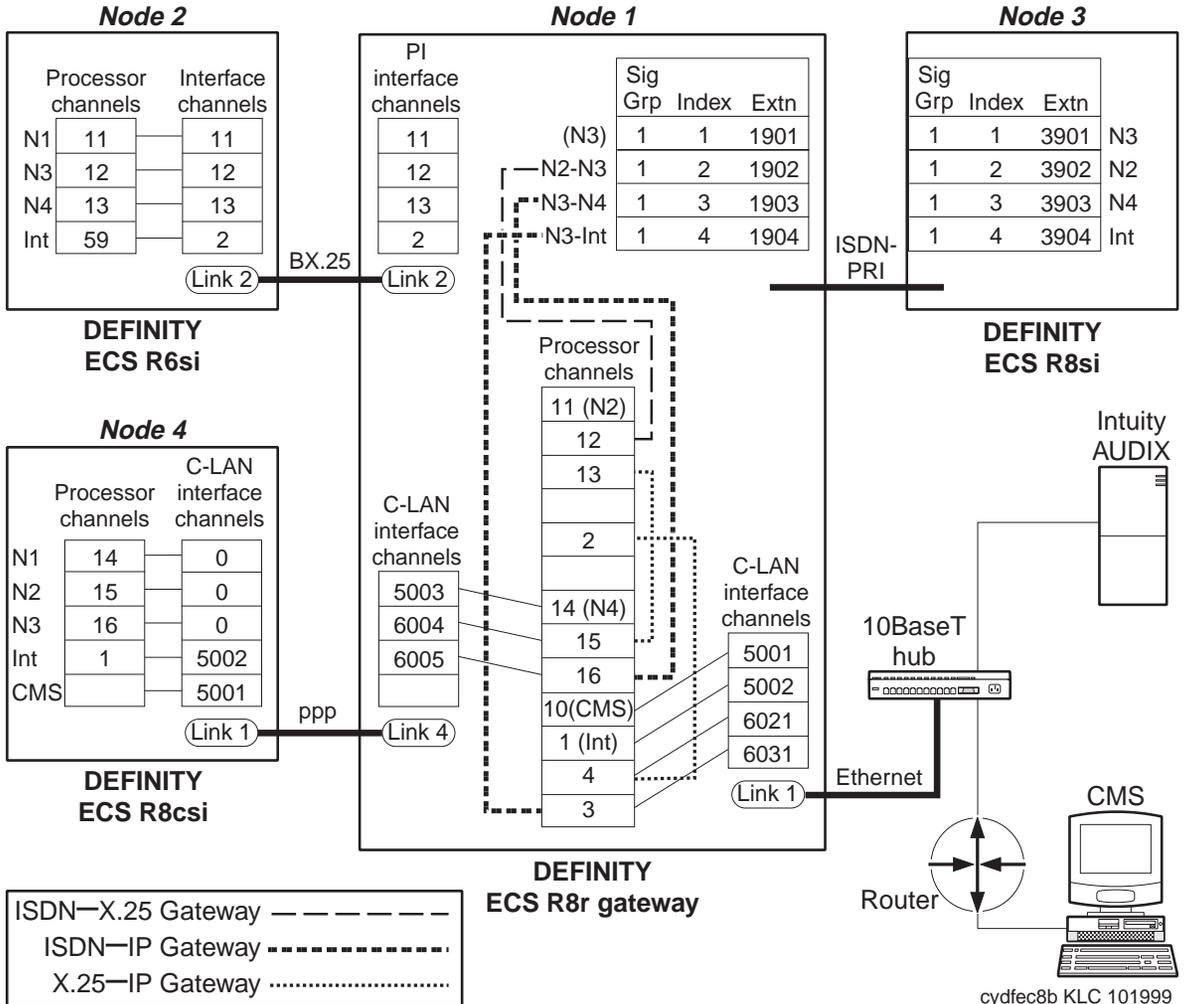
Network Map

The network map shows the RNX, trunk group, hunt group numbers, data module type, and extension for each Switch Node in the network. For TCP/IP connections, the node name and IP address is shown for each node.
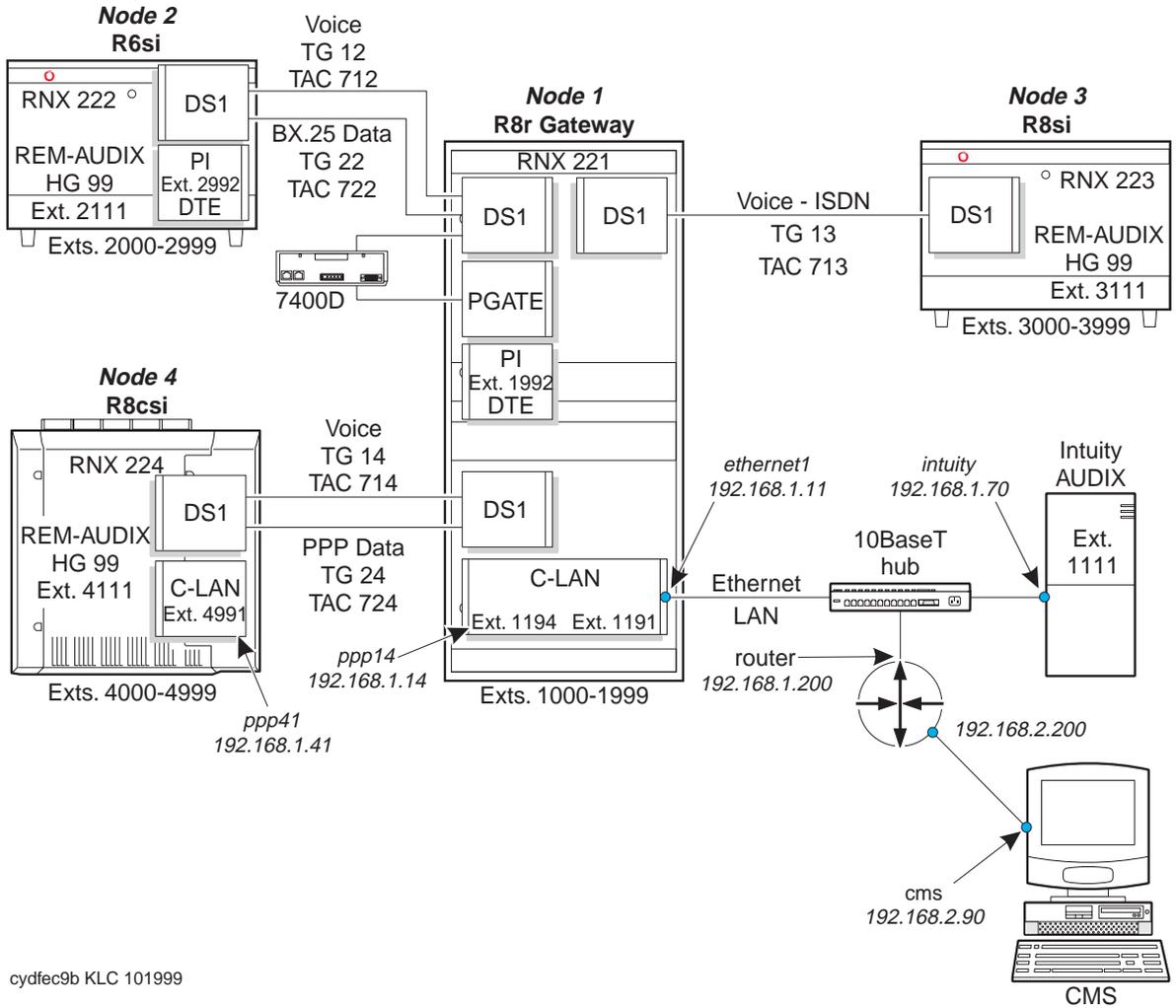
cydfec9b KLC 101999

Switch-Node 1 Administration

This section displays the filled-in screens for the administration of Switch Node 1.

DS1 Circuit Packs

Connection to Switch Node 2

```
add ds1 1c19                                           Page    1 of    2
                           DS1 CIRCUIT PACK

            Location: 01c19                    Name: Switch 1 to Switch 2
            Bit Rate: 1.544             Line Coding: b8zs
    Line Compensation: 1               Framing Mode: esf
      Signaling Mode: common-chan



Interface Companding: mulaw
            Idle Code: 11111111
              DMI-BOS? n




       Slip Detection? n              Near-end CSU Type: other
```

Connection to Switch Node 3

```
add ds1 1c18                                           Page    1 of    2
                           DS1 CIRCUIT PACK

            Location: 01c18                    Name: Switch 1 to Switch 3
            Bit Rate: 1.544             Line Coding: b8zs
    Line Compensation: 1               Framing Mode: esf
      Signaling Mode: isdn-pri
              Connect: pbx                      Interface: network
                                        Country Protocol: 1
                                        Protocol Version: a
Interface Companding: mulaw                          CRC? n
            Idle Code: 11111111
                         DCP/Analog Bearer Capability: 3.1kHz



       Slip Detection? n              Near-end CSU Type: other
```

**Connection to Switch
Node 4**

```
add ds1 1c17                                          Page   1 of   2
                          DS1 CIRCUIT PACK


          Location: 01C17                       Name: Switch 1 to Switch 4
          Bit Rate: 1.544                Line Coding: b8zs
  Line Compensation: 1                  Framing Mode: esf
     Signaling Mode: robbed bit



Interface Companding: mulaw
          Idle Code: 11111111
           DMI-BOS? n




      Slip Detection? n            Near-end CSU Type: other
```

Dial Plan

```
display dialplan
                          DIAL PLAN RECORD


                                    Local Node Number: 1
                                      ETA Node Number:
      Uniform Dialing Plan: 4-digit       ETA Routing Pattern:
  UDP Extension Search Order: local-extensions-first
FIRST DIGIT TABLE
First                         Length
Digit  - 1 -      - 2 -      - 3 -      - 4 -      - 5 -      - 6 -
  1:                             extension
  2:                             extension
  3:                             extension
  4:                             extension
  5:
  6:
  7:                    dac
  8: fac
  9: fac
  0: attd
  *:                    dac
  #:                    dac
```

Signaling Group

Page 1

```
change signaling group next                                  Page 1 of 5
                          SIGNALING GROUP
Group Number: 1                 Group Type:
                    Associated Signaling? y        Max number of NCA TSC: 5
                        Primary D-Channel: 01c1824    Max number of CA TSC: 23
                                                 Trunk Group for NCA TSC: 13
           Trunk Group for Channel Selection: ___
               Supplementary Service Protocol: a
```

**Page 2 – Administered
NCA TSC Assignment**

```
                                                         Page 2 of 5
                      ADMINISTERED NCA TSC ASSIGNMENT

Service/Feature: _____        As-needed Inactivity Time-out (min): __

 TSC    Local                                         Adj.        Mach.
Index   Ext.   Enabled  Established   Dest. Digits    Appl.  Name    ID
  1:    1901      y     permanent     3901            dcs    _____  3
  2:    1902      y     permanent     3902            gateway _____ __
  3:    1903      y     permanent     3903            gateway _____ __
  4:    1904      y     permanent     3904            gateway _____ __
  5:
  :
 16:
```

Synchronization Plan

```
                                                      Page 1 of X
                        SYNCHRONIZATION PLAN
                 SYNCHRONIZATION SOURCE (circuit pack location)
                        Stratum: 4
                   Port Network: 1
                        Primary: 01c20    Secondary: ___

      Location   Name      Slip   Type   Location   Name      Slip  Type
      01c17  DCS Node 4     n     UDS1-BD ____ _____  _    ____
      01c18  DCS Node 3     n     TBRI-BD ____ _____  _    ____
      01c19  DCS Node 2     n             ____ _____  _    ____
      01c20  AT&T           y             ____ _____  _    ____
      ____ _____   _             ____ _____  _    ____
      ____ _____   _             ____ _____  _    ____
      ____ _____   _             ____ _____  _    ____
      ____ _____   _             ____ _____  _    ____
NOTE:  TN722B & TN464B DS1 sources result in stratum 4, type II synchronization
```

Trunk Groups

**Group 12 (tie to Switch
Node 2) — page 1**

```
add trunk-group 12                                        Page   1 of  10
                              TRUNK GROUP

Group Number: 12                      Group Type: tie        CDR Reports: y
  Group Name: Switch 1 to Switch 2 tg12   COR: 1        TN: 1        TAC: 712
   Direction: two-way        Outgoing Display? n    Trunk Signaling Type:
 Dial Access? y              Busy Threshold: 99          Night Service:
Queue Length: 0                               Incoming Destination:
  Comm Type: avd                      Auth Code? n
                                    Trunk Flash? n

         BCC: 0
TRUNK PARAMETERS
    Trunk Type (in/out): wink/wink       Incoming Rotary Timeout(sec): 5
     Outgoing Dial Type: tone                  Incoming Dial Type: tone
        Wink Timer(msec): 300           Disconnect Timing(msec): 500
        Digit Treatment:                                  Digits: __
                                            Sig Bit Inversion: none
     Connected to Toll? n     STT Loss: normal      DTT to DCO Loss: normal
    Incoming Dial Tone? y
              Bit Rate: 1200        Synchronization: async     Duplex: full
 Disconnect Supervision - In? y  Out? n
 Answer Supervision Timeout: 0            Receive Answer Supervision? y
```

Group 12 — Page 2

```
display trunk-group 12                                    Page   2 of  10
TRUNK FEATURES
         ACA Assignment? n            Measured: none
                              Internal Alert? n      Maintenance Tests? y
                            Data Restriction? n
                             Glare Handling: none
            Used for DCS? y   PBX ID: 2
   Suppress # Outpulsing? n
                   Seize When Maintenance Busy: neither-end




Incoming Tone (DTMF) ANI: no             Per Call CPN Blocking Code:
          Connected to CO? n             Per Call CPN Unblocking Code:
```

**Group 12 — member
assignments**

```
                          TRUNK GROUP
                              Administered Members (min/max):   1/3
GROUP MEMBER ASSIGNMENTS                Total Administered Members:   3

     Port    Code Sfx Name        Night        Mode      Type   Ans Delay
  1: 01c1901  TN767  F _____    20
  2: 01c1902  TN767  F _____    20
  3: 01c1903  TN767  F _____    20
  4:
  5:
```

**Group 22 (data to
Switch Node 2)— page1**

```
add trunk-group 22                                          Page    1 of  10
                            TRUNK GROUP


Group Number: 22                     Group Type: tie         CDR Reports: y
  Group Name: DCS data to node 2 - TG22   COR: 1       TN: 1       TAC: 722
   Direction: two-way          Outgoing Display? n    Trunk Signaling Type:
 Dial Access? y                Busy Threshold: 99         Night Service:
Queue Length: 0                                        Incoming Destination:
   Comm Type: data                   Auth Code? n
                                   Trunk Flash? n

         BCC: 0
TRUNK PARAMETERS
    Trunk Type (in/out): wink/wink      Incoming Rotary Timeout(sec): 5
     Outgoing Dial Type: tone                   Incoming Dial Type: tone
       Wink Timer(msec): 300          Disconnect Timing(msec): 500
        Digit Treatment:                                 Digits: __
                                          Sig Bit Inversion: none
     Connected to Toll? n    STT Loss: normal     DTT to DCO Loss: normal
     Incoming Dial Tone? y
             Bit Rate: 1200         Synchronization: async   Duplex: full
 Disconnect Supervision - In? y  Out? n
 Answer Supervision Timeout: 0            Receive Answer Supervision? y
```

Group 22 — Page 2

```
add trunk-group 22                                         Page    2 of  10
TRUNK FEATURES
           ACA Assignment? n              Measured: none
                                   Internal Alert? n      Maintenance Tests? y
                                 Data Restriction? n
                                  Glare Handling: none
              Used for DCS? n
   Suppress # Outpulsing? n
                   Seize When Maintenance Busy: neither-end




 Incoming Tone (DTMF) ANI: no                 Per Call CPN Blocking Code:
           Connected to CO? n                 Per Call CPN Unblocking Code:
```

**Group 22 — Group
member assignments**

```
                              TRUNK GROUP
                              Administered Members (min/max):   1/3
GROUP MEMBER ASSIGNMENTS               Total Administered Members:   3

      Port    Code Sfx Name         Night          Mode      Type   Ans Delay
  1: 01c1923  TN767  F                                               20
  2:
  3:
  4:
  5:
  6:
  7:
  8:
  9:
 10:
```

Group 13 (ISDN-PRI to Switch Node 3) — page 1

```
add trunk-group 13                                          Page    1 of  10
                              TRUNK GROUP

Group Number: 13                    Group Type: isdn          CDR Reports: y
  Group Name: ISDN TG 13 to Switch 3     COR: 1        TN: 1        TAC: 713
   Direction: two-way          Outgoing Display? n                 ATM? _
 Dial Access? n                Busy Threshold: 99        Night Service: _____
Queue Length: 0
Service Type: tie                     Auth Code? n          TestCall ITC: rest
                        Far End Test Line No:
TestCall BCC: 4
TRUNK PARAMETERS
          Codeset to Send Display: 6      Codeset to Send TCM,Lookahead: 6
          Max Message Size to Send: 260   Charge Advice: none
  Supplementary Service Protocol: a      Digit Handling (in/out): enbloc/enbloc

            Trunk Hunt: cyclical
      Connected to Toll? n       STT Loss: normal       DTT to DCO Loss: normal
Calling Number - Delete:        Insert:           Numbering Format:
              Bit Rate: 1200          Synchronization: async     Duplex: full
 Disconnect Supervision - In? y  Out? n
 Answer Supervision Timeout: 0
```

Group 13 — page 2

```
display trunk-group 13                                     Page    2 of  10
TRUNK FEATURES
          ACA Assignment? n              Measured: none      Wideband Support? n
                                  Internal Alert? n       Maintenance Tests? y
                                 Data Restriction? n  NCA-TSC Trunk Member: 1
                                     Send Name: n       Send Calling Number: n
              Used for DCS? y    PBX ID: 3
                  Suppress # Outpulsing? n                   DCS Signaling: d-chan
 Outgoing Channel ID Encoding: preferred      UUI IE Treatment: service-provider


                                                    Send Connected Number: n


              Send UCID? n
 Send Codeset 6/7 LAI IE? y
```

Group 13 — member assignments

```
add trunk-group 13                                         Page    4 of  10
                              TRUNK GROUP
                                 Administered Members (min/max):   0/0
GROUP MEMBER ASSIGNMENTS                 Total Administered Members:   0

     Port     Code Sfx Name        Night            Sig Grp
  1: 01c1801  TN464  E                                1
  2: 01c1802  TN464  E                                1
  3: 01c1803  TN464  E                                1
  4: 01c1804  TN464  E                                1
  5:
  6:
  7
```

Group 14 (tie to Switch Node 4) — page 1

```
add trunk-group 14                                            Page   1 of   10
                              TRUNK GROUP

Group Number: 14                    Group Type: tie         CDR Reports: y
  Group Name: Switch 1 to Switch 4 tg14   COR: 1        TN: 1        TAC: 714
   Direction: two-way          Outgoing Display? n    Trunk Signaling Type:
 Dial Access? y                Busy Threshold: 99         Night Service:
Queue Length: 0                                      Incoming Destination:
   Comm Type: voice                   Auth Code? n
                                    Trunk Flash? n

        BCC: 0
TRUNK PARAMETERS
   Trunk Type (in/out): wink/wink     Incoming Rotary Timeout(sec): 5
    Outgoing Dial Type: tone               Incoming Dial Type: tone
      Wink Timer(msec): 300           Disconnect Timing(msec): 500
       Digit Treatment:                              Digits: __
                                           Sig Bit Inversion: none
    Connected to Toll? n     STT Loss: normal     DTT to DCO Loss: normal
    Incoming Dial Tone? y
             Bit Rate: 1200       Synchronization: async   Duplex: full
 Disconnect Supervision - In? y  Out? n
 Answer Supervision Timeout: 0          Receive Answer Supervision? y
```

Group 14 — Page 2

```
add trunk-group 14                                            Page   2 of   10
TRUNK FEATURES
         ACA Assignment? n            Measured: none
                              Internal Alert? n     Maintenance Tests? y
                           Data Restriction? n
                             Glare Handling: none
            Used for DCS? y   PBX ID: 4
  Suppress # Outpulsing? n
                  Seize When Maintenance Busy: neither-end




Incoming Tone (DTMF) ANI: no               Per Call CPN Blocking Code:
           Connected to CO? n              Per Call CPN Unblocking Code:
```

Group 14 — member assignments

```
                              TRUNK GROUP
                              Administered Members (min/max):   1/3
GROUP MEMBER ASSIGNMENTS         Total Administered Members:   3

    Port    Code Sfx Name        Night          Mode      Type   Ans Delay
 1: 01c1701 TN767  F                                               20
 2: 01c1702 TN767  F                                               20
 4: 01c1703 TN767  F                                               20
 5:
 6:
 7:
 8:
 9:
10:
```

**Group 24 (data to
Switch Node 4) —
page1**

```
add trunk-group 24                                       Page   1 of  10
                             TRUNK GROUP


Group Number: 24                    Group Type: tie           CDR Reports: y
  Group Name: DCS data to node 4-TG24      COR: 1         TN: 1        TAC: 724
   Direction: two-way          Outgoing Display? n    Trunk Signaling Type:
 Dial Access? y                 Busy Threshold: 99           Night Service:
Queue Length: 0                                       Incoming Destination:
   Comm Type: rbavd                     Auth Code? n
                                      Trunk Flash? n

         BCC: 0
TRUNK PARAMETERS
   Trunk Type (in/out): wink/wink       Incoming Rotary Timeout(sec): 5
    Outgoing Dial Type: tone               Incoming Dial Type: tone
      Wink Timer(msec): 300            Disconnect Timing(msec): 500
       Digit Treatment:                                    Digits: __
                                         Sig Bit Inversion: none
     Connected to Toll? n    STT Loss: normal      DTT to DCO Loss: normal
     Incoming Dial Tone? y
              Bit Rate: 1200        Synchronization: async    Duplex: full
 Disconnect Supervision - In? y  Out? n
 Answer Supervision Timeout: 0            Receive Answer Supervision? y
```

Group 24 — Page 2

```
add trunk-group 24                                       Page   2 of  10
TRUNK FEATURES
         ACA Assignment? n              Measured: none
                                 Internal Alert? n      Maintenance Tests? y
                              Data Restriction? n
                                Glare Handling: none

             Used for DCS? n
  Suppress # Outpulsing? n
                    Seize When Maintenance Busy: neither-end




Incoming Tone (DTMF) ANI: no                Per Call CPN Blocking Code:
        Connected to CO? n                Per Call CPN Unblocking Code:
```

**Group 24 — member
assignments**

```
                            TRUNK GROUP
                             Administered Members (min/max):   1/3
GROUP MEMBER ASSIGNMENTS               Total Administered Members:   3

      Port    Code Sfx Name          Night            Mode      Type   Ans Delay
  1: 01c1723  TN767  F                                                    20
  2:
  3:
  4:
  5:
  6:
  7:
  8:
  9:
 10:
```

Uniform Dialing Plan

```
display udp 2
                                                           Page 1 of 2
                           UNIFORM DIALING PLAN
                             Ext Codes: ddxx

                         Ext Code: _____  Type: _____ ___

dd   Type          dd   Type          dd   Type          dd   Type          dd   Type
0x: _____ ___    1x: local   ___    2x: udpcode 222    3x: udpcode 223    4x: udpcode 224
00: _____ ___    10: _____ ___    20: _____ ___    30: _____ ___    40: _____ ___
01: _____ ___    11: _____ ___    21: _____ ___    31: _____ ___    41: _____ ___
02: _____ ___    12: _____ ___    22: _____ ___    32: _____ ___    42: _____ ___
03: _____ ___    13: _____ ___    23: _____ ___    33: _____ ___    43: _____ ___
04: _____ ___    14: _____ ___    24: _____ ___    34: _____ ___    44: _____ ___
05: _____ ___    15: _____ ___    25: _____ ___    35: _____ ___    45: _____ ___
06: _____ ___    16: _____ ___    26: _____ ___    36: _____ ___    46: _____ ___
07: _____ ___    17: _____ ___    27: _____ ___    37: _____ ___    47: _____ ___
08: _____ ___    18: _____ ___    28: _____ ___    38: _____ ___    48: _____ ___
09: _____ ___    19: _____ ___    29: _____ ___    39: _____ ___    49: _____ ___
```

AAR Digit Analysis

```
display aar analysis 1                                    Page   1 of   2
                           AAR DIGIT ANALYSIS TABLE
                                                      Percent Full:    6

           Dialed          Total      Route      Call   Node  ANI
           String        Min  Max    Pattern     Type   Num   Reqd
            222           7    7       102         aar    2     n
            223           7    7       103         aar    3     n
            224           7    7       104         aar    4     n
```

ISDN TSC Gateway Channel Assignment

```
change isdn tsc-gateway                                    Page   1 of   2
                    ISDN TSC GATEWAY CHANNEL ASSIGNMENT

   Sig   Adm'd NCA  Processor  Appli-     Sig   Adm'd NCA  Processor  Appli-
  Group  TSC Index  Channel    cation    Group  TSC Index  Channel    cation
1: 1_       2_        12       dcs    17: __       __        __       _____
2: 1_       3_        16       dcs    18: __       __        __       _____
3: 1_       4_         3       audix  19: __       __        __       _____
4: __       __        ___      _____ 20: __       __        __       _____
:
```

Routing Patterns

Pattern 102

```
display route-pattern 102
                         Pattern Number: 102

   Grp.  FRL NPA Pfx Hop Toll No. Del Inserted                          IXC
   No.           Mrk Lmt List Digits  Digits
1:12      0                    3                                        user
2:                                                                      user
3:                                                                      user
4:                                                                      user
5:                                                                      user
6:                                                                      user

     BCC VALUE  TSC CA-TSC     ITC  BCIE Service/Feature      Numbering LAR
     0 1 2 3 4 W     Request                                  Format
1: y y y y y n  n              both ept                                 none
2: y y y y y n  n              rest                                     none
3: y y y y y n  n              rest                                     none
4: y y y y y n  n              rest                                     none
5: y y y y y n  n              rest                                     none
6: y y y y y n  n              rest                                     none
```

Pattern 103

```
add route-pattern 103
                           Pattern Number: 103

  Grp.  FRL NPA Pfx Hop Toll No. Del Inserted                        IXC
  No.           Mrk Lmt List Digits  Digits
1:13     0                   3                                        user
2:                                                                    user
3:                                                                    user
4:                                                                    user
5:                                                                    user
6:                                                                    user

    BCC VALUE  TSC CA-TSC    ITC  BCIE Service/Feature      Numbering LAR
    0 1 2 3 4 W     Request                                 Format
1: y y y y y n  y as needed  both ept
2: y y y y y n  n            rest                                     none
3: y y y y y n  n            rest                                     none
4: y y y y y n  n            rest                                     none
5: y y y y y n  n            rest                                     none
6: y y y y y n  n            rest                                     none
```

Pattern 104

```
display route-pattern 104
                           Pattern Number: 104

  Grp.  FRL NPA Pfx Hop Toll No. Del Inserted                        IXC
  No.           Mrk Lmt List Digits  Digits
1:14     0                   3                                        user
2:                                                                    user
3:                                                                    user
4:                                                                    user
5:                                                                    user
6:                                                                    user

    BCC VALUE  TSC CA-TSC    ITC  BCIE Service/Feature      Numbering LAR
    0 1 2 3 4 W     Request                                 Format
1: y y y y y n  n            both ept
2: y y y y y n  n            rest                                     none
3: y y y y y n  n            rest                                     none
4: y y y y y n  n            rest                                     none
5: y y y y y n  n            rest                                     none
6: y y y y y n  n            rest                                     none
```

Node Names

page 1

```
change node-names                                    Page   1 of   6
                          NODE NAMES

     Audix Names    IP Address        MSA Names    IP Address
     intuity        192.168.200.10    msa          ___.___.___.___
```

page 2

```
change node names
                                                            Page 2 of 6
                            NODE NAMES

   Name                 IP Address          Name              IP Address
1.ppp14_____  192.168.200.12_  17. _____   ___.___.___.___
2.ppp41_____  192.168.200.14_  18. _____   ___.___.___.___
3.CMS_____  192.168.201.10_  19. _____   ___.___.___.___
4.router_____  192.168.200.1__  20. _____   ___.___.___.___
5.ethernet1_____  192.168.200.11_
 :
16.
```

Data Modules

x.25 data module

```
add data-module 1992
                                                            Page 1 of 2
                            DATA MODULE

Data Extension: 1992                Name: x.25 on link 2 to node 2_____
        Type: x.25                  Remote Loop-Around Test? n
        Port: 01C0101    COR: 1       Destination Number: external
   Baud Rate: 9600_____   TN: 1      Establish Connection? n
Endpoint Type: adjunct              Connected Data Module: 1900_
        Link: 2_      DTE/DCE: dte         Error Logging? n
                  Enable Link: n


 Permanent Virtual Circuit? y      Highest PVC Logical Channel: 64
  Switched Virtual Circuit? n
```

pdm data module

```
add data-module 1900                                           Page   1 of   1
                             DATA MODULE
  Data Extension: 1900              Name:                                BCC: 2
              Type: pdm             COS: 1        Remote Loop-Around Test? n
              Port: 01c2001         COR: 1         Secondary data module? n
               ITC: restricted      TN: 1                   Connected To: dte


ABBREVIATED DIALING
  List1:


SPECIAL DIALING OPTION:



ASSIGNED MEMBER ( Station with a data extension button for this data module )


        Ext     Name
     1:
```

ppp data module

```
add data-module 1994
                                                           Page 1 of x
                     DATA MODULE

   Data Extension: 1994            Name:  ppp on link 4 to node 4     BCC: 2
              Type: ppp            COS: 1
              Port: 01c1502        COR: 1
              Link: 4              TN: 1
      Enable Link? n

       Node Name: ppp14
      Subnet Mask: 255.255.255.0


  Establish Connection: y

DESTINATION
           Digits: 7241991
        Node Name: ppp41
            CHAP? n
```

ethernet data module

```
add data 1191
                                                         Page 1 of X
                          DATA MODULE

   Data Extension: 1191          Name: ethernet on link 1              BCC: 2
             Type: ethernet
             Port: 01c1517
             Link: 1

 Network uses 1's for Broadcast Addresses? y
```

IP Interface

```
change ip-interfaces                                    Page   1 of   2

                              IP Interfaces

 Network regions are interconnected?  n
  En-                                                                    Net
 abled Type   Slot  Code Sfx Node Name  Subnet Mask      Gateway Addr    Rgn
  y    C-LAN  01c15 TN799 B  ethernet1  255.255.255.0   192.168.200.1    1
  _    _____  _____ _____ _  _____  255.255.255.0   ___.___.___.___
  _    _____  _____ _____ _  _____  255.255.255.0   ___.___.___.___  _
  _    _____  _____ _____ _  _____  255.255.255.0   ___.___.___.___  _
  _    _____  _____ _____ _  _____  255.255.255.0   ___.___.___.___  _
  _    _____  _____ _____ _  _____  255.255.255.0   ___.___.___.___  _
  _    _____  _____ _____ _  _____  255.255.255.0   ___.___.___.___  _
  _    _____  _____ _____ _  _____  255.255.255.0   ___.___.___.___  _
  _    _____  _____ _____ _  _____  255.255.255.0   ___.___.___.___  _
```

Processor Channel Assignments

.

```
change communications-interface processor-channels
                                                         Page 1 of X
                    PROCESSOR CHANNEL ASSIGNMENT

Proc                  Gtwy       Interface    Destination      Session     Mach
Chan Enable  Appl.    To  Mode   Link/Chan    Node       Port  Local/Remote ID
  1:  y      audix         s     1   5002     intuity    0      1    1       1
  2:  y      gtwy-tcp 4    _     2   2                   _____  2    59      _
  3:  y      gateway       s     1   5031     intuity    0      3    3       _
  4:  y      gtwy-tcp 2    s     1   5021     intuity    0      2    2       _
  :
  :
 10:  y      mis           s     1   5001     cms        0      1    1       _
 11:  y      dcs           _     2   11                  _____  11   11      2
 12:  y      gateway       _     2   12                  _____  12   12      _
 13:  y      gtwy-tcp 15   _     2   13                  _____  13   13      _
 14:  y      dcs           s     4   5003     ppp41      0      14   14      4
 15:  y      gtwy-tcp 13   s     4   5004     ppp41      0      15   15      _
 16:  y      gateway       s     4   5005     ppp41      0      16   16      _
  :
 64:  _      _____      _     __  ____     _____  0      ___  ___     __
```

Switch-Node 2 Administration

This section displays the filled-in screens for the administration of Switch Node 2.

DS1 Circuit Packs

```
add ds1 1a10
                            DS1 CIRCUIT PACK

            Location: 01a10                      Name: sw 2 to sw 1
            Bit Rate: 1.544               Line Coding: b8zs
   Line Compensation: 1                  Framing Mode: esf
      Signaling Mode: common-chan


            Idle Code: 11111111
              DMI-BOS? n


      Slip Detection? n
```

Dial Plan

```
change dialplan
                            DIAL PLAN RECORD

                                            Local Node Number: 2
                                              ETA Node Number:
         Uniform Dialing Plan: 4-digit        ETA Routing Pattern:
   UDP Extension Search Order: local-extensions-first
FIRST DIGIT TABLE
First                                 Length
Digit  - 1 -        - 2 -       - 3 -        - 4 -        - 5 -        - 6 -
  1:                                       extension
  2:                                       extension
  3:                                       extension
  4:                                       extension
  5:
  6:
  7:                      dac
  8: fac
  9: fac
  0: attd
  *:                      dac
  #:                      dac
```

Synchronization Plan

```
                                                    Page 1 of X
                          SYNCHRONIZATION PLAN
                 SYNCHRONIZATION SOURCE (circuit pack location)
                          Stratum: 4
                     Port Network: 1
                          Primary: 01a10      Secondary: ___

     Location    Name      Slip    Type    Location    Name           Slip  Type
     01a10  _____  y    UDS1-BD  _____  _____   _    ___
     _____  _____  _             _____  _____   _    ___
     _____  _____  _             _____  _____   _    ___
     _____  _____  _             _____  _____   _    ___
     _____  _____  _             _____  _____   _    ___
     _____  _____  _             _____  _____   _    ___
     _____  _____  _             _____  _____   _    ___
     _____  _____  _             _____  _____   _    ___
NOTE: TN722B & TN464B DS1 sources result in stratum 4, type II synchronization
```

Trunk Goups

Group 12 — page 1

```
display trunk-group 12                                  Page   1 of  10
                          TRUNK GROUP


Group Number: 12                 Group Type: tie           CDR Reports: y
  Group Name: tg12                      COR: 1      TN: 1        TAC: 712
   Direction: two-way      Outgoing Display? n    Trunk Signaling Type:
 Dial Access? y            Busy Threshold: 99           Night Service:
Queue Length: 0                                    Incoming Destination:
   Comm Type: avd                   Auth Code? n
                               Trunk Flash? n
         BCC: 0
TRUNK PARAMETERS
   Trunk Type (in/out): wink/wink       Incoming Rotary Timeout(sec): 5
    Outgoing Dial Type: tone                   Incoming Dial Type: tone
      Wink Timer(msec): 300         Disconnect Timing(msec): 500
       Digit Treatment:                                    Digits:
                                        Sig Bit Inversion: none
     Connected to Toll? n      STT Loss: normal      DTT to DCO Loss: normal
   Incoming Dial Tone? y
             Bit Rate: 1200          Synchronization: async    Duplex: full
 Disconnect Supervision - In? y  Out? n
Answer Supervision Timeout: 0            Receive Answer Supervision? y
```

Group 12 — Page 2

```
display trunk-group 12                                    Page   2 of  10
TRUNK FEATURES
          ACA Assignment? n              Measured: none
                               Internal Alert? n      Maintenance Tests? y
                             Data Restriction? n
                             Glare Handling: none
             Used for DCS? y  PBX ID: 1
   Suppress # Outpulsing? n
                    Seize When Maintenance Busy: neither-end




Incoming Tone (DTMF) ANI: no                Per Call CPN Blocking Code:
          Connected to CO? n                Per Call CPN Unblocking Code:
```

Group 12 — member assignments

```
                              TRUNK GROUP
                            Administered Members (min/max):   1/3
GROUP MEMBER ASSIGNMENTS             Total Administered Members:   3

      Port     Code Sfx Name         Night           Mode      Type   Ans Delay
  1: 01a1001   TN767   E
  2: 01a1002   TN767   E
  3: 01a1003   TN767   E
  4:
  5:
  6:
```

Uniform Dialing Paln

```
change udp x
                                                      Page 1 of 2
                        UNIFORM DIALING PLAN
                        Ext Codes: ddxx

dd   Type        dd   Type        dd   Type       dd   Type       dd   Type
0x: _____ ___ 1x: udpcode 221 2x: local   ___ 3x: udpcode 223 4x: udpcode 224
00: _____ ___ 10: _____ ___ 20: _____ ___ 30: _____ ___ 40: _____ ___
01: _____ ___ 11: _____ ___ 21: _____ ___ 31: _____ ___ 41: _____ ___
02: _____ ___ 12: _____ ___ 22: _____ ___ 32: _____ ___ 42: _____ ___
03: _____ ___ 13: _____ ___ 23: _____ ___ 33: _____ ___ 43: _____ ___
04: _____ ___ 14: _____ ___ 24: _____ ___ 34: _____ ___ 44: _____ ___
05: _____ ___ 15: _____ ___ 25: _____ ___ 35: _____ ___ 45: _____ ___
06: _____ ___ 16: _____ ___ 26: _____ ___ 36: _____ ___ 46: _____ ___
07: _____ ___ 17: _____ ___ 27: _____ ___ 37: _____ ___ 47: _____ ___
08: _____ ___ 18: _____ ___ 28: _____ ___ 38: _____ ___ 48: _____ ___
09: _____ ___ 19: _____ ___ 29: _____ ___ 39: _____ ___ 49: _____ ___
7
```

AAR Digit Analysis

```
change aar analysis 1                                          Page    1 of    2
                         AAR DIGIT ANALYSIS TABLE
                                                         Percent Full:    6

         Dialed            Total       Route     Call    Node  ANI
         String           Min  Max   Pattern     Type    Num   Reqd
    221                     7    7      101        aar     1     n
    223                     7    7      101        aar     3     n
    224                     7    7      101        aar     4     n
```

Routing Patterns

```
display route-pattern 101
                         Pattern Number: 101

  Grp.  FRL NPA Pfx Hop Toll No. Del Inserted                           IXC
  No.           Mrk Lmt List Digits  Digits
1:12     0                    3                                         user
2:                                                                      user
3:                                                                      user
4:                                                                      user
5:                                                                      user
6:                                                                      user
```

Data Modules

procr-intf data module

```
add data-module 2992                                          Page 1 of 1
                              DATA MODULE

  Data Extension: 2992              Name: x.25 on link 2 to node 1
           Type: procr-intf     COS: 1      Maintenance Extension: 2002
Physical Channel: 02             COR: 1          Destination Number: 7221993
            ITC: Restricted       TN: 1      Establish Connection? y
           Link: 2            DTE/DCE: dce    Connected Data Module:
_____
                           Enable Link: n
ABBREVIATED DIALING
  List1: _____

SPECIAL DIALING OPTION: _____

ASSIGNED MEMBER (Station with a data extension button for this data module)

       Ext              Name
    1.
```

Processor Channel Assignments

Release 6 Processor
Channel Assignment
screen

```
change communications-interface processor-channels                  Page 1 of 4
                        PROCESSOR CHANNEL ASSIGNMENT
   Proc                    Interface                Remote
   Chan     Appl.      Link   Chan     Priority   Proc Chan        Machine-ID
    1:      _____     _     __       ____        __               __
    :
   11:      dcs___      2     11       ____        11                1
   12:      dcs___      2     12       ____        12                3_
   13:      dcs___      2     13       ____        13                4_
    :
   59:      audix_      2     2_       ____        __                __
```

Release 6 Interface
Links screen

```
change communications-interface links                        Page 1 of 1
                             INTERFACE LINKS
                  Est   PI              Destination     DTE/
   Link   Enable  Conn  Ext     Port    Digits      Brd   DCE   Identification
    1:     _      _     _____   ____    _____  _____  ___   _____
    2:     y      y     2992_   1a1004  1992 _____  _____  dce   _____
    3:     _      _     _____   ____    _____  _____  ___   _____
Link 1 [eia] - Connected to : ___ Clocking : _____
```

Hunt Group

page 1

```
add hunt-group 99                                              Page   1 of  10
                              HUNT GROUP

           Group Number: 99                               ACD? n
             Group Name: Intuity 1                       Queue? n
         Group Extension: 2111                           Vector? n
             Group Type: ucd-mia                  Coverage Path:
                     TN: 1           Night Service Destination:
                    COR: 1                    MM Early Answer? n
          Security Code:
     ISDN Caller Display:
```

page 2

```
add hunt-group 1                                               Page   2 of  10
                              HUNT GROUP

                        Message Center: rem-audix
                        AUDIX Extension: 1111


     Calling Party Number to INTUITY AUDIX? n
                            LWC Reception: none
```

Switch-Node 3 Administration

This section displays the filled-in screens for the administration of Switch Node 3.

DS1 Circuit Packs

```
add ds1 1a11                                            Page   1 of   2
                             DS1 CIRCUIT PACK

           Location: 01a11                        Name: Switch 3 to Switch 1
           Bit Rate: 1.544               Line Coding: b8zs
   Line Compensation: 1                  Framing Mode: esf
      Signaling Mode: isdn-pri



Interface Companding: mulaw
           Idle Code: 11111111
             DMI-BOS? n




     Slip Detection? n                Near-end CSU Type: other

```

Dial Plan

```
change dialplan
                            DIAL PLAN RECORD


                                            Local Node Number: 3
                                              ETA Node Number:
        Uniform Dialing Plan: 4-digit        ETA Routing Pattern:
  UDP Extension Search Order: local-extensions-first
FIRST DIGIT TABLE
First                                Length
Digit  - 1 -        - 2 -      - 3 -      - 4 -        - 5 -        - 6 -
  1:                                   extension
  2:                                   extension
  3:                                   extension
  4:                                   extension
  5:
  6:
  7:                       dac
  8: fac
  9: fac
  0: attd
  *:                       dac
  #:                       dac
```

Synchronization Plan

```
change synch                                                    Page 1 of X
                           SYNCHRONIZATION PLAN
                   SYNCHRONIZATION SOURCE (circuit pack location)
                              Stratum: 4
                         Port Network: 1
                              Primary: 1a11     Secondary: ___

       Location    Name        Slip    Type    Location    Name         Slip  Type
       01a11  DCS SW1_____      y      UDS1-BD  _____  _____  _    ____
       _____  _____   _               _____  _____  _    ____
       _____  _____   _               _____  _____  _    ____
       _____  _____   _               _____  _____  _    ____
       _____  _____   _               _____  _____  _    ____
       _____  _____   _               _____  _____  _    ____
       _____  _____   _               _____  _____  _    ____
NOTE: TN722B & TN464B DS1 sources result in stratum 4, type II synchronization
```

Signaling Group

Page 1

```
add signaling group next
                                                                Page 1 of 5
                           SIGNALING GROUP
Group Number: 1
                      Associated Signaling? y          Max number of NCA TSC: 5_
                         Primary D-Channel: 01a1124     Max number of CA TSC: 23
                                                        Trunk Group for NCA TSC: 13
         Trunk Group for Channel Selection: ___
             Supplementary Service Protocol: a__
```

**Page 2 – Administered
NCA TSC Assignment**

```
                                                                Page 2 of 5
                        ADMINISTERED NCA TSC ASSIGNMENT

Service/Feature: _____          As-needed Inactivity Time-out (min): __

  TSC   Local                                           Adj.        Mach.
 Index   Ext.   Enabled Established  Dest. Digits  Appl.  Name        ID
  1:    3901      y      permanent   1901_____  dcs____ _____    1_
  2:    3902_     y      permanent   1902_____  dcs____ _____    2_
  3:    3903_     y      permanent   1903_____  dcs____ _____    4_
  4:    3904_     y      permanent   1904_____  audix__ _____    1_
```

Trunk Groups

Group 13 (ISDN-PRI) —
page 1

```
add trunk-group 13                                           Page   1 of  10
                            TRUNK GROUP

Group Number: 13                      Group Type: isdn-pri     CDR Reports: y
  Group Name: ISDN TG 13 to sw 1             COR: 1       TN: 1        TAC: 713
   Direction: two-way          Outgoing Display? n
 Dial Access? n                      Busy Threshold: 99         Night Service:
Queue Length: 0
Service Type: tie                        Auth Code? n          TestCall ITC: rest
                      Far End Test Line No:
TestCall BCC: 4
TRUNK PARAMETERS
          Codeset to Send Display: 6      Codeset to Send TCM,Lookahead: 6
          Max Message Size to Send: 260    Charge Advice: none
   Supplementary Service Protocol: a      Digit Handling (in/out): enbloc/enbloc

              Trunk Hunt: cyclical
     Connected to Toll? n      STT Loss: normal       DTT to DCO Loss: normal
Calling Number - Delete:     Insert:                 Numbering Format:
             Bit Rate: 1200        Synchronization: async    Duplex: full
 Disconnect Supervision - In? y  Out? n
 Answer Supervision Timeout: 0
```

Group 13 — page 2

```
add trunk-group 13                                           Page   2 of  10
TRUNK FEATURES
          ACA Assignment? n               Measured: none      Wideband Support? n
                                  Internal Alert? n        Maintenance Tests? y
                                Data Restriction? n     NCA-TSC Trunk Member: 1
                                    Send Name: n        Send Calling Number: n
           Used for DCS? y  PBX ID: 1
  Suppress # Outpulsing? n                              DCS Signaling: d-chan
 Outgoing Channel ID Encoding: exclusive     UUI IE Treatment: service-provider


                                              Send Connected Number: n


             Send UCID? n
 Send Codeset 6/7 LAI IE? y
```

Group 13 — member assignments

```
display trunk-group 13                                Page   4 of  10
                              TRUNK GROUP
                                Administered Members (min/max):   0/0
GROUP MEMBER ASSIGNMENTS                  Total Administered Members:   0

       Port     Code Sfx Name        Night           Sig Grp
  1: 01a1101  TN464  e                                   1
  2: 01a1102  TN464  e                                   1
  3: 01a1103  TN464  e                                   1
  4: 01a1104  TN464  e                                   1
  5:
  6:
```

Uniform Dialing Paln

```
change udp x
                                                      Page 1 of 2
                         UNIFORM DIALING PLAN
                         Ext Codes: ddxx

dd  Type           dd   Type         dd   Type        dd   Type       dd   Type
0x: _____ ___    1x: udpcode 221   2x: udpcode 222  3x: local  ___  4x: udpcode 224
00: _____ ___    10: _____ ___   20: _____ ___  30: _____ ___ 40: _____ ___
01: _____ ___    11: _____ ___   21: _____ ___  31: _____ ___ 41: _____ ___
02: _____ ___    12: _____ ___   22: _____ ___  32: _____ ___ 42: _____ ___
03: _____ ___    13: _____ ___   23: _____ ___  33: _____ ___ 43: _____ ___
04: _____ ___    14: _____ ___   24: _____ ___  34: _____ ___ 44: _____ ___
05: _____ ___    15: _____ ___   25: _____ ___  35: _____ ___ 45: _____ ___
06: _____ ___    16: _____ ___   26: _____ ___  36: _____ ___ 46: _____ ___
07: _____ ___    17: _____ ___   27: _____ ___  37: _____ ___ 47: _____ ___
08: _____ ___    18: _____ ___   28: _____ ___  38: _____ ___ 48: _____ ___
09: _____ ___    19: _____ ___   29: _____ ___  39: _____ ___ 49: _____ ___
```

AAR Digit Analysis

```
display aar analysis 1                                Page   1 of   2
                         AAR DIGIT ANALYSIS TABLE
                                                  Percent Full:    6

          Dialed        Total      Route    Call   Node  ANI
          String      Min   Max   Pattern   Type   Num   Reqd
          221          7     7      101      aar     1    n
          222          7     7      101      aar     2    n
          224          7     7      101      aar     4    n
```

Routing Patterns

```
add route-pattern 101
                            Pattern Number: 101

  Grp.  FRL NPA Pfx Hop Toll No. Del Inserted                      IXC
  No.            Mrk Lmt List Digits  Digits
1:13     0                     3                                   user
2:                                                                 user
3:                                                                 user
4:                                                                 user
5:                                                                 user
6:                                                                 user

    BCC VALUE   TSC CA-TSC    ITC  BCIE Service/Feature    Numbering LAR
    0 1 2 3 4 W     Request                                Format
1: y y y y y n  y  as needed both ept                               none
2: y y y y y n  n             rest                                  none
3: y y y y y n  n             rest                                  none
4: y y y y y n  n             rest                                  none
5: y y y y y n  n             rest                                  none
6: y y y y y n  n             rest                                  none
```

Hunt Group

page 1

```
add hunt-group 99                                          Page   1 of   10
                            HUNT GROUP

          Group Number: 99                             ACD? n
            Group Name: Intuity 1                    Queue? n
       Group Extension: 3111                         Vector? n
            Group Type: ucd-mia             Coverage Path:
                    TN: 1         Night Service Destination:
                   COR: 1                   MM Early Answer? n
         Security Code:
    ISDN Caller Display:
```

page 2

```
add hunt-group 99                                          Page   2 of   10
                            HUNT GROUP

                       Message Center: rem-audix
                      AUDIX Extension: 1111



   Calling Party Number to INTUITY AUDIX? n
                          LWC Reception: none
```

Switch-Node 4 Administration

This section displays the filled-in screens for the administration of Switch Node 4.

Bus Bridge

```
change system-parameters maintenance                            Page    2 of    3

                    MAINTENANCE-RELATED SYSTEM PARAMETERS

MINIMUM MAINTENANCE THRESHOLDS ( Before Notification )
        TTRs: 4          CPTRs: 1        Call Classifier Ports: 0
        MMIs: 0          VCs: 0

TERMINATING TRUNK TRANSMISSION TEST ( Extension )
   Test Type 100:          Test Type 102:          Test Type 105:

ISDN MAINTENANCE
   ISDN-PRI Test Call Extension:         ISDN-BRI Service SPID:

DS1 MAINTENANCE
   DS0 Loop-Around Test Call Extension:

LOSS PLAN ( Leave Blank if no Extra Loss is Required )
   Minimum Number of Parties in a Conference Before Adding Extra Loss:

SPE OPTIONAL BOARDS
                    Packet Intf1? y     Packet Intf2? y
         Bus Bridge: 01a05   Inter-Board Link Timeslots  Pt0: 6 Pt1: 1 Pt2: 1
```

DS1 Circuit Packs

page 1

```
add ds1 1a10                                            Page    1 of    2
                           DS1 CIRCUIT PACK

          Location: 01a10                          Name: Switch 4 to Switch 1
          Bit Rate: 1.544                   Line Coding: b8zs
  Line Compensation: 1                     Framing Mode: esf
     Signaling Mode: robbed-bit




Interface Companding: mulaw
          Idle Code: 11111111




     Slip Detection? n                 Near-end CSU Type: other
```

Dial Plan

```
change dialplan
                             DIAL PLAN RECORD

                                          Local Node Number: 4
                                            ETA Node Number:
          Uniform Dialing Plan: 4-digit        ETA Routing Pattern:
  UDP Extension Search Order: local-extensions-first
FIRST DIGIT TABLE
First                                Length
Digit  - 1 -        - 2 -        - 3 -        - 4 -        - 5 -        - 6 -
  1:                                      extension
  2:                                      extension
  3:                                      extension
  4:                                      extension
  5:
  6:
  7:                         dac
  8: fac
  9: fac
  0: attd
  *:                         dac
  #:                         dac
```

Synchronization Plan

```
                                                    Page 1 of X
                           SYNCHRONIZATION PLAN
                  SYNCHRONIZATION SOURCE (circuit pack location)
                        Stratum: 4
                   Port Network: 1
                        Primary: 01a10     Secondary: ___

      Location    Name        Slip    Type    Location    Name          Slip  Type
      01a10   _____    y     UDS1-BD  _____  _____   _    ____
      _____   _____    _              _____  _____   _    ____
      _____   _____    _              _____  _____   _    ____
      _____   _____    _              _____  _____   _    ____
      _____   _____    _              _____  _____   _    ____
      _____   _____    _              _____  _____   _    ____
      _____   _____    _              _____  _____   _    ____
      _____   _____    _              _____  _____   _    ____
      _____   _____    _              _____  _____   _    ____
NOTE: TN722B & TN464B DS1 sources result in stratum 4, type II synchronization
```

Trunk Groups

Group 14 — page 1

```
display trunk-group 14                                     Page   1 of  10
                              TRUNK GROUP

Group Number: 14                      Group Type: tie          CDR Reports: y
  Group Name: Node 4 to Node 1 - TG14     COR: 1        TN: 1        TAC: 714
   Direction: two-way          Outgoing Display? n     Trunk Signaling Type:
 Dial Access? y                 Busy Threshold: 99          Night Service:
Queue Length: 0                                       Incoming Destination:
   Comm Type: voice                  Auth Code? n
                                  Trunk Flash? n
         BCC: 0
TRUNK PARAMETERS
   Trunk Type (in/out): wink/wink       Incoming Rotary Timeout(sec): 5
    Outgoing Dial Type: tone                   Incoming Dial Type: tone
      Wink Timer(msec): 300              Disconnect Timing(msec): 500
       Digit Treatment:                                      Digits:
                                          Sig Bit Inversion: none
     Connected to Toll? n      STT Loss: normal     DTT to DCO Loss: normal
    Incoming Dial Tone? y
            Bit Rate: 1200         Synchronization: async    Duplex: full
 Disconnect Supervision - In? y  Out? n
 Answer Supervision Timeout: 0               Receive Answer Supervision? y
```

Group 14 — Page 2

```
display trunk-group 14                                     Page   2 of  10
TRUNK FEATURES
          ACA Assignment? n                Measured: none
                                  Internal Alert? n       Maintenance Tests? y
                              Data Restriction? n
                              Glare Handling: none
            Used for DCS? y  PBX ID: 1
  Suppress # Outpulsing? n
                    Seize When Maintenance Busy: neither-end




Incoming Tone (DTMF) ANI: no                Per Call CPN Blocking Code:
       Connected to CO? n                 Per Call CPN Unblocking Code:
```

**Group 14 — member
assignments**

```
                              TRUNK GROUP
                              Administered Members (min/max):   1/3
GROUP MEMBER ASSIGNMENTS                 Total Administered Members:   3

      Port    Code Sfx Name        Night          Mode      Type   Ans Delay
 1: 01a1001   TN767  e                                              20
 2: 01a1002   TN767  e                                              20
 3: 01a1003   TN767  e                                              20
 4:
 5:
 6:
```

**Group 24 (data to
Switch Node 1) —
page1**

```
add trunk-group 24                                         Page   1 of  10
                               TRUNK GROUP

Group Number: 24                      Group Type: tie           CDR Reports: y
  Group Name: dcs data to Switch 1         COR: 1         TN: 1       TAC: 124
   Direction: two-way         Outgoing Display? n     Trunk Signaling Type:
 Dial Access? y                    Busy Threshold: 99           Night Service:
Queue Length: 0                                      Incoming Destination:
   Comm Type: rbavd                      Auth Code? n
                                   Trunk Flash? n
         BCC: 0
TRUNK PARAMETERS
   Trunk Type (in/out): wink/wink        Incoming Rotary Timeout(sec): 5
    Outgoing Dial Type: tone                  Incoming Dial Type: tone
      Wink Timer(msec): 300            Disconnect Timing(msec): 500
       Digit Treatment:                               Digits:
                                       Sig Bit Inversion: none
    Connected to Toll? n     STT Loss: normal      DTT to DCO Loss: normal
    Incoming Dial Tone? y
             Bit Rate: 1200        Synchronization: async    Duplex: full
 Disconnect Supervision - In? y  Out? n
 Answer Supervision Timeout: 0            Receive Answer Supervision? y
```

Group 24 — page 2

```
add trunk-group 24                                         Page   2 of  10
TRUNK FEATURES
         ACA Assignment? n               Measured: none
                                  Internal Alert? n       Maintenance Tests? y
                               Data Restriction? n
                                 Glare Handling: none
             Used for DCS? n
   Suppress # Outpulsing? n
                    Seize When Maintenance Busy: neither-end




Incoming Tone (DTMF) ANI: no                  Per Call CPN Blocking Code:
        Connected to CO? n                  Per Call CPN Unblocking Code:
```

**Group 14 — member
assignments**

```
                               TRUNK GROUP
                            Administered Members (min/max):   1/3
GROUP MEMBER ASSIGNMENTS                Total Administered Members:   3

     Port    Code Sfx Name          Night           Mode     Type   Ans Delay
  1: 01a1023  TN767  f                                                 20
  2:
  3:
  4:
```

Uniform Dialing Paln

```
change udp x                                                    Page 1 of 2
                          UNIFORM DIALING PLAN
                          Ext Codes: ddxx


dd   Type          dd   Type         dd   Type         dd   Type         dd   Type
0x: _____ ___  1x: udpcode 221  2x: udpcode 222  3x: udpcode 223  4x: local    ___
00: _____ ___  10: _____ ___  20: _____ ___  30: _____ ___  40: _____ ___
01: _____ ___  11: _____ ___  21: _____ ___  31: _____ ___  41: _____ ___
02: _____ ___  12: _____ ___  22: _____ ___  32: _____ ___  42: _____ ___
03: _____ ___  13: _____ ___  23: _____ ___  33: _____ ___  43: _____ ___
04: _____ ___  14: _____ ___  24: _____ ___  34: _____ ___  44: _____ ___
05: _____ ___  15: _____ ___  25: _____ ___  35: _____ ___  45: _____ ___
06: _____ ___  16: _____ ___  26: _____ ___  36: _____ ___  46: _____ ___
07: _____ ___  17: _____ ___  27: _____ ___  37: _____ ___  47: _____ ___
08: _____ ___  18: _____ ___  28: _____ ___  38: _____ ___  48: _____ ___
09: _____ ___  19: _____ ___  29: _____ ___  39: _____ ___  49: _____ ___
```

AAR Digit Analysis

```
display aar analysis 1                                      Page   1 of   2
                          AAR DIGIT ANALYSIS TABLE
                                                        Percent Full:    6

            Dialed          Total     Route    Call  Node  ANI
            String        Min  Max   Pattern   Type  Num   Reqd
             221           7    7      101      aar    1    n
             222           7    7      101      aar    2    n
             223           7    7      101      aar    3    n
```

Routing Patterns

```
display route-pattern 101
                          Pattern Number: 101

  Grp.  FRL NPA Pfx Hop Toll No. Del Inserted                          IXC
  No.           Mrk Lmt List Digits  Digits
1:14     0                    3                                        user
2:                                                                     user
3:                                                                     user
4:                                                                     user
5:                                                                     user
6:                                                                     user
```

Node Names

page 1

```
change node-names                                              Page   1 of   6
                              NODE NAMES


     Audix Names    IP Address          MSA Names    IP Address
     intuity1       192.168.200.10      msa          ___.___.___.___
```

page 2

```
change node names
                                                          Page 2 of 6
                              NODE NAMES

   Name              IP Address          Name              IP Address
 1.ppp41             192.168.200.14   17. _____   ___.___.___.___
 2.ppp14             192.168.200.12   18. _____   ___.___.___.___
 3.CMS               192.168.201.10   19. _____   ___.___.___.___
 4.router            192.168.200.1    20. _____   ___.___.___.___
 5.ethernet1         192.168.200.11   21. _____   ___.___.___.___
:
16.
```

Data Modules

ppp data module

```
add data-module 4991
                                                          Page 1 of x
                         DATA MODULE

   Data Extension: 4991           Name:  ppp on link 1 to switch 1     BCC: 2
             Type: ppp            COS: 1
             Port: 01a0515        COR: 1
             Link: 1              TN: 1
     Enable Link? n

        Node Name: ppp41
      Subnet Mask: 255.255.255.0


Establish Connection: n

DESTINATION
           Digits: 7241994
        Node Name: ppp14
            CHAP? n
```

Processor Channel Assignments

```
change communications-interface processor-channels
                                                              Page 1 of X
                    PROCESSOR CHANNEL ASSIGNMENT

Proc                    Gtwy        Interface   Destination     Session       Mach
Chan Enable  Appl.    To  Mode   Link/Chan   Node      Port  Local/Remote   ID
  1:   n    audix            s     1  5041    intuity   0  _    4     4      1
  :
 10:   n    mis              s     1  5001     cms       0       1     1
  :
 14:   n    dcs              c     1  0        ppp14    5003    14    14      1
 15:   n    dcs              c     1  0        ppp14    5004    15    15      2
 16:   n    dcs              c     1  0        ppp14    5005    16    16      3
  :
```

IP Routing

```
add ip-route next                                    Page   1 of   1
                            IP ROUTING


      Route Number: 1
  Destination Node: audix
           Gateway: ppp14
       C-LAN Board: 1a05
            Metric: 0
        Route Type: host
```

IP Routing

```
add ip-route next                                    Page   1 of   1
                            IP ROUTING


      Route Number: 2
  Destination Node: cms
           Gateway: ppp14
       C-LAN Board: 1a05
            Metric: 0
        Route Type: host
```

Hunt Group

page 1

```
add hunt-group 99                                              Page   1 of  10
                             HUNT GROUP

            Group Number: 99                             ACD? n
              Group Name: Intuity 1                     Queue? n
         Group Extension: 4111                          Vector? n
              Group Type: ucd-mia              Coverage Path:
                      TN: 1          Night Service Destination:
                     COR: 1               MM Early Answer? n
           Security Code:
      ISDN Caller Display:
```

page 2

```
add hunt-group 1                                               Page   2 of  10
                             HUNT GROUP

                         Message Center: rem-audix
                        AUDIX Extension: 1111


      Calling Party Number to INTUITY AUDIX? n
                            LWC Reception: none
```

Intuity Translations for DCS AUDIX

This screen is administered on Intuity, not on the DEFINITY ECS.

```
                        Switch Interface Administration

    Switch Link Type: LAN                  Switch: Definity
    Extension Length: 4                   Country: United States
 Host Switch Number: 1
        Audix Number: 1


 Switch   IP Address/Host Name  TCP Port   Switch   IP Address/Host Name  TCP Port
 Number                                    Number

 1        192.168.200.11        5002       11       ___.___.___._____  _____
 2        192.168.200.11        5021       12       ___.___.___._____  _____
 3        192.168.200.11        5031       13       ___.___.___._____  _____
 4        192.168.200.14        5041       14       ___.___.___._____  _____
 5        _____  _____     15       ___.___.___._____  _____
 :
 10       _____  _____     20       ___.___.___._____  _____
```

CMS Administration

See *CentreVu® Call Management System, Software Installation and Setup*, 585-215-866 for administration procedures for the CMS server.

A Screens Reference

This appendix gives detailed field descriptions for a selection of DEFINITY administration screens (forms). The screen descriptions are divided into two groups — a) Networking Screens, which are needed for network administration and are used in other chapters of this document, and b) Other Network-related Screens, which are related to network administration but not referred to elsewhere in this document. Field descriptions for other DEFINITY screens can be found in the Administrator's Guide, 555-233-506.

Networking Screens

Note: All Trunk Group screens are described in *DEFINITY ECS R8 Administrator's Guide*, 555-233-506.

Other Network-Related DEFINITY Screens

Networking Screens

Node Names

In this context, a *node* is defined as any of the following — a C-LAN port, a bridge or router, a CMS ethernet port, or an Intuity AUDIX, or other MSA (Message Server Adjunct) network interface card. The AUDIX and MSA node name and IP address must be entered on ***page 1*** of the screen. The data for all other node types, including CMS, must be entered on ***pages 2–6***.

The Node Names form holds up to 8 Audix node names with up to 7 characters each, up to 7 MSA node names (up to 7 characters each) on page 1. It holds up to 160 non-specific node names (up to 15 characters each) for DCS, CMS, or bridge/router nodes, on pages 2–6.

The node names and IP addresses in any network should be assigned in a logical and consistent manner from the point of view of the whole network. These names and addresses should be assigned in the planning stages of the network and should be available from the customer system administrator or from a Lucent representative.

> **NOTE:**
>
> **Enter node names for Intuity AUDIX and MSA adjuncts on page 1.**
>
> **Enter node names for CMS, switches, and routers starting on page 2.**

page 1

```
                                                              page 1 of 6
                               NODE NAMES

    Audix Name        IP address           MSA Names     IP Address
 1. audix         ___.___.___.___    1. msa  _    ___.___.___.___
 2. _____      ___.___.___.___    2. _____  ___.___.___.___
 3. _____      ___.___.___.___    3. _____  ___.___.___.___
 4. _____      ___.___.___.___    4. _____  ___.___.___.___
 5. _____      ___.___.___.___    5. _____  ___.___.___.___
 6. _____      ___.___.___.___    6. _____  ___.___.___.___
 7. _____      ___.___.___.___    7. _____  ___.___.___.___
 8. _____      ___.___.___.___
```

Audix or MSA Name   Identifies the name of the AUDIX or Message Server Adjunct (MSA) node.

Valid entries	Usage
1-7 alphanumeric characters with no embedded spaces. Defaults: **audix**, **msa** (csi, si) blank (r)	Used as a label for the associated IP address. The node names must be unique on each switch.

| **IP Address** | The IP address associated with the node name. (Not needed for X.25 connections). |

Pages 2 – 6

```
                                                                Page 2 of 6
                                 NODE NAMES

Name                   IP Address              Name               IP Address
 1. Default           __0._0._0._0. 17. _____    ___.___.___.___
 2. _____   ___.___.___.___  18. _____    ___.___.___.___
 3. _____   ___.___.___.___  19. _____    ___.___.___.___
 4. _____   ___.___.___.___  20. _____    ___.___.___.___
 5. _____   ___.___.___.___  21. _____    ___.___.___.___
 6. _____   ___.___.___.___  22. _____    ___.___.___.___
 7. _____   ___.___.___.___  23. _____    ___.___.___.___
 8. _____   ___.___.___.___  24. _____    ___.___.___.___
 9. _____   ___.___.___.___  25. _____    ___.___.___.___
10. _____   ___.___.___.___  26. _____    ___.___.___.___
11. _____   ___.___.___.___  27. _____    ___.___.___.___
12. _____   ___.___.___.___  28. _____    ___.___.___.___
13. _____   ___.___.___.___  29. _____    ___.___.___.___
14. _____   ___.___.___.___  30. _____    ___.___.___.___
15. _____   ___.___.___.___  31. _____    ___.___.___.___
16. _____   ___.___.___.___  32. _____    ___.___.___.___
```

Name   The name of the adjunct or switch node. Valid entries are alpha-numeric and/or special characters for identification. Default is blank.

Valid entries	Usage
1-15 alphanumeric characters with no embedded spaces.	Used as a label for the associated IP address. The node names must be unique on each switch.

IP Address   The IP address for the node named in the previous field.

Valid entries	Usage
32-bit address expressed in dotted-decimal notation — four decimal numbers each in the range 1–255 separated by a decimal point.	A unique IP address is assigned to each port on the C-LAN circuit pack that is used for a connection. Each node name is associated with a unique IP address except in the following circumstance: If the network includes a gateway switch that connects to non-IP nodes (via X.25 or ISDN), then switches on the IP side of the gateway would list all nodes on the non-IP side of the gateway with the (same) IP address of the gateway; that is, several nodes could be listed on the Node Names screen with the same IP address. See Chapter 1 for more information about IP addresses.

IP Interfaces

Use the IP Interfaces screen to define an interface to the LAN from either the C-LAN or MedPro circuit packs. The physical interface is port 17 on the C-LAN board and is a network interface card on the MedPro. This screen specifies the IP address (via the Node Names screen), subnet mask, default gateway address, and the network region for each IP interface on the local DEFINITY ECS.

Note: The C-LAN and MedPro circuit packs must be administered on the Circuit Packs screen before they can be administered on this screen.

```
change ip-interfaces                                          Page   1 of   2

                             IP Interfaces

 Inter-region IP connectivity allowed?  n
Enable                                                                    Net
Eth Pt Type    Slot   Code Sfx Node Name      Subnet Mask    Gateway Addr  Rgn
   y   C-LAN   01A10 TN799 B  clan-a1        255.255.255.0  192.168.10 .100 1
   y   MEDPRO  01A13 TN802 B  med-a1         255.255.255.0  192.168.10 .100 1
   y   MEDPRO  01A16 TN802 B  med-a2         255.255.255.0  192.168.20 .100 1
   y   C-LAN   01A09 TN799 B  clan-a2        255.255.255.0  192.168.10 .100 2
   y   MEDPRO  01B13 TN802 B  med-a3         255.255.255.0  192.168.10 .100 2
   y   C-LAN   01A09 TN799 B  clan-b2        255.255.255.0  192.168.20 .100 2
   n                                         255.255.255.0      .   .   .
   n                                         255.255.255.0      .   .   .
   n                                         255.255.255.0      .   .   .
```

Inter-region IP connectivity allowed? Specifies whether or not IP endpoints registered in one region can use media processing resources (MedPro) in another region.

Valid Values	Usage
y/n	Enter **y** to allow IP endpoints (phones and trunks) to use MedPro resources administered in regions that are different from the endpoints' regions.
	The MedPro and C-LAN boards are assigned to the regions specified in the Net Rgn field. Endpoints are assigned to the same region as the C-LAN boards they use.
	The DEFINITY system first allocates MedPro resources that are assigned to the same regions as the endpoints. If demand for MedPro resources exceeds supply within the local region, available MedPro resources from other regions are used if this field is set to **y**, or call blockage occurs if this field is set to **n**.

Enable Eth Pt   Used to enable or disable the C-LAN or MedPro IP Ethernet port.

Valid Values	Usage
y/n	The Ethernet port must be enabled (**y**) before it can be used. The port must be disabled (**n**) before changes can be made to its attributes on this screen.
	If an enabled Ethernet port is changed to disabled, all signaling and/or media connections will be removed and the associated calls will be torn down.
	The **busy-out** command applied to the circuit pack for the interface overrules the Enable Eth Pt field.

Type   Specifies the type of circuit pack for the IP network interface (C-LAN or MedPro).

Slot   Specifies the location of the circuit pack for the IP network interface in the standard CCcss format (CC = cabinet number, c = carrier letter, ss = slot number).

Code   Display only. Specifies the board code of the circuit pack for the IP interface. This field is automatically populated with TN799 for C-LAN or TN802 for MedPro.

Sfx   Display only. Specifies board code suffix. This field is automatically populated with B for the TN802 and the TN799.

Node Name   The unique node name for the IP interface. The node name must be on the Node Names screen (pages 2–6 only; node names on page 1 of the Node Names screen cannot be used in this field).

Subnet Mask

The subnet mask determines which part of an IP address is the network identifier and which part is the host identifier. The subnet mask is associated with the IP address administered on the Node Names screen for the IP interface identified by the Node Names field on this screen.

See Chapter 1 for more information on IP addresses and subnetting.

Valid Values	Usage
The valid values of the subnet mask depend on the IP address that the subnet mask is applied to — in this case, the IP address on the Node Names screen that is associated with the name entered in the Node Name field.	This field can be used to subdivide a network into 2 or more subnetworks.
	The subnet mask consist of a string of n contiguous 1's followed by a string of 32–n contiguous 0's. When applied to a 32-bit IP address, the subnet mask indicates that the first n bits of the address form the network ID and the next 32–n bits form the host ID portion of the address.
In general, each octet value must be one of the following numbers: 255 or 0, corresponding to the network and host portions of an IP address; or 192, 224, 240, 248, or 252, corresponding to using 2, 3, 4, 5, or 6 bits from the host ID for the subnet ID.	The following default values for the subnet mask are used for no subnetting:
	Class A addresses: 255.0.0.0
	Class B addresses: 255.255.0.0
	Class C addresses: 255.255.255.0

Gateway Address

Specifies the address of a network node that will serve as the default gateway for the IP interface.

Valid Value	Usage
An IP address of a bridge or router on the network that is directly connected to the IP interface.	The default gateway enables communication with nodes on (sub)networks that are different from the (sub)network of the IP interface. A default gateway makes use of explicit IP routes unnecessary.
The gateway address must be administered on the Node Names screen.	If left blank, this node (this IP interface) can communicate with nodes on different (sub)networks only if explicit IP routes (on the IP Routing screen) are defined — communication with nodes on the same (sub)network is not affected. With the Gateway Address left blank, you can enable communications with individual nodes on other (sub)networks by creating host IP routes to them. Or you can enable communication with all nodes on a different (sub)network by defining a network IP route to that (sub)network. You can define a combination of network and host IP routes to enable communications to all nodes on some (sub)networks and individual nodes on other (sub)networks.

Net Rgn   Specifies the network region assigned to the IP interface.

Valid Values	Usage
1–10 Default is **1**.	The Region field on the IP Interfaces screen allows you to set up segregated groups of MedPro resources. This feature can be used in a variety of ways. For example, you could use regions to allocate specific MedPro boards to H.323 trunks and others to stations; or you could use regions to avoid traffic over low bandwidth or high-latency network links.

IP Routing

```
add ip-route 3                                              Page   1 of   1
                              IP ROUTING


      Route Number: 3
  Destination Node:
          Gateway:
      C-LAN Board:
           Metric:
        Route Type:
```

General Description

IP routes are needed when switches are connected in an IP network and default gateways are not assigned *and* you want network nodes on different (sub)networks to communicate.

There are two type of IP routes — *host* and *network*. The following table summarizes when you would use each type:

Connection Type	When to Define IP Routes:
Ethernet	**Host IP Routes** Define a host IP route when endpoints are on different subnets and no default gateway is defined for the local node.
	Network IP Routes Define network IP routes when you want hosts on the local subnet to communicate with hosts on some remote subnets but not others.
PPP	Define a host IP route when there are one or more intermediate nodes between endpoints. Network IP routes are not used with ppp connections.

In a LAN environment, if network security is a concern, not assigning default gateways limits internode access to paths that are explicitly administered.

Note: 1. If you set up an IP route from a node that is connected via a ppp link to the node you are using for the Gateway, you must *first enable the link* on the ppp data module.

Note: 2. If an entry in the Destination Node or Gateway field is rejected, check that the name has been entered on the Node Names screen. In particular, check that names are entered on the correct page of the Node Names screen — page 1 for AUDIX and MSA, *pages 2–6 for a CMS server*, a node in a switch, and router nodes.

Route Number

A number that identifies this IP route.

Valid Value	Usage
1–400	Command-line entry. Enter a specific number or **n** for the next available number.

Destination Node

The node name of the final destination for this connection.

Valid Value	Usage
A name previously entered on the Node Names screen.	This is the final destination of the IP route for this connection.

Gateway

The node name of the first intermediate node.

Valid Value	Usage
A name previously entered on the Node Names screen and is either a port on the C-LAN board or identified as a Destination Node on another IP route.	If there are no intermediate nodes between the local and remote C-LAN ports for this connection, the Gateway is the local C-LAN port. If there are one or more intermediate nodes, the first intermediate node is the Gateway.
	For example, consider a connection between two switches (two C-LAN ports) that goes through a WAN with multiple routers. Each router is an intermediate node but the first router is the Gateway for the IP route between the C-LAN ports. This router is defined as *first* by setting up another IP route between the local C-LAN port and the router. In this IP route, the local C-LAN port is the Gateway and the router is the Destination.

C-LAN Board

The slot location of the local C-LAN board.

Valid Value	Usage
A slot location occupied by a C-LAN board.	Enter MMCSS, where MM is a 2-digit machine number, C is the carrier letter, and SS is a 2-digit slot number.

Metric   The metric value indicates the desirability of the IP route in terms of the efficiency of
                              the data transmission between two nodes.

Valid Values	Usage
0 or **1**	A metric value of **1** is used only on a switch that has more than one C-LAN board installed.
	You can always enter either **0** or **1** in the Metric field but the choice should be guided by the information below.

If there are two routes to the same destination, one with metric **0** and one with metric **1**, the switch software will choose the route with metric **0** because it is (if properly administered) the more efficient route of the two. On the other hand, if both routes are administered with metric **0**, the switch will choose whichever it sees first, not necessarily the most efficient one.

By entering **1** in the Metric field, you are telling the switch, "this is a complex route; if you know of a simpler route (metric **0**) to this destination, use that instead." In other words, metric **1** diverts usage of the route to a metric-**0** route, if available.

The following diagram illustrates the use of the Metric field. Switches A and C are connected via switch B over two LANs. Switch B has two C-LAN boards, which are connected via a ppp link. The network nodes are numbered 1 through 6.
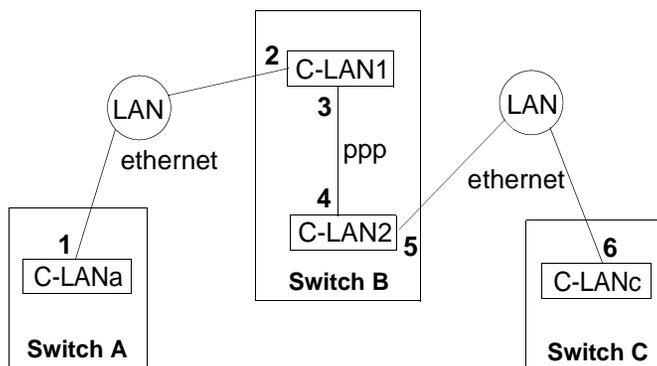
The following IP routes are required for communications between switches A and C:

Route	Administered on	Board Loc.	Destination Node	Gateway Node	Metric
1	Switch A	C-LANa	6	2	0
2	Switch B	C-LAN1	6	4	1
3	Switch B	C-LAN2	1	3	1
4	Switch C	C-LANc	1	5	0
Implied	*Switch B*	*C-LAN2*	*6*	*5*	*0*

The implied route from C-LAN2 to node 6 via node 5 is not administered on the IP Routing screen but is a built-in part of the C-LAN firmware and the automatic subnet routing feature. (We are assuming that automatic subnet routing is enabled for node 5 on the Data Module screen.) Therefore, on Switch B there are two routes to destination 6 — route 2 and the implied route.

A message originating on Switch B destined for node 6 can use either route 2 or the implied route. The switch will choose the implied route because it has metric **0** while route 2 has metric **1**. By using the implied route, the message goes directly from the source to C-LAN2, without passing through C-LAN1. If route 2 had been administered with metric **0**, the switch may have used route 2, which goes through C-LAN1 to C-LAN2. In this case, if traffic volume were high, the PPP connection between C-LAN1 and C-LAN2 could be unnecessarily overloaded. Of course, any destination-6 message already being handled by C-LAN1, such as a message from Switch A, would have to use route 2.

The same description applies to route 3 and destination 1. There is an implied metric-**0** route with destination 1 and gateway 2.

Route Type

The Route Type is a display-only field that appears on the screen when the change, display, and list commands are used; it does not appear for the add command. It specifies whether this is a network or host route.

A network route enables communications between the node specified in the C-LAN Board field and *all* nodes on the (sub)network specified in the Destination Node field. A host route enables communications between the node specified in the C-LAN Board field and the *single* node specified in the Destination Node field.

For a network route, the node name in the Destination Node field must be administered on the Node Names screen where it is associated with a (sub)network address, not a specific node address. For example, 192.168.1.0 is the network address for the 192.168.1 network.

The identification of an address as a network address or a host address depends on how the network is subnetted, which is specified by the Subnet Mask field on the IP Interfaces screen.

Valid Value	Usage
network or host	Display only.

IP Media Parameters

This screen specifies the types of codecs available on the IP Interface board (TN802B). The codecs encode and compand the analog voice data for transmission over the IP facilities. The order in which the codecs are listed is the preferred order of use by the switch.

Note: The codec ordering *must be the same* on DEFINITY switches at both ends of an H.323 trunk connection. The set of codecs listed need not be the same, but the order of the listed codecs must be the same.

```
change ip-parameters                                     Page   1 of   1

                            IP Media Parameters

     Audio Codec
     Preferences

 1: G.711MU
 2: G.723-6.3K
 3: G.729A
 4:


     UDP Port Range

     Min: 2048
     Max: 65535 n
```

**Audio Codec
Preferences**

Enter the codec types in the order of preference of use..

Valid Value	Usage
G.711A, G711MU, G723-6.3K, G723-5.8K, G729A	Enter up to four codec types in the order of preference of use. See IP Parameters (page 34) for a description of the differences between codec types.

UDP Port Ranges

Enter a minimum and maximum port number.

Valid Value	Usage
1–65535 Min < Max.	Enter a minimum and maximum port number to specify a block of port numbers to be used for audio connections.

Data Module Screens

The Data Module screen must be administered at both ends of a DCS connection, except for ISDN connections. There are two types of data modules used with TCP/IP connections — *ppp* and *ethernet*. There are two types of data modules used with BX.25 connections — the *proc-intf* data module is used for the csi and si models, and the *x.25* data module is used with the r model. The *pdm* data module is needed when the r model is connected to an si model via x.25.

The fields that are common to two or more of the data module types are described first, followed by the screen pictures and descriptions of the fields that are unique for a given data module type.

Common Data Module Fields

The following fields are common to two or more of data module types.

Data Extension   Extension number for this data module.

Valid Entries	Data Module Types	Usage
A 1- to 5-digit number consistent with the Dial Plan	ppp ethernet procr-intf x.25 pdm	The data extension is entered on the command line. If *next* is entered on the command instead of an extension number, the system assigns the next available extension number.

Type   The data module type, which determines the connection type.

Valid Entries	Data Module Types	Usage
For TCP/IP connections: **ppp** and **ethernet**. For X.25 connections: **proc-intf** (for the csi and si models) **x.25** and **pdm** (for the r-model).	ppp ethernet procr-intf x.25 pdm	Enter the data module type that is appropriate type for the connection type and switch model. For an r-model connected to an si-model via X.25, a **pdm** data module needs to be administered in addition to the **x.25** data module.

Port

Seven characters to specify the port location for this data module in the format NNCSSPP.

Valid Entries	Data Module Types	Usage
NN = cabinet number: • 01 – 44 (r model) • 01 – 03 (si model) • 01 (csi model) C = carrier position: a – e SS = slot number: 00 – 20 PP = port number: 01 – 16	ppp ethernet x.25 pdm	You can enter x in the Port field to indicate that there is no hardware associated with the port assignment (Administration Without Hardware).

Link

The communication interface link number associated to this data module.

Valid Entries	Data Module Types	Usage
• **1–33** r model • **1–25** si model • **1–25** csi model	ppp ethernet procr-intf x.25	Indicates the interface link number that connects to another node in a DCS network, a Message Server, CMS, SDN Gateway, or AUDIX.

Name

Descriptive label for the data module.

Valid Entries	Data Module Types	Usage
0–27 alphanumeric characters. Default is blank.	ppp ethernet procr-intf x.25 pdm	This field is not used by the system software. Enter a descriptive name for ease in identifying the data module. The contents of this field are displayed when the *list data module* command is used.

COS

Class of service. COS specifies a group of feature-access permissions of a group of telephones.

Valid Entries	Data Module Types	Usage
0–15 Default is **1**	ppp procr-intf pdm	The value for this fields will be specified by the system administrator.

COR

Class of restriction. COR identifies caller and called-party privileges for telephones, telephone groups, data modules, and trunk groups.

Valid Entries	Data Module Types	Usage
0-95 Default is **1**	ppp procr-intf x.25 pdm	The values for these fields will be specified by the system administrator. Administer the COR so that account codes are not required. Forced entry of account codes is turned off for wideband endpoints.

TN

Tenant partition number. Enables a single DEFINITY ECS to appear to users as several small independent switches.

Valid Entries	Data Module Types	Usage
1-20 (csi, si) **1-100** (r) Default is **1**	ppp procr-intf x.25 pdm	Partitioning could be useful when 2 or more user groups (tenants) have different switch-usage patterns. For R6 and later configurations, all MASI trunks are associated with Tenant 1.

BCC

Bearer capability class. *This field is not administrable on the data module screens.* BCC is used with ISDN connections to identify the types of traffic that can be supported by a given trunk.

Valid Values	Data Module Types	Usage
0-4	ppp ethernet pdm	For non-ISDN connections, leave the default (2). For ISDN connections, 0 = Voice only. Use for H.323 trunks. 1 = Mode 1 data — allows restricted circuit-switched data on a B-channel; 56Kbps 2 = Mode 2 data — 64 Kbps data packaged in an inverted HDLC protocol and limited to user data rates between 300bps and 19.2Kbps. 3 = Mode 3 data — when circuit switched, 64Kbps digital data packaged in LAPD protocol. 4 = Mode 0 data — a data bearer capability that allows full 64Kbps unrestricted circuit switched data on a B-channel. Also referred to as *clear channel*.

Node Name The node name for the interface (C-LAN port) defined by this data module.

Valid Entries	Data Module Types	Usage
A name administered on the Node Names Screen. For a ppp data module, AUDIX and MSA names listed on page 1 of the Node Names screen are not allowed in this field — only names listed on pages 2–6 of the Node Names screen are valid.	ppp	This name is associated with an IP address of the port on the Node Names screen.

Destination Number This field specifies the destination of the link.

Valid Entries	Data Module Types	Usage
Extension number or TAC + extension number or **eia** or **external** Leave blank if Establish Connection? is set to **n**.	procr-intf x.25	Used to enable access to the correct trunk group at the far end of the connection. This is typically the trunk access code (TAC) plus the extension of data module on the far end. If you use just the extension, then you must administer UDP and AAR route patterns to access the correct trunk group. If a trunk access code (TAC) is used, prepend the TAC to the extension. Enter **eia** (simplex system only) for ... The Link field must be set to **1** for **eia**. For the x.25 data module, to connect the Adjunct via the cable on the back of the PGATE circuit pack, enter **external**. If a value other than **external** is used, the associated X.25 data module must have a baud rate of **switched**. This field can be left blank assuming the other side will call it; however, it is preferable to put in the actual digits of the other side and set the Establish Connection field to n. This enables you to identify which X.25 data module on the remote switch is expected to call this data module.

Used to enable access to the correct trunk group at the far end of the connection. This is typically the trunk access code (TAC) plus the extension of data module on the far end. If you use just the extension, then you must administer UDP and AAR route patterns to access the correct trunk group.

Establish Connection? Specifies whether this switch will be responsible for the call setup for this connection.

Valid Entries	Data Module Types	Usage
y/n Default is **n**.	procr-intf x.25	Enter **y** if the System is responsible for any part of the call setup for the link defined by this data module. If the physical link is through a pair of MPDMs or MTDMs, then each switch terminating the link must set up a connection between its Processor Interface Data Module and MPDM/MTDM. Enter the opposite value when administering the data module for switch at the other end of the connection. If the link is to be used for ISDN signaling, enter **y**.

Connected Data Module This in an information-only field. This field displays when the Destination Number field is other than **eia**.

Valid Entries	Data Module Types	Usage
no entries — information only	procr-intf x.25	

Connected To Specifies whether the connected device is dte or isn.

Valid entries	Data Module Types	Usage
dte, isn	pdm	Displays only when Type is **pdm** and the Destination Number is set to **eia**. Enter **dte** if the data module is connected to Data Terminal Equipment (DTE) or enter **isn** if connected to an Information Systems Network (ISN).

ITC Information Transfer Capability. This field is used to determine the type of transmission facilities to be used for ISDN calls originating from this endpoint. Displays when Communication Type is **56k-data**, **64k-data**, or **Wideband**.

Enter **restricted** (default) or **unrestricted** to indicate the type of transmission facilities to be used for ISDN calls originated from this endpoint. The field does not display for voice-only or BRI stations.

When adding an access endpoint with the ITC administered as unrestricted, its associated port must be a channel of a DS1 circuit pack with zero code suppression administered as b8zs. If the port is not a channel of a DS1 circuit pack with its zero code suppression administered as b8zs, the end validation fails and the form submission is rejected.

When adding an access endpoint with the ITC administered as restricted, its associated port can be a channel from a DS1 circuit pack with Zero Code Suppression administered as zcs or b8zs.

For an existing access endpoint, ITC can only be changed from restricted to unrestricted if its associated port is a channel of a DS1 circuit pack with its Zero Code Suppression field administered as b8zs. If the port is on a channel of a DS1 circuit pack with its Zero Code Suppression administered as zcs or b8zs, the end validation fails and the form submission is rejected. Without this end validation, a user could administer an access endpoint as unrestricted when in fact it is restricted, that is its associated port is a member of a DS1 circuit pack that uses ZCS data transmission.

Valid Entries	Data Module Types	Usage
`restricted` `unrestricted`	procr-intf pdm netcon analog-dm	Use **restricted** except for wideband endpoints. For **unrestricted**, only unrestricted transmission facilities (b8zs and hdb3) will be used to complete the call. An unrestricted facility is a transmission facility that does not enforce 1's density digital transmission (that is, digital information is sent exactly as is). For **restricted**, either restricted (ami-zcs or ami-basic) or unrestricted transmission facilities is used to complete the call. A restricted facility is a transmission facility that enforces 1's density digital transmission (that is, a sequence of eight digital zeros is converted to a sequence of seven zeros and a digital one) via zcs coding on DS1 circuit pack.

DTE/DCE

Designates the interface defined by this data module as data terminal equipment or data communications equipment.

Valid Entries	Data Module Types	Usage
`dte/dce`	procr-intf x.25	The DTE/DCE assignments must be opposites on the two ends of the connection.

Remote Loop-Around Test?

Activates/deactivates remote loop-around testing.

Valid Entries	Data Module Types	Usage
`y/n`	procr-intf pdm	Set to **n** unless testing.

Data Module — Type *ethernet*

Use the ethernet data module type to define an interface between port 17 on the C-LAN board and the LAN. This data module associates a link number and extension number with the C-LAN port address.

```
add data-module next
                                                             Page 1 of X
                            DATA MODULE

   Data Extension: 2377            Name: ethernet on link 2
              Type: ethernet
              Port: 01c0817
              Link: 2


 Network uses 1's for broadcast addresses? y
```

Common Fields

See Common Data Module Fields (256) for descriptions of fields on this screen that are not listed below.

Network uses 1's for broadcast addresses?

This field allows you to specify whether the DEFINITY system is to use all 1's or all 0's in the host ID to form broadcast addresses sent on the network by this C-LAN board.

Valid Entries	Usage
y/n default is **y**	Leave the default (**y**) if the private network contains only DEFINITY switches and adjuncts. Set to **n** only if the network includes non-DEFINITY switches that use the 0's method of forming broadcast addresses, as described below.
	The binary form of a broadcast address is most commonly formed by combining the (sub)network portion with all 1's for the host portion of the address. However, some non-DEFINITY older systems form broadcast addresses using 0's instead of 1's in the host portion. These systems usually recognize a received broadcast message as such only if the message address is formed using the 0's method.
	For a broadcast message *received*, the C-LAN board recognizes either form as a broadcast address and therefore accepts (looks at) the message. For a broadcast message *sent*, the C-LAN board uses the 1's method if this field is set to **y** and uses the 0's method if this field is set to **n**.
	If one or more nodes in the network is a non-DEFINITY switch that uses the 0's method, then every DEFINITY switch in the network that wishes to broadcast to these 0's-method switches must set this field to **n**.

Data Module — Type *ppp*

Use the ppp data module for direct point to point TCP/IP connections between DCS nodes. This data module associates a link number and destination node with the port address and node name for the local node.

The fields on this form can be changed only when the corresponding port on the C-LAN circuit pack has been busied-out.

```
add data-module next
                                                                Page 1 of x
                         DATA MODULE

    Data Extension:                 Name: _____ BCC: 2
              Type: ppp_____         COS: 1
              Port: _____         COR: 1
              Link: __               TN: 1
       Enable Link? n

        Node Name: _____
      Subnet Mask: 255.255.255.0___

Establish Connection: _

DESTINATION
          Digits: _____
       Node Name: _____
           CHAP? y
      Chap Secret:_____
```

Common Fields   See Common Data Module Fields (256) for descriptions of fields on this screen that are not listed below.

Subnet Mask   The subnet mask is used to specify the network and host portions of the IP address for the C-LAN port that is identified in the Port field. The IP address is administered on the Node Names screen and is associated with the port location via the node name, which is a common field on the Node Names and ppp Data Module screens.

When a new ppp Data Module is created, the system populates the Subnet Mask field with one of three default subnet masks, depending on the node name you enter in the Node Names field. If the node name is associated with a Class C address on the Node Names screen, the Subnet Mask field is populated with the default Class C subnet mask, 255.255.255.0. Similarly, if the node name is associated with a Class A or Class B address on the Node Names screen, Class A (255.0.0.0) or Class B (255.255.0.0) default subnet masks automatically populate the Subnet Mask field.

The default subnet masks correspond to no subnetting. If you want to create subnetworks, you have the option to override the default subnet mask by entering a different subnet mask in the Subnet Mask field. If you enter a subnet mask, the system checks it for validity. For Class C addresses, there are 5 valid subnet masks. For Class B addresses there are 13 valid masks and for Class A addresses there are 21 valid masks.

Valid Value	Usage
The default subnet mask is one of three values depending on the class of the IP address of the local C-LAN port: • Class A: 255.0.0.0 • Class B: 255.255.0.0 • Class C: 255.255.255.0	Enter a value for the subnet mask to specify the subnet group to which the IP address of this node belongs.

The valid subnets for each Class of address are:

Class A (default 255.0.0.0)	Class B: (default 255.255.0.0)	Class C (default 255.255.255.0)
255.192.0.0	255.255.192.0	255.255.255.192
255.224.0.0	255.255.224.0	255.255.255.224
255.240.0.0	255.255.240.0	255.255.255.240
255.248.0.0	255.255.248.0	255.255.255.248
255.252.0.0	255.255.252.0	255.255.255.252
255.254.0.0	255.255.254.0	
255.255.0.0	255.255.255.0	
255.255.128.0	255.255.255.128	
255.255.192.0	255.255.255.192	
255.255.224.0	255.255.255.224	
255.255.240.0	255.255.255.240	
255.255.248.0	255.255.255.248	
255.255.252.0	255.255.255.252	
255.255.254.0		
255.255.255.0		
255.255.255.128		
255.255.255.192		
255.255.255.224		
255.255.255.240		
255.255.255.248		
255.255.255.252		

Notice that all 5 valid Class C subnet masks can also be valid Class B or Class A subnet masks, and all 13 valid Class B subnet masks can also be valid Class A subnet masks.

For example, 255.255.255.224 is a valid subnet mask for all three address classes. It allows 6 (2^3–2) subnetworks for Class C addresses, 2046 (2^{11}–2) subnetworks for Class B addresses and 524,286 (2^{19}–2)subnetworks for Class A addresses. Each of these subnetworks can have 30 (2^5–2) hosts.

Destination Digits

Used to enable access to the correct trunk group at the far end of the connection. This is typically the trunk access code (TAC) plus the extension of data module on the far end. If you use just the extension, then you must administer UDP and AAR route patterns to access the correct trunk group.

Valid Value	Usage
The extension or TAC + extension of the destination data module.	If a trunk access code (TAC) is used, prepend the TAC to the extension. If the Establish Connection field is **n**, this field should be left blank.

Destination Node Name

Name of the node at the far end of this connection.

Valid Value	Usage
A name administered on the Node Names Screen.	

Chap?

Challenge Handshake Authentication Protocol.

Valid Value	Usage
y/n	Identifies whether the Challenge Handshake Authentication Protocol is used over this link. If you enter **y**, the system will prompt for a CHAP secret (password).

Chap Secret

Password for the Challenge Handshake Authentication Protocol.

Valid Value	Usage
1–30 alphanumeric characters, but cannot begin with the "at" sign (@).	This field displays only if the CHAP field is **y**. This field displays the data being entered or changed. It displays an asterisk (*) when the form is brought up initially if the field already contains some data.
Default is blank.	This field displays the actual contents rather than asterisks if the form is brought up by the init login.

Data Module — Type *procr-intf* (used for BX.25 connections with the si model)

Use the procr-intf data module type to define an interface between the Processor Interface circuit pack and the DS1 facilities carrying the X.25 data for the connection to far end switch. This data module associates a link number with a physical channel number and extension number for the PI port used for the connection.

This form applies when the Destination Number field is *not* set to eia.

```
add data-module next                                          Page 1 of 1
                              DATA MODULE

  Data Extension: 3456       Name: _____
            Type: procr-intf  COS: 1        Maintenance Extension: ____
Physical Channel: __          COR: 1            Destination Number: _____
             ITC: _____   TN: 1        Establish Connection? n
            Link: __      DTE/DCE: DTE      Connected Data Module: _____
                  Enable Link: n

ABBREVIATED DIALING
  List1: _____

SPECIAL DIALING OPTION: hot-line
    HOT LINE DESTINATION
        Abbreviated Dialing Dial Code (From above list): _

ASSIGNED MEMBER (Station with a data extension button for this data module)

        Ext              Name
    1.
```

This form applies when the Destination Number field is set to `eia` (and Link = 1).

```
add data-module next                                          Page 1 of 1
                              DATA MODULE

  Data Extension: 3456       Name: _____
            Type: procr-intf  COS: 1        Maintenance Extension: ____
Physical Channel: __          COR: 1            Destination Number: eia___
             ITC: _____   TN: 1        Establish Connection? n
            Link: 1_      DTE/DCE: DTE                 Connected To: ___
                  Enable Link: n                          Clocking: _____

ABBREVIATED DIALING
  List1: _____

SPECIAL DIALING OPTION: _____
    HOT LINE DESTINATION
        Abbreviated Dialing Dial Code (From above list): _

ASSIGNED MEMBER (Station with a data extension button for this data module)

        Ext              Name
    1.
```

Common Fields	See Common Data Module Fields (256) for descriptions of fields on this screen that are not listed below.

Physical Channel   A number used by the switch software to identify the physical channel.

Valid Value	Usage
A 2-digit number equal to the link number entered on this screen.	A multi-carrier cabinet system supports the use of two Processor Interface circuit packs, the first circuit pack (mounted in Control Carrier A) supports physical channels or links 01 through 04; the second (mounted in Control Carrier A) supports physical channels or links 05 through 08. A single-carrier cabinet system supports one Processor Interface circuit pack and physical channels or links 01 through 04 only.

Maintenance Extension The extension used to perform maintenance functions on the standby physical channel in a duplicated system. This is the extension specified on the dial plan. The standby remote loop around tests fail if this field is not administered.

Abbreviated Dialing List 1   Specifies the type of abbreviated dialing list.

Valid Value	Usage
s (system) **g** (group) **p** (personal) **e** (enhanced) blank	If **g** or **p** is entered, a group number or personal list number also is required. Entry in this field supports Data Hot Line. This field can be left blank.

Note: See *Administrator's Guide*, 555-233-502, for detailed information on abbreviated dialing.

Special Dialing Option   Identifies the type of dialing when this data module originates calls.

Valid Value	Usage
hot-line, **default**, or blank.	Leave blank for regular (normal) keyboard dialing.

| **Assigned Member Ext and Name** | Display only. Extension and name of a previously administered user who has an associated Data Extension button and who will share the use of the module. |

| **Clocking** | Displays only when the Destination Number field is set to **eia** (and Link = **1**). This field sets the clocking for the physical layer of the protocol. |

Valid Value	Usage
internal, external	Entering **internal** specifies that the clocking is provided by the eia port, and **external** (default) specifies that clocking is provided by the other end of the link. One end of the link should be set to **internal** and the other end should be set to **external**.

Data Module - type *X.25* (used for BX.25 connections with the r model)

This form applies only to the r model.

```
                                                            Page 1 of 2
                              DATA MODULE

  Data Extension: ____          Name: _____
           Type: x.25                           Remote Loop-Around Test? n
           Port: __            COR: 1               Destination Number: _____
      Baud Rate: _____     TN: 1              Establish Connection? n
  Endpoint Type:_____                         Connected Data Module: ____
           Link: 1_          DTE/DCE: ___                    Error Logging? _
                      Enable Link? n


   Permanent Virtual Circuit? _              Highest PVC Logical Channel: __
    Switched Virtual Circuit? _
```

Common Fields   See Common Data Module Fields (256) for descriptions of fields on this screen that
                         are not listed below.

Baud Rate   Specifies the data transmission rate for this connection.

Valid entries	Usage
9600, 19200, switched	Set to **9600** for DCS connections to the si model, or to an r model with an external 9600 baud data line.
	Set to **switched** for r-to-r connections with common-channel signaling on DS1 trunks.
	Set to **9600** for connections to Intuity.
	Set to either **9600** or **19200** for CMS, depending on the physical connectivity.

Endpoint Type   Must be assigned as **adjunct**. An endpoint type is a type of packet switched data
                         endpoint that uses X.25 call control procedures. The X.25 Endpoint connects to
                         external ports on the PGATE board and to the TDM bus via a DS1 trunk. Ports
                         connected to the adjunct endpoint can be either DTEs or DCEs.

Valid entries	Usage
adjunct	Set to **adjunct** for DCS, CMS, or Intuity AUDIX.

Error Logging?　　　Used to record X.25 protocol errors in the hardware error log.

Valid Value	Usage
y/n	Set to **n** for normal operations. Set to **y** for testing.

Permanent Virtual Circuit?　　　Indicates that the logical channels for PVC are allowed for this port; default is **y** (cannot be changed).

Valid Value	Usage
y/n Default is **y**.	

Switched Virtual Circuit?　　　Indicates that the Switched Virtual Circuit is not allowed for this port; default is **n** (cannot be changed).

Valid Value	Usage
y/n Default is **n**.	

Highest PVC Logical Channel　　　Indicates that 1 to 64 Logical Channels are allowed on this port.

Valid Value	Usage
1-64 default is **64**	Leave at 64 for normal operations.

Data Module - type x.25 (Page 2)

```
                                                          Page 2 of 2
                            DATA MODULE
   LAYER 2 PARAMETERS
                 Number of Outstanding Frames (w): 4
                       Retry Attempt Counter (N2): 2
                                   Frame Size (N1): 135
          Retransmission (T1) Timer (1/10 seconds): 10
                  Idle (T4) Timer (1/10 seconds): 30
  LAYER 3 PARAMETERS
          Number of Outstanding Packets: 2
          Restart (T20) Timer (seconds): 8
            Reset (T22) Timer (seconds): 10
```

Number of Outstanding Frames (w)　　　Specifies layer 2 window size (**1–7** frames). If the value is **2**, up to 2 frames can be sent without confirmation. Default is **4**.

Retry Attempt Counter (N2)	Specifies the number of times (**0–7**) to send one frame when this frame is not confirmed for a period of time. Default is **2**.
Frame Size (N1)	Specifies the number of bytes (**135–263**) in a frame. Default is **135**. If the value is **135**, there can be up to 1080 bits within a frame. This value is suitable for all adjuncts and for DCS.
Retransmission (T1) Timer (1/10 seconds)	The T1 timer is started at the beginning or the end of the transmission of a frame. At the end of this timer (**0–250**), retransmission of a frame is initiated according to the procedures for link set-up and disconnection or information transfer. Default is **10**.
Idle (T4) Timer (1/10 seconds)	The T4 timer is a system parameter that represents the time a DTE allows without frames being exchanged on the data link (**0–250**). Default is **30**.
Number of Outstanding Packets	Specifies the number of packets (**2–7**) that can be sent without confirmation. Default is **2**.
Restart (T20) Timer (seconds)	The T20 timer is a DTE time-limit (**0–500**) started when DTE issues a restart indication and terminated when the restart request is received or confirmed. Default is **8**.
Reset (T22) Timer (seconds)	The T22 timer is a DTE time-limit (**0–500**) started when DTE issues a reset indication and terminated when the reset request is received or confirmed. Default is **10**.

Data Module - type *pdm* (used for BX.25 connections with the r model)

This form applies only to the r model.

This form assigns a Modular Processor Data Module (MPDM) data module (700D, 7400B, 7400D or 8400B). The MPDM is an external hardware device that provides a Data Communications Equipment (DCE) interface for connection to equipment such as data terminals, CDR output devices, on-premises administration terminal, Message Server, Property Management System (PMS), AUDIX, and host computers. It also provides a Digital Communications Protocol (DCP) interface to the digital switch.

Use the *tdm* data module type to assign an MTDM, which provides an EIA Data Terminal Equipment (DTE) interface for connection to off-premises private line trunk facilities or a switched telecommunications network and a DCP interface for connection to the digital switch.

```
                                                              Page 1 of 1
                            DATA MODULE

    Data Extension: 30          Name: 27                              BCC:
              Type: pdm_____  COS: 1        Remote Loop-Around Test? n
              Port: _____       COR: 1           Secondary data module? n
               ITC: restricted__  TN: 1                   Connected to: dte

ABBREVIATED DIALING
  List1:

SPECIAL DIALING OPTION:



ASSIGNED MEMBER (Station with a data extension button for this data module)
         Ext      Name
      1: 1002     27 character station name
```

Common Fields   See Common Data Module Fields (256) for descriptions of fields on this screen that are not listed below.

Secondary data module Specifies whether this PDM is the primary or secondary data module.

Valid Value	Usage
y/n	Enter **y** if this PDM is the secondary data module used for Dual I-channel AUDIX networking. Enter **n** if this is the primary PDM, or if this data module is not used for AUDIX networking. The primary data module must be administered before the secondary data module may be added. If Port is **X**, this field must be set to **n**.

Communication-Interface Processor Channel

```
                        PROCESSOR CHANNEL ASSIGNMENT

Proc                    Gtwy        Interface      Destination      Session    Mach
Chan   Enable   Appl.   To   Mode   Link/Chan   Node         Port   Local/Remote ID
  1:     _    _____       _      __  _____   _____   0_____   ___  ___    __
  2:     _    _____       _      __  _____   _____   0_____   ___  ___    __
  3:     _    _____       _      __  _____   _____   0_____   ___  ___    __
  4:     _    _____       _      __  _____   _____   0_____   ___  ___    __
  5:     _    _____       _      __  _____   _____   0_____   ___  ___    __
  6:     _    _____       _      __  _____   _____   0_____   ___  ___    __
  7:     _    _____       _      __  _____   _____   0_____   ___  ___    __
  8:     _    _____       _      __  _____   _____   0_____   ___  ___    __
  9:     _    _____       _      __  _____   _____   0_____   ___  ___    __
 10:     _    _____       _      __  _____   _____   0_____   ___  ___    __
 11:     _    _____       _      __  _____   _____   0_____   ___  ___    __
 12:     _    _____       _      __  _____   _____   0_____   ___  ___    __
 13:     _    _____       _      __  _____   _____   0_____   ___  ___    __
 14:     _    _____       _      __  _____   _____   0_____   ___  ___    __
 15:     _    _____       _      __  _____   _____   0_____   ___  ___    __
 16:     _    _____       _      __  _____   _____   0_____   ___  ___    __
```

Proc Chan   Displays the BX.25 virtual channel number or the TCP/IP listen port channel to carry this processor (virtual) channel.

Valid entries	Usage
1-128 (csi model) **1-256** (si model) **1-384** (r model)	Enter information about the processor channel in the row corresponding to the processor channel number you want to use. Any Processor Channel number can be used in the range appropriate for the switch model.
	For connections to adjuncts, processor channel numbers 1, 2, 3, etc. are typically used. For connections between switches, it may be convenient to use processor channel numbers that are indicative of the endpoints of the connection. For example, processor channel 13 for a connection between switch 1 and switch 3.

Enable   Type **y** to enable a processor channel. Type **n** (default) to disable a processor channel.

Valid entries	Usage
y/n	Enter **y** when assigning the processor channel. This field must be set to **n** before you can change any of the processor channel parameters.

Appl.   Identifies the switch application used on this link.

Valid entries	Usage
audix, **dcs**, **fp-mwi**, **gateway**, **gtwy-tcp**, **mis**, **msaamwl**, **msaclk**, **msahlwc**, **msallwc**, **msamcs**, **qsig-mwi**, and blank	The **gateway** application is used for conversion between ISDN and either TCP/IP or BX.25. The **gtwy-tcp** application is used for conversion between BX.25 and TCP/IP.
	These application types are used on the gateway switch only.

Gtwy To   Used for **gtwy-tcp** applications only. Identifies the processor channel that this
                             processor channel is serving as a gateway to.

Valid entries	Usage
1–128 (csi model) **1–256** (si model) **1–384** (r model)	Two processor channels on the gateway switch are needed to set up a **gtwy-tcp** gateway, which converts between X.25 and TCP/IP protocols. For each of the two **gtwy-tcp** processor channels, the Gtwy To field points to the other **gtwy-tcp** processor channel.
	For example, if processor channels 5 and 17 are used for a **gtwy-tcp** gateway, Gtwy To for processor channel 5 would be set to 17 and Gtwy To for processor channel 17 would be set to 5.

Mode   Identifies whether the IP session is passive (client) or active (server).

Valid entries	Usage
c (client) **s** (server) blank	This field must be blank if the type of interface link is x.25 (r model) or procr-intf (si model). This field cannot be blank if the type of interface link is ethernet or ppp.
	Set the Mode to **s** for ppp or ethernet connections to CMS. Set opposite values (**c**<-->**s**) on the endpoints for ppp or ethernet connections between switches or between a switch and Intuity AUDIX.

Interface Link   Identifies the physical link carrying this processor (virtual) channel.

Valid entries	Usage
1-25 (csi, si) **1-33** (r)	For the *csi model*, all links (up to 25) must be used for tcp/ip connections.
	For the *si model*, links numbered 1 through (4 times the number of PI circuit packs) can be either x.25 or tcp/ip. The rest of the links (up to 25) must be tcp/ip.
	For the *r model*, links numbered 1 through (4 times the number of PGATE circuit packs) can be either x.25 or tcp/ip. The rest of the links (up to 33) must be tcp/ip.

Interface Chan   Identifies the BX.25 virtual channel number or the TCP/IP listen port channel to carry this processor (virtual) channel.

Valid entries	Usage
1-64 (x.25) **0, 5000-64500** (ethernet or ppp)	The channel number 0 means any available port can be used (which will be automatically selected by the system).
	For TCP/IP connections, the following values are recommended:
	• 5001 CMS (Appl. = **mis**)
	• 5002 Intuity AUDIX (Appl. = **audix**)
	• 5003 DCS (Appl. = **dcs**, not a gateway)
	These three values should be reused for multiple instances of these applications; for example, if there are two Intuity AUDIX's, use 5002 for both; or if there are four DEFINITY ECS's, use 5003 for all four. The combination of Link, Interface Channel, and Mach ID must be unique.
	• 6000 + (Appl. = **gtwy-tcp**)
	The Interface Channel number must be unique for the **gtwy-tcp** and **gateway** application types.

Destination Node   Identifies the switch or adjunct at the far end of this link.

Valid entries	Usage
A node name previously entered on the Node Names screen or blank.	This must be a name entered on the Node Names screen. For ppp connections, it must match the Destination Node Name entered on the ppp Data Module screen.

Destination Port   Identifies the port number of the destination.

Valid entries	Usage
`0, 5000-64500`	The channel number 0 means any available port can be used (which will be automatically selected by the system).

Session Local   A number used by the system to identify one end of a connection.

Valid entries	Usage

`1-128 (csi)`
`1-256 (si)`
`1-384 (r)`
	The Local and Remote Session numbers can be any value between 1 and 256, but they must be consistent between endpoints. For each connection, the Local Session number on the local switch must equal the Remote Session number on the remote switch and vice versa.

	It is allowed, and sometimes convenient, to use the same number for the Local and Remote Session numbers. For example, it is frequently convenient (but not necessary) to use the processor channel number for both the session numbers.
	For the `qsig-mwi` and `fp-mwi` applications, the Local Session numbers must be unique on the switch. For other applications, it is allowed, but not recommended, to use the same Session numbers for two or more connections.

Session Remote   See Session Local, above.

Mach ID   The machine identification number.

Valid entries	Usage
`1-63` (si model)	For switches and Intuity AUDIX, the Machine ID is the Local Node Number on the dial plan. For the `qsig-mwi` and `fp-mwi` applications, the Machine ID is the index used on the Message Waiting Indication Subscriber Number Prefixes screen. Machine ID is not used for the CMS adjunct.

Circuit Packs

This screen administers circuit packs to carrier slots before the circuit packs are actually installed in the carrier or cabinet. This allows the system to be configured (administered) when the circuit packs have not yet been physically inserted in their appropriate slots. Before any voice terminals, attendant consoles, or trunks can be administered in the system, the correct type of circuit pack must be installed in the appropriate slot, or using the Circuit Pack screen, a circuit pack must be assigned to the slot.

The Circuit Pack Administration screens do not have to be completed if the system cabinet is equipped with the circuit packs at the time of administration. However, for switch node carriers, these screens must be administered.

Note: For initial installation procedures, circuit packs should only be assigned slots per the hardware Configuration Layout record (obtained from the factory or Customer Services Support Organization). Arbitrarily assigning circuit packs to slots should not be attempted because this eventually requires (at the time of installation and test) realignment of the circuit packs and reworking associated wiring to agree with the software translations or new software translations to agree with the shipped hardware configuration.

```
                                                         Page 1 of X
                              CIRCUIT PACKS
        Cabinet: __                        Carrier: _
Cabinet Layout: _____     Carrier Type: _____
Slot Code   Sf Mode Name                 Slot Code   Sf Mode Name
 00: _____ _                             11: MEDPRO _      RESERVED-IP
 01: _____ _                             12: MEDPRO _      RESERVED-IP
 02: _____ _                             13: TN802_ B      MAPD
 03: _____ _                             14: _____ _
 04: _____ _                             15: _____ _
 05: _____ _                             16: _____ _
 06: _____ _                             17: _____ _
 07: _____ _                             18: _____ _
 08: _____ _                             19: _____ _
 09: _____ _                             20: _____ _
 10: _____ _                             21: _____ _
 '#' indicates circuit pack conflict.
```

Note: Each page of the screen represents one carrier within the cabinet specified on the command line. For G3si, all carriers and slots appear even if they are not included in the actual hardware. This supports reconfiguration.

Cabinet   This field shows the cabinet number as entered on the command line.

Valid entries	Usage
Display-only field.	

Carrier

This field shows the letter of the carrier (A through E) circuit packs are being administered on.

Valid entries	Usage
Display-only field.	

Cabinet Layout

This field is only displayed for G3r. This field describes the physical layout of the cabinet.

Valid entries	Usage
Display-only field.	Values that may display are **five-carrier** and **single-carrier-stack**.

Carrier Type

This field shows the type of carrier.

Note: Note: For G3r, if the Carrier Type (as administered through the Cabinet Administration screen) does not match the physical hardware, the Code fields may display question marks.

Valid entries	Usage
Display-only field.	Values that may display are **dup-switch-node**, **expansion-control**, **not-used**, **port**, **processor**, and **switch-node**.

Slot

The slot equates to the physical slot of the given carrier; the number of slots displayed depends on the system being configured.

• For G3r, the number of slots represent all administrable slots available for the given carrier type.

• For G3si, all slots that could possibly be administered are displayed, even if they do not apply to the current configuration of the system. This is to accommodate the situation when a system is being reconfigured.

Valid entries	Usage
Display-only field.	

Code Enter the circuit pack code. If there is a physical circuit pack installed in the slot, the entry must match that of the circuit pack. If there is equipment administered on a slot, the equipment must be removed from the circuit pack before the circuit pack can be changed or removed.

Valid entries	Usage
TN followed by a 3- or 4-digit number of a valid DEFINITY circuit pack. a valid **ADX**xxx number a valid **ASAI**xx number a valid **DIG**x number **LGATE**	
TN802	For the IP Interface assembly (TN802B/MAPD). There must be at least two empty slots preceding the slot administered as code TN802. The Code field for these empty slots will automatically be populated with DSMAPD, which must be changed to MEDPRO for the MedPro mode of the IP Interface/TN802B.

Sfx Enter the circuit pack suffix, if applicable.

Valid entries	Usage
B to **Z**	
blank	

Mode This is a display-only field that shows the circuit pack mode, if applicable.

Note:

Valid entries	Usage
Display-only field.	

Name This is a display-only field showing the alphanumeric name of the circuit pack (such as Digital Line).

Note: Note: When the circuit pack physically inserted in the slot differs from what has been administered on this screen, a "#" displays between the Sfx and Name fields.

Valid entries	Usage
Display-only field.	

Signaling Group

The Signaling Group screen defines the signaling parameters for ISDN-PRI, H.323, and ATM signaling groups.

Type ISDN-PRI   The ISDN-PRI Signaling Group screen identifies groups of DS1 interface B-channels for which a given D-channel or D-channel pair carries associated signaling information. The Non-Facility Associated Signaling (NFAS) feature allows a D-channel to convey signaling information for B-channels that are located on DS1 facilities other than the one containing the D-channel. With NFAS, a signaling group does not necessarily correspond to a single DS1 interface. The Signaling Group screen is administered to show how B-channels and D-channels are related.

The Signaling Group screen also supports Facility Associated Signaling (FAS). The screen establishes the fact that a D-channel carries signaling information for all B-channels on its associated DS1 interface, and for no others.

In addition, the screen administers Temporary Signaling Connections (TSC) used in support of DCS Over ISDN-PRI D-channel (includes ISDN-PRI D-channel DCS AUDIX).

Screen for ISDN-PRI Non-Facility Associated Signaling

```
                                                   Page 1 of 5
                            SIGNALING GROUP

Group Number: 2                   Group Type: isdn-pri
                      Associated Signaling? n        Max number of NCA TSC: 0
                         Primary D-Channel:          Max number of CA TSC: 0
                       Secondary D-Channel:          Trunk Group for NCA TSC:
          Trunk Group for Channel Selection:         X-Mobility/Wireless Type: NONE
             Supplementary Service Protocol: a

            Trunk Brd        Interface ID        Trunk Brd        Interface ID
             1:                                   11:
             2:                                   12:
             3:                                   13:
             4:                                   14:
             5:                                   15:
             6:                                   16:
             7:                                   17:
             8:                                   18:
             9:                                   19:
            10:                                   20:
```

Screen for ISDN-PRI Facility Associated Signaling

```
                                                   Page 1 of 5
                            SIGNALING GROUP

Group Number: 2                    Group Type: isdn-pri
                      Associated Signaling? y        Max number of NCA TSC: 0
                         Primary D-Channel:          Max number of CA TSC: 0
                                                     Trunk Group for NCA TSC:
          Trunk Group for Channel Selection:         X-Mobility/Wireless Type: NONE
             Supplementary Service Protocol: a
```

Group Number

Display-only field when the screen is accessed using an administration command such as **display** or **change**.

Valid entries	Usage
Display-only field	

Associated Signaling

For FAS, the D-channel can carry signaling information only for B-channels located on the same DS1 circuit pack.

Valid entries	Usage
y	Indicates Facility Associated Signaling
n	Indicates Non-Facility Associated Signaling.

Primary D-channel

Enter a 6- to 7-character port number associated with the DS1 Interface circuit pack port. The port number assigns the primary D-channel in the Signaling Group. For 24-channel facilities, the 24th port is assigned as the D-channel. For 32-channel facilities, the 16th port is assigned as the D-channel.

Valid entries	Usage
01 through **44** (G3r)	First and second characters are the cabinet number
01 through **03** (G3si)	
A through **E**	Third character is the carrier.
01 through **20**	Fourth and fifth characters are the slot number
16 or **24**	Sixth and seventh characters are the port
blank	

Secondary D-channel

Enter a 6- to 7-character port number associated with the DS1 Interface circuit pack port used for secondary D-channel signaling. Displays when the Associated Signaling field is **n** (indicates NFAS). The port number assigns the secondary D-channel in the Signaling Group. For 24-channel facilities, the 24th port is assigned as the D-channel. For 32-channel facilities, the 16th port is assigned as the D-channel.

Valid entries	Usage
01 through **44** (G3r)	First and second characters are the cabinet number
01 through **03** (G3si)	
A through **E**	Third character is the carrier
01 through **20**	Fourth and fifth characters are the slot number
16 or **24**	Sixth and seventh characters are the port
blank	

Max Number of NCA TSC

The maximum number of simultaneous Non-Call Associated Temporary Signaling Connections (NCA-TSCs) that can exist in the Signaling Group. This number includes all NCA-TSCs that are administered on this screen and those NCA-TSCs that tandem through the switch in-route to another switch in the network.

Valid entries	Usage
0 to **256**.	

Max number of CA TSC

The maximum number of simultaneous Call Associated Temporary Signaling Connections (CA-TSCs) that can exist in the Signaling Group. Typically, the number of ISDN-PRI trunk group members controlled by the Signaling Group.

Valid entries	Usage
0 to **400**.	

Trunk Group For NCA TSC

The ISDN-PRI trunk group number whose incoming call handling table will be used to handle incoming NCA-TSCs through the Signaling Group. Enter the assigned ISDN-PRI trunk group number whose call handling table will be used to route the incoming NCA TSCs. (An ISDN-BRI trunk group may not be used.)

Valid entries	Usage
1 to **99**.	
blank	

Trunk Group for Channel Selection

Enter the assigned trunk group number. (An ISDN-BRI trunk group may not be used.)

Valid entries	Usage
1 to **99**.	
blank	

Supplementary Service Protocol

Determines whether AT&T NCA TSCs or QSIG NCA TSCs are sent over the interface. To change this field from **a** to **b**, first check the Adm'd NCA TSC Index field on the ISDN TSC Gateway Channel Assignments (page 291). Make sure no NCA TSC on the Signaling Group screen is administered as a Gateway Channel. If they are, you must remove the NCA TSC Gateway assignment first before this field can be changed to **b**.

Valid entries	Usage
a	AT&T protocol
b	QSIG protocol. This field may be set to **b** only if the Basic Supplementary Services field on the System-Parameters Customer-Options screen is **y**. If this field is **b**, pages 2 through 5 do not appear.

Trunk Brd

Enter a 5-character DS1 Interface circuit pack number that has trunk members belonging to this Signaling Group. Displays when the Associated Signaling field is **n** (indicates NFAS).

Valid entries	Usage
01 through **44** (G3r)	First and second characters are the cabinet number
01 through **03** (G3si)	
A through **E**	Third character is the carrier
01 through **20**	Fourth and fifth characters are the slot number
blank	

Interface ID

In an NFAS Signaling Group, an Interface ID must be assigned to each DS1 facility so that it can be referenced by both interfacing switches. When a call is established between switches, the Interface ID at each end is used to determine which B-channel is to be used to establish the call. The Interface ID numbers on both ends must be the same. Displays when the Associated Signaling field is **n** (indicates NFAS). Enter an interface ID for the corresponding DS1 Interface circuit pack. Pages 2 through 5 of the screen.

N**CA TSC**   The Non-call associated temporary signaling connections (NCA TSC) are
                               administered on pages 2–5 of the ISDN-PRI and H.323 Signaling Group screens, and
                               on pages 3–6 of the ATM Signaling Group screen.

```
                          ADMINISTERED NCA TSC ASSIGNMENT                Page 2 of 5
      Service/Feature: _____              As-needed Inactivity Time-out (min): __
       TSC   Local                                                    Adj.      Mach.
      Index   Ext.    Enabled Established   Dest. Digits    Appl.      Name       ID
        1:   _____      _     _____    _____ _____  _____    __
        2:   _____      _     _____    _____ _____  _____    __
        3:   _____      _     _____    _____ _____  _____    __
        4:   _____      _     _____    _____ _____  _____    __
        5:   _____      _     _____    _____ _____  _____    __
        6:   _____      _     _____    _____ _____  _____    __
        7:   _____      _     _____    _____ _____  _____    __
        8:   _____      _     _____    _____ _____  _____    __
        9:   _____      _     _____    _____ _____  _____    __
       10:   _____      _     _____    _____ _____  _____    __
       11:   _____      _     _____    _____ _____  _____    __
       12:   _____      _     _____    _____ _____  _____    __
       13:   _____      _     _____    _____ _____  _____    __
       14:   _____      _     _____    _____ _____  _____    __
       15:   _____      _     _____    _____ _____  _____    __
       16:   _____      _     _____    _____ _____  _____    __
```

Service/Feature

The service type for all administered NCA-TSCs assigned in this Signaling Group.

Valid entries	Usage
accunet	
i800	
inwats	
lds	
mega800	
megacom	
multiquest	
operator	
sdn	
sub-operator	
wats-max-bnd	
Facility Type 0 and 1 user-defined services.	
blank	

As-needed Inactivity Time-out (min)

The inactivity time-out for as-needed NCA-TSCs assigned in the Signaling Group. An as-needed administered NCA-TSC staying inactive in this time period will be removed from service.

Valid entries	Usage
10 to **90**	
blank	

TSC Index

Specifies the administered NCA-TSCs assigned.

Valid entries	Usage
Display-only field.	The administered NCA TSC index represents one DCS or DCS AUDIX logical channel connecting any two switches. The Index number ranges from 1–64.

Local Ext

Used to assign an extension on the switch to the administered NCA-TSC. The extension cannot be previously assigned to another administered NCA-TSC, station, or data module, and so on.

Valid entries	Usage
An unassigned extension number.	
blank	

Enabled

Enables or disables the administered NCA-TSC.

Valid entries	Usage
y	Enter **y** to enable the administered NCA-TSC.
n	

Establish

Used to indicate the strategy for establishing this administered NCA-TSC.

Valid entries	Usage
permanent	An entry of **permanent** means that the administered NCA-TSC can be established by either the near end or the far end.
as-needed	An entry of **as-needed** means the administered NCA-TSC will be established the first time the administered NCA-TSC is needed. It can be set up either by the near end or far end switch.
blank	

Dest. Digits

Used to route the administered NCA-TSC to the far end switch. These digits are sent as entered to the destination switch; no routing or other digit manipulation is performed.

Valid entries	Usage
0 through **9**	Can include up to 15 digits.
+	
*	
#	
blank	

Appl.

Specifies the application this administered NCA-TSC is going to be used for.

Valid entries	Usage
audix	Used for ISDN-PRI D-channel DCS AUDIX feature.
dcs	Used for the DCS Over ISDN-PRI D-channel feature.
gateway	Used when the administered NCA-TSC will be used as one end in the gateway channel connecting to a BX.25 link. If **gateway** is entered, then the ISDN TSC Gateway Channel Assignments screen must be completed.
masi	
blank	

Adjunct Name

Only displays for G3r configurations. Displays when the Appl field is **audix**.

Valid entries	Usage
Enter the name of the AUDIX as it appears on the "Adjunct Names" screen.	

Machine ID

Used to indicate the far-end PBX or the AUDIX machine to which this administered NCA-TSC will be connected. This number is the Local Node Number administered on the Dial Plan Record screen.

Valid entries	Usage
1-63	For DCS
1-99	For AUDIX
1-12	For MASI
blank	

Type H.323   The H.323 signaling group type is used for H.323 trunks.

```
                                                            Page 1 of 5
                            SIGNALING GROUP

Group Number: 2                   Group Type: h.323
                                                    Max number of NCA TSC: 0
                                                     Max number of CA TSC: 0
                                                  Trunk Group for NCA TSC:
        Trunk Group for Channel Selection:
           Supplementary Service Protocol: a


       Near-end Node Name:                     Far-end Node Name:
     Near-end Listen Port: 1720            Far-end Listen Port:

           LRQ Required? n         Calls Share IP Signaling Connection? n

                                    Bypass If IP Threshold Exceeded? n

                                    Internetworking Message: PROGress
```

Near-end Node Name

.

Valid entries	Usage
A node name administered on the Node Names form on this switch.	Enter the node name for the C-LAN IP interface on this switch.

Far-end Node Name

.

Valid entries	Usage
A node name administered on the Node Names form on this switch.	Optional. If entered, this is the node name for the far-end C-LAN IP Interface used for trunks assigned to this signaling group.

Near-end Listen Port

.

Valid entries	Usage
1719, 1720 or 5000–9999	Enter an unused port number. The number **1720** is recommended.
	If LRQ is set to **y**, this field must be **1719**.

Far-end Listen Port

.

Valid entries	Usage
blank or **0–65535**	Optional. If entered, the same number as entered in the Near-end Listen Port field is recommended; if not left blank, this number must match the number entered in the Near-end Listen Port field on the signaling group form for the far-end switch.

IRQ Required?

.

Valid entries	Usage
y **n** (default)	Leave the default (**n**) if the far-end switch is a DEFINITY ECS. Set to **y** only if the far-end switch is a non-DEFINITY switch *and* requires a location request (to obtain a signaling address) in its signaling protocol.

Calls Share IP signaling connection?

.

Valid entries	Usage
y **n** (default)	Enter **y** for inter-DEFINITY connections. Otherwise, leave the default (**n**).

Bypass if IP Threshold Exceeded?

.

Valid entries	Usage
y **n** (default)	Set to **y** to automatically remove from service trunks assigned to this signaling group when IP transport performance falls below limits administered on the Maintenance-Related System Parameters (sys par maint) screen.

Internetworking Message

Specifies whether the system sends alerting or progress if an incoming trunk call is routed to a non-ISDN trunk group (for example, CO or tie). This field is administerable on a per-port basis.

.

Valid entries	Usage
PROGress (default)	
ALERTing	

Type ATM The atm signaling group type is used for atm trunks.

```
                                                         Page 1 of 5
                            SIGNALING GROUP

Group Number: 2                 Group Type: atm
                                                 Max number of NCA TSC: 0
                                                  Max number of CA TSC: 0
                                               Trunk Group for NCA TSC:
        Trunk Group for Channel Selection:
            Supplementary Service Protocol: a

 CIRCUIT PARAMETERS
        Virtual Path Identifier: 0
     Virtual Channel Identifier:

                    Signaling Mode: isdn-pri          Circuit Type: T1
                        Idle Code: 11111111               Connect: network
            Interface Companding: mulaw
                Country Protocol: 1
                Protocol Version: a
                                         DCP/Analog Bearer Capability: 3.1kHz

                                           Internetworking Message: PROGress
```

Virtual Path Identifier

This is a display-only field.

Virtual Channel Identifier

.

Valid entries	Usage
blank or **32–1023**	

Signaling Mode

This is a display-only field.

Idle Code

.

Valid entries	Usage
An 8-digit binary number. default is **11111111**	

Interface Companding

.

Valid entries	Usage
mulaw or **alaw**	Use mulaw in the U.S., Canada, and Japan. Use alaw elsewhere.

Country Protocol

.

Valid entries	Usage
1–**25** or **etsi**	Use 1 for the U.S.

Protocol version

.

Valid entries	Usage
a, **b**, or **c**	

Circuit Type

.

Valid entries	Usage
T1 or **E1**	Use T1 for U.S. and Japan. Use E1 elsewhere.

Connect

.

Valid entries	Usage
host, **network**, or **pbx**	

DCP/Analog Bearer Capability

.

Valid entries	Usage
3.1kHz or **speech**	

Internetworking Message

.Specifies whether the system sends alerting or progress if an incoming trunk call is routed to a non-ISDN trunk group (for example, CO or tie). This field is administerable on a per-port basis.

.

Valid entries	Usage
PROGress (default)	
ALERTing	

ISDN TSC Gateway Channel Assignments

This screen is required when the switch is to act as a gateway between a switch that supports the Temporary Signaling Connections (TSC) feature and a non-TSC-compatible switch. The gateway provides interface protocols necessary for communications to exist between a switch administered with Non-Call Associated TSCs in a Signaling Group on the ISDN side and a processor channel (BX.25) on the non-ISDN side. A NCA-TSC is a type of virtual connection established for exchanging user information messages on ISDN-PRI D-channels. There is no B-channel related to the connection.

```
                                                           Page 1 of 2
                            ISDN TSC GATEWAY CHANNEL ASSIGNMENT
    Sig    Adm'd NCA   Processor  Appli-      Sig    Adm'd NCA   Processor  Appli-
   Group   TSC Index   Channel    cation     Group   TSC Index   Channel    cation
   1: _      ___        ____      _____    17: __    ___        ____      _____
   2: _      ___        ____      _____    18: __    ___        ____      _____
   3: _      ___        ____      _____    19: __    ___        ____      _____
   4: _      ___        ____      _____    20: __    ___        ____      _____
   5: _      ___        ____      _____    21: __    ___        ____      _____
   6: _      ___        ____      _____    22: __    ___        ____      _____
   7: _      ___        ____      _____    23: __    ___        ____      _____
   8: _      ___        ____      _____    24: __    ___        ____      _____
   9: _      ___        ____      _____    25: __    ___        ____      _____
  10: _      ___        ____      _____    26: __    ___        ____      _____
  11: _      ___        ____      _____    27: __    ___        ____      _____
  12: _      ___        ____      _____    28: __    ___        ____      _____
  13: _      ___        ____      _____    29: __    ___        ____      _____
  14: _      ___        ____      _____    30: __    ___        ____      _____
  15: _      ___        ____      _____    31: __    ___        ____      _____
  16: _      ___        ____      _____    32: __    ___        ____      _____
```

Sig Group   Used to indicate the Signaling Group to which the NCA-TSC belongs.

Valid entries	Usage
1 to **30**.	
blank	

Adm'd NCA TSC Index   Used to indicate the administered NCA-TSC that acts as one endpoint of the gateway.

Valid entries	Usage
1 to **64**.	
blank	

Processor Channel   Used to indicate the processor channel to which the administered NCA-TSC index will be mapped. This processor channel is used as another endpoint of the connection in this gateway assignment.

Valid entries	Usage
1 to **64**	
blank	

Application   Used to indicate the feature this gateway is used for. Gateway channels can be used for DCS+ or ISDN-PRI DCS AUDIX feature.

Valid entries	Usage
audix	
dcs	
blank	

Other Networking-Related DEFINITY Screens

Communication Interface Links

This screen is display-only starting with Release 7. The fields are now administered on the Data Module screens associated with the link. There is one Interface Link screen per System. Interface Links provide a physical interface between the system and the other nodes in a DCS, ISDN, a Message Server Adjunct, a CMS, an ISDN Gateway adjunct (supports CPN/BN), or AUDIX.

```
                                                              Page 1 of x
                              INTERFACE LINKS
  Link   Enable   Est     Extn    Type   Destination  DTE   Conn     Name
                  Conn                    Number       DCE   Mod.
   1:     n        n
   2:     n        n
   3:     n        n
   4:     n        n
    :
    :
  17:
```

Link

Indicates the interface link number that connects to another node in a DCS network, a Message Server, CMS, ISDN Gateway, or AUDIX. Interface links always terminate on a port in a PGATE circuit pack for G3r or on the NetPkt (or PI for X.25) circuit pack for G3si.

Valid entries	Usage
Display-only field.	

Enable

The link is enabled on the Data Module screen.

Valid entries	Usage
y	**y** – link is enabled.
n	**n** – link is not enabled. Message flow over the link is suppressed.

| **Est Conn** | If the physical link is over a DS1 interface, it is possible (except for ISDN signaling links) for one switch to set up the entire connection (see Destination below). In this case, the other switch will not initiate any part of the connection between the two endpoints. Typically, when using a DS1 interface, the Enable field is **y** on both the originating and terminating switches but only one link between the two switches will have Est Conn set to **y**. The originating switch is defined as having Est Conn set to **y**. |

Valid entries	Usage
y	The System is responsible for any part of the call setup required for the link between the System and the far-end data module. Should be **y** if the link is to be used for ISDN signaling.
n	The System is not responsible for any part of the call setup.

| **Ext** | The extension of the associated local data module for this link. This field is similar to the pre-R7 PI Ext field for the si model and the X.25 Extension field for the r model. |

| **Type** | The type of connection — x.25, ethernet, or ppp. This field replaces the pre-R7 Protocol field. The type of connection — x.25, ethernet, or ppp. |

| **Destination Number** | This field is similar to the pre-R7 Destination Digits field for the si model and the Destination Number field for the r model. Displays the destination of the link. It does not apply to Ethernet links. |

| **DTE/DCE** | Applies to si-models only. It is administered on the Data Module screen — type proc-intf for the si model and type x.25 for the r-mode. If one endpoint of a link is DTE, then the other must be DCE, and vice versa. The assignments must be coordinated on a network-wide level. Endpoint Switch Links are generally DTE and Tandem links are generally DCE. If both endpoints are of the same type (that is, endpoints or tandem), then the assignment of which is DTE and which is DCE is arbitrary. Typically, when using a DS1 interface, the originating switch should be administered as **DTE** and the terminating switch as **DCE**. |

| **Conn Mod.** | This field is similar to the pre-R7 Connected Data Module field. It is administered on the Data Module screen — type proc-intf for the si model and type x.25 for the r model. |

| **Name** | Used for identification purposes only. It is administered on the Data Module screen. This field is similar to the pre-R7 Identification field. |

Data Module - type netcon

```
                                                            Page 1 of 1
                                DATA MODULE

Data Extension: _____           Name:                       BCC: _
Type: netcon                    COS: _      Maintenance Extension: _____
Physical Channel: __            COR: _
Name: _____           TN: _           Maximum Bit Rate: _____
ITC: restricted


ABBREVIATED DIALING
  List1: _____

SPECIAL DIALING OPTION: _____
     HOT LINE DESTINATION
          Abbreviated Dialing Dial Code (From above list): _
ASSIGNED MEMBER (Station with a data extension button for this data module)

      Ext  Name
     1.
```

Common Fields

See Common Data Module Fields (256) for descriptions of fields on this screen that are not listed below.

Physical Channel

Identifies the number of the Network Control/Packet Interface data channel (identified as a netcon data channel). This field appears only the si models.

Valid Value	Usage
1 to 8	

Maintenance Extension

The extension used to perform maintenance functions on the standby physical channel in a duplicated system. This is the extension specified on the dial plan. The standby remote loop around tests fail if this field is not administered.

Maximum Bit Rate

Identifies the maximum allowable bit rate for the modem. Displays only if the Modem field is **y**.

Valid entries	Usage
300, 1200, 2400, 4800, 9600, 14400, 19200, and 28800	
default is 9600	

Abbreviated Dialing List 1

Specifies the type of abbreviated dialing list.

Valid Value	Usage
s (system) **g** (group) **p** (personal) **e** (enhanced) blank	If **g** or **p** is entered, a group number or personal list number also is required. Entry in this field supports Data Hot Line. This field can be left blank.

Note: See *Administrator's Guide*, 555-233-502, for detailed information on abbreviated dialing.

Special Dialing Option

Identifies the type of dialing when this data module originates calls.

Valid Value	Usage
hot-line, **default**, or blank.	Leave blank for regular (normal) keyboard dialing.

Assigned Member Ext and Name

Display only. Extension and name of a previously administered user who has an associated Data Extension button and who will share the use of the module.

Data Module - type analog-dm

This type of data module behaves identically to a 2500 set, but it accepts rotary dial pulses.

```
                                                              Page 1 of 1
                            DATA MODULE

  Data Extension: ____              Name:
             Type: analog-dm        COS:
             Port: __               COR:
              ITC: restricted        TN:


 ABBREVIATED DIALING
   List1: _____

 SPECIAL DIALING OPTION: ____
     HOT LINE DESTINATION
         Abbreviated Dialing Dial Code (From above list): _
 ASSIGNED MEMBER (Station with a data extension button for this data module)

        Ext Name
     1.
```

Common Fields　　See Common Data Module Fields (256) for descriptions of fields on this screen that are not listed below.

Abbreviated Dialing List 1　　Specifies the type of abbreviated dialing list.

Valid Value	Usage
s (system) **g** (group) **p** (personal) **e** (enhanced) blank	If **g** or **p** is entered, a group number or personal list number also is required. Entry in this field supports Data Hot Line. This field can be left blank.

Special Dialing Option　　Identifies the type of dialing when this data module originates calls.

Valid Value	Usage
hot-line, **default**, or blank.	Leave blank for regular (normal) keyboard dialing.

Assigned Member Ext and Name　　Display only. Extension and name of a previously administered user who has an associated Data Extension button and who will share the use of the module.

Extended Trunk Access Call Screening

This screen allows a set of digit strings to be identified that should not be routed via ETA. This screen can also block the routing of certain FACs or TACs. For example, if the system administrator were to notice a digit string being mistakenly dialed repeatedly that ended up being routed via ETA to a remote PBX only to have the remote PBX return intercept treatment, then that digit string would be a candidate for the entry into the ETA call screening table. Entry into this table would have the effect of return intercept treatment to the caller without first attempting to route the digits to the remote PBX for interpretation via ETA.

```
Page 1 of 1
                              ETA CALL SCREENING TABLE
  Entry
    No. Call Screening Entry
     0: _____
     1: _____
     2: _____
     3: _____
     4: _____
     5: _____
     6: _____
     7: _____
     8: _____
     9: _____
```

Call Screening Entry   Assign those digit strings (up to 10) that should be blocked for this RNX. Each string can have up to 6 digits and/or special or wildcard characters.

Valid entries	Usage
Digits **0** through **9**	
x	
X	
*	
#	The **#** character may only be used as the first character.
blank	

Extension Number Portability Numbering Plan

```
Page 1 of 1
                        EXTENSION NUMBER PORTABILITY
                              NUMBERING PLAN
     ENP        ENP        ENP        ENP        ENP        ENP        ENP        ENP        ENP        ENP
     Code       Code       Code       Code       Code       Code       Code       Code       Code       Code
 0x: ____   1x: ____   2x: ____   3x: ____   4x: ____   5x: ____   6x: ____   7x: ____   8x: ____   9x: ____
 00: ____   10: ____   20: ____   30: ____   40: ____   50: ____   60: ____   70: ____   80: ____   90: ____
 01: ____   11: ____   21: ____   31: ____   41: ____   51: ____   61: ____   71: ____   81: ____   91: ____
 02: ____   12: ____   22: ____   32: ____   42: ____   52: ____   62: ____   72: ____   82: ____   92: ____
 03: ____   13: ____   23: ____   33: ____   43: ____   53: ____   63: ____   73: ____   83: ____   93: ____
 04: ____   14: ____   24: ____   34: ____   44: ____   54: ____   64: ____   74: ____   84: ____   94: ____
 05: ____   15: ____   25: ____   35: ____   45: ____   55: ____   65: ____   75: ____   85: ____   95: ____
 06: ____   16: ____   26: ____   36: ____   46: ____   56: ____   66: ____   76: ____   86: ____   96: ____
 07: ____   17: ____   27: ____   37: ____   47: ____   57: ____   67: ____   77: ____   87: ____   97: ____
 08: ____   18: ____   28: ____   38: ____   48: ____   58: ____   68: ____   78: ____   88: ____   98: ____
 09: ____   19: ____   29: ____   39: ____   49: ____   59: ____   69: ____   79: ____   89: ____   99: ____
```

EPN Code

Assign a 3-digit code to translate each 4- or 5-digit UDP extension that is node number routed to a 7 digit, AAR-like number used for outpulsing a call within an ENP sub network. This field maps each leading digit of a UDP extension to an ENP Code or blank.

Valid entries	Usage
000 to **999**	Enter 3-digit ENP code
blank	

Hop Channel Assignments Screen

This screen assigns Hop Channels. The maximum number of connections that may be established between channels on the system's interface links varies depending on System configuration.

```
                    HOP CHANNEL ASSIGNMENT                Page 1 of 4
  Link/Channel A   Link/Channel B        Link/Channel A   Link/Channel B
   1: __    __         __    __        17: __    __          __    __
   2: __    __         __    __        18: __    __          __    __
   3: __    __         __    __        19: __    __          __    __
   4: __    __         __    __        20: __    __          __    __
   5: __    __         __    __        21: __    __          __    __
   6: __    __         __    __        22: __    __          __    __
   7: __    __         __    __        23: __    __          __    __
   8: __    __         __    __        24: __    __          __    __
   9: __    __         __    __        25: __    __          __    __
  10: __    __         __    __        26: __    __          __    __
  11: __    __         __    __        27: __    __          __    __
  12: __    __         __    __        28: __    __          __    __
  13: __    __         __    __        29: __    __          __    __
  14: __    __         __    __        30: __    __          __    __
  15: __    __         __    __        31: __    __          __    __
  16: __    __         __    __        32: __    __          __    __
```

Observe the following when assigning hop channels:

- The Link/Chan pair must not be assigned to a local processor channel on the Processor Channel Assignments screen.

- The four associated hop channel fields must be either filled in or left blank.

Pages 1 through X of the Screen

```
                    HOP CHANNEL ASSIGNMENT                Page 1 of 2
  Link/Chan  Link/Chan  Priority        Link/Chan  Link/Chan  Priority
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
   _    __    _    __      _              _    __    _    __      _
```

This is a two-page screen for G3si and a four-page screen for G3r.

Link

Enter an interface link number in each field.

Valid entries	Usage
1 to **8**	
blank	

Chan(nel)

Enter a channel number in each field. This field is labeled "Channel" for G3r and "Chan" for G3si.

Valid entries	Usage
1 to **64**	
blank	

Priority

Indicates whether the hop channel has high or low priority. Priorities should be assigned based on the operational speed of the links and the number of hops in the network channel. Displays for G3si only.

Valid entries	Usage
high	
low	
blank	

Implementation notes

The fields that appear on a particular screen will vary depending upon the system configuration (Cabinet Layout and Carrier Type) being administered.

The number of Slot fields displayed will vary depending on the system being configured. For G3r, the number of Slot fields displayed will represent all administrable slots available for the given Carrier Type. For G3si, all possible Slots will display.

Node Number Routing

This screen specifies the routing pattern associated with each node in a public or private network. NNR is a required capability for Extension Number Portability (ENP) and is associated with the Uniform Dial Plan (UDP).

```
change node-routing 87 partition 2                              Page  1 of  2
                             NODE NUMBER ROUTING
                          Partitioned Group Number: 2
       Route         Route         Route         Route         Route         Route         Route
        Pat           Pat           Pat           Pat           Pat           Pat           Pat
                15: ____     30: ____     45: ____     60: ____     75: ____     90: ____
    1: ____      16: ____     31: ____     46: ____     61: ____     76: ____     91: ____
    2: ____      17: ____     32: ____     47: ____     62: ____     77: ____     92: ____
    3: ____      18: ____     33: ____     48: ____     63: ____     78: ____     93: ____
    4: ____      19: ____     34: ____     49: ____     64: ____     79: ____     94: ____
    5: ____      20: ____     35: ____     50: ____     65: ____     80: ____     95: ____
    6: ____      21: ____     36: ____     51: ____     66: ____     81: ____     96: ____
    7: ____      22: ____     37: ____     52: ____     67: ____     82: ____     97: ____
    8: ____      23: ____     38: ____     53: ____     68: ____     83: ____     98: ____
    9: ____      24: ____     39: ____     54: ____     69: ____     84: ____     99: ___
   10: ____      25: ____     40: ____     55: ____     70: ____     85: ____
   11: ____      26: ____     41: ____     56: ____     71: ____     86: ____
   12: ____      27: ____     42: ____     57: ____     72: ____     87: ____
   13: ____      28: ____     43: ____     58: ____     73: ____     88: ____
   14: ____      29: ____     44: ____     59: ____     74: ____     89: ____
```

Partitioned Group Number	This read-only field displays the partitioned group number associated with the node numbers being administered.

Valid entries	Usage
Read-only field	The partitioned group number is either specified on the command line or defaults to partitioned group number 1.

Node Number	This display-only field lists the node number to be changed.

Valid entries	Usage
Display-only field	Two pages display simultaneously for a total of 200 nodes (100 per page). For example, entering **change node-routing 87** displays nodes 1 through 199, and entering **change node-routing 151** displays nodes 100 through 299. However, entering **change node-routing 999** displays nodes 900 through 999 on one page.

Route Pattern	Enter the routing pattern associated with the corresponding node number. This field repeats the same number of times as there are node numbers on the page.

Valid entries	Usage
1 to **254**	
blank	

Message Waiting Indication Subscriber Number Prefixes

The information entered on this screen enables MWI messages to be routed to the subscriber's switch in a QSIG network.

```
                                                              Page 1 of 1
            MESSAGE WAITING INDICATION SUBSCRIBER NUMBER PREFIXES

 Machine Inserted          Routing   AUDIX    Machine Inserted          Routing   AUDIX
   ID    Digits            Digits    Mach ID    ID    Digits            Digits    Mach ID

   1:    _____      _____       __      11:    _____      _____       __
   2:    _____      _____       __      12:    _____      _____       __
   3:    _____      _____       __      13:    _____      _____       __
   4:    _____      _____       __      14:    _____      _____       __
   5:    _____      _____       __      15:    _____      _____       __
   6:    _____      _____       __      16:    _____      _____       __
   7:    _____      _____       __      17:    _____      _____       __
   8:    _____      _____       __      18:    _____      _____       __
   9:    _____      _____       __      19:    _____      _____       __
  10:    _____      _____       __      20:    _____      _____       __
```

Inserted Digits to form Complete Number

Displays only if this machine-ID is assigned to the qsig-mwi application in the Change Communication-Interface Processor-Channels form.

Valid entries	Usage
up to 12 digits **(0-9)**	The entered digits are those needed in front of the Intuity AUDIX subscriber number which allows the Message Center PBX to obtain a complete number for the subscriber. This digit string has a valid entry in the AAR or ARS analysis tables enabling a route to the Remote PBX associated with a particular process channel.
blank	

Note: Both of the following two fields must be filled in. If either one is filled in and the other is left blank, an error displays.

Routing Digits (e.g. AAR/ARS Access Code)

Enter the desired numbers (up to 4 digits).

Valid entries	Usage
up to 4 digits **(0-9, *, #)**	These digits comprise the AAR or ARS access code. Blank is not a valid entry.

AUDIX Mach ID

This field value corresponds to the AUDIX number serving that switch as translated in the AUDIX number field of the Switch Interface Administration Screen on the AUDIX platform.

Valid entries	Usage
(1-99) blank	

Synchronization Plan

This screen assigns primary and secondary external synchronization sources. This provides synchronization between the switch and digital facilities that the switch is connected to. When the switch is connected to digital facilities, the switch (both Processor Cabinets and Expansion Cabinets) must be synchronized to the incoming data rate of 8,000 frames-per-second. This timing information reference may be derived from DS1 facilities or from a Stratum 3 external clock. Loss of the reference signal, excessive phase changes, and variation in timing frequency can cause loss of data or dropped data connections. When no external digital facilities, including Stratum 3 external clocks, are present or when a switch is the "master" node of a network providing timing to the rest of the network, the timing can come from an oscillator on the switch's tone/clock circuit pack.

The Synchronization Plan may not be required for some digital connections. The switch's internal clock may suffice.

Page 1 of the screen

```
                                                            Page 1 of X
                          SYNCHRONIZATION PLAN
                 SYNCHRONIZATION SOURCE (circuit pack location)
                       Stratum: _
                  Port Network: _
                       Primary: ___        Secondary: ___

     Location    Name         Slip    Type    Location    Name           Slip  Type
     01C17    _____   D     UDS1-BD  _____  _____    _    ___
     01C18    _____   Y     TBRI-BD  _____  _____    _    ___
     _____   _____   _              _____  _____    _    ___
     _____   _____   _              _____  _____    _    ___
     _____   _____   _              _____  _____    _    ___
     _____   _____   _              _____  _____    _    ___
     _____   _____   _              _____  _____    _    ___
     _____   _____   _              _____  _____    _    ___
  NOTE: TN722B & TN464B DS1 sources result in stratum 4, type II synchronization
```

Stratum   Enter the stratum level to be used for synchronization.

Valid entries	Usage
3, 4	Stratum 3 capability is only possible when using a TN780 Tone Clock circuit pack.

Port Network   Only displays when the Stratum field is **3**.

Valid entries	Usage
Display-only field.	

Primary

Enter the 5-character circuit pack location number for the circuit pack that will function as the primary synchronization source. The clock circuit pack's internal source is the implicit last choice. Only one switch in the network can function as the primary synchronization source. Only displays when the Stratum field is **4**.

The Primary and Secondary synchronization sources (DS1 or BRI trunk facilities) must be on the same Port Cabinet (that is, PPN, EPN1, or EPN3).

Valid entries	Usage
01 through **44** (G3r)	First and second characters are the cabinet number
01 through **03** (G3si)	
A through **E**	Third character is the carrier
01 through **20**	Fourth and fifth characters are the slot number
blank	A blank entry means no external source.

Secondary

The system will select automatically the secondary circuit pack if the primary circuit has a failure. Only displays when the Stratum field is **4**.

The Primary and Secondary synchronization sources (DS1 or BRI trunk facilities) must be on the same Port Cabinet (that is, PPN, EPN1, or EPN3).

Valid entries	Usage
01 through **44** (G3r)	First and second characters are the cabinet number
01 through **03** (G3si)	
A through **E**	Third character is the carrier
01 through **20**	Fourth and fifth characters are the slot number
blank	A blank entry means no external source.

Pages 1–X of the screen

Location/Name

Identifies the location and name for each DS1 or BRI trunk circuit pack administered via the DS1 or BRI Trunk Circuit Pack screen. Only displays if the Stratum field is **4**.

Valid entries	Usage
Display-only field.	

Slip

Displays as **y** if the Slip Detection field has been enabled for any of the 8 ports on the DS1 Circuit Pack screen.

Valid entries	Usage
Display-only field.	

Type

Contains a value for each displayed circuit pack that indicates the circuit pack's maintenance name. For example, UDS1-BD appears for a TN464 circuit pack, and TBR1-BD appears for a TN2185 circuit pack.

Valid entries	Usage
Display-only field.	

Uniform Dial Plan

This screen administers the Uniform Dial Plan (UDP).

```
                                                          Page 1 of 2
                           UNIFORM DIALING PLAN
                              Ext Codes: _____
                           Ext Code: _____  Type: _____ ___

  dd    Type        dd    Type        dd    Type        dd    Type        dd    Type
  0x: _____ ___  1x: _____ ___  2x: _____ ___  3x: _____ ___  4x: _____ ___
  00: _____ ___  10: _____ ___  20: _____ ___  30: _____ ___  40: _____ ___
  01: _____ ___  11: _____ ___  21: _____ ___  31: _____ ___  41: _____ ___
  02: _____ ___  12: _____ ___  22: _____ ___  32: _____ ___  42: _____ ___
  03: _____ ___  13: _____ ___  23: _____ ___  33: _____ ___  43: _____ ___
  04: _____ ___  14: _____ ___  24: _____ ___  34: _____ ___  44: _____ ___
  05: _____ ___  15: _____ ___  25: _____ ___  35: _____ ___  45: _____ ___
  06: _____ ___  16: _____ ___  26: _____ ___  36: _____ ___  46: _____ ___
  07: _____ ___  17: _____ ___  27: _____ ___  37: _____ ___  47: _____ ___
  08: _____ ___  18: _____ ___  28: _____ ___  38: _____ ___  48: _____ ___
  09: _____ ___  19: _____ ___  29: _____ ___  39: _____ ___  49: _____ ___
```

```
                                                          Page 2 of 2
                           UNIFORM DIALING PLAN
                              Ext Codes: _____
                           Ext Code: _____  Type: _____ ___

  dd    Type        dd    Type        dd    Type        dd    Type        dd    Type
  5x: _____ ___  6x: _____ ___  7x: _____ ___  8x: _____ ___  9x: _____ ___
  50: _____ ___  60: _____ ___  70: _____ ___  80: _____ ___  90: _____ ___
  51: _____ ___  61: _____ ___  71: _____ ___  81: _____ ___  91: _____ ___
  52: _____ ___  62: _____ ___  72: _____ ___  82: _____ ___  92: _____ ___
  53: _____ ___  63: _____ ___  73: _____ ___  83: _____ ___  93: _____ ___
  54: _____ ___  64: _____ ___  74: _____ ___  84: _____ ___  94: _____ ___
  55: _____ ___  65: _____ ___  75: _____ ___  85: _____ ___  95: _____ ___
  56: _____ ___  66: _____ ___  76: _____ ___  86: _____ ___  96: _____ ___
  57: _____ ___  67: _____ ___  77: _____ ___  87: _____ ___  97: _____ ___
  58: _____ ___  68: _____ ___  78: _____ ___  88: _____ ___  98: _____ ___
  59: _____ ___  69: _____ ___  79: _____ ___  89: _____ ___  99: _____ ___
```

Ext Codes   Displays a string of digits, "x", and "dd." The position of the dd shows which digit positions of the Ext Codes are being administered. For example, **512dd** means that the last two digits of the Ext Codes, for the leading digits 512, are being administered on the screen. The string, **5ddxx**, shows that the second and third digits of the Ext Codes, for the leading digit 5, are being administered on the screen (these entries would all be wildcard entries).

| **Ext Code, Type (and associated data)** | Displays what rules apply if the entries on the screen are not administered. For example, shows a screen for Ext Codes starting with 512. If these entries are not administered, the entry for Ext Code 51xxx applies to these entries, and if Ext Code 51xxx is not administered, the entry for Ext Code 5xxxx applies to these entries. In a 5-digit UDP, these read-only fields display only if at least 3 digits are specified in the command-line key, although one set (the set on the left) of these fields would still display if 2 digits are specified in the command-line key. If only 1 digit is specified or if 'x' or 'X' is specified in the command-line key, then neither of these sets of fields display, since there is no Ext Code more general than those listed on the screen. |

Valid entries	Usage
`AARCode`	
`ENPNode`	
`Local`	
`TempOOS`	
`UDPCode`	
blank	

| **dd** | Displays the two digits (or x's) representing the extension or group of extensions to be administered. For this field, "xx:" is repeated on both pages, since it is the default for all other entries on both pages. Changing the type associated with this field on one page changes it on both pages. |

| Type | Specify the type of treatment for the extension. That is, specify whether the extension should receive intercept treatment, be converted to AAR, or be converted via ENP. The difference between AAR Location Codes and UDP Location Codes is that 7-digit AAR Numbers created from AAR Location Codes may be changed during AAR analysis by AAR digit conversion before being routed. Seven-digit AAR Numbers created from UDP Location Codes are not subject to digit conversion before being routed with AAR digit analysis.When an extension code that is displayed on the UDP screen is not administrable because it conflicts with the translations in the first and/or second digit tables, then the type field for that extension code displays "NotInDP." |

Valid entries	Usage
AARCode	
ENPNode	
Local	
TempOOS	The entry **TempOOS** indicates an extension is temporarily out-of-service. Calls to these extensions receive reorder.
UDPCode	
blank	A blank entry indicates this Ext code is not administered. If no matching code can be found, then the call receives intercept treatment.

Location Code   Specify the 3-digit location code for Ext Codes administered with a type of AARCode or UDPCode. This field displays if AARCode or UDPCode is entered as the type.

Node Number   Specify the node number for Ext Codes administered with a type of ENPNode. This field pops up if ENPNode is entered as the type.

Note: Note: This node number must not be the same as the local node number on the dial plan screen.

B Private Networking

This appendix contains five main sections: (1) a description of Distributed Communications System (DCS) and the features that can be used transparently on a DCS network, (2) a description of ISDN Plus networking capability, (3) a description of QSIG and its features, (4) a brief description of Centralized Voice Mail with Mode codes, and (5) a brief description of Japan TTC private networking protocols.

Contents of this Appendix

Distributed Communications System

Distributed Communications System (DCS) allows you to configure 2 or more switches as if they were a single, large DEFINITY ECS. DCS provides attendant and voice-terminal features between these switch locations. DCS simplifies dialing procedures and allows transparent use of some of the DEFINITY ECS features. (Feature transparency means that features are available to all users on DCS regardless of the switch location.)

Configuring a DCS network is a complex process that involves 4 major steps:

- Planning your DCS network

- Connecting the physical equipment in the network

- Administering the physical layer (hardware connections)

- Administering the link layer to create a DCS

Description of DCS

DCS network configurations can be:

- TCP/IP DCS network — A DCS network configured with 2 or more switches using TCP/IP (PPP or 10/100BaseT Ethernet) signaling for transporting DCS feature transparency information.

- Traditional DCS network — A DCS network configured with 2 or more switches using BX.25 signaling for transporting DCS feature transparency information.

- D-channel DCS network (private network only) — A DCS network that includes DEFINITY ECS using the ISDN-PRI D-channel DCS transparency information (D-channel signaling). ISDN-PRI facilities with this type of network use only private-line facilities.

- D-channel DCS network (public network access/egress) — A DCS network that includes DEFINITY ECS using D-channel signaling. At least one of these ISDN-PRI facilities uses a public network ISDN-PRI.

- Integrated DCS network (private network only) — A DCS network that contains a variety of switches using TCP/IP, BX.25, or D-channel signaling methods. At least one DEFINITY ECS serves as an ISDN-PRI DCS Gateway node. This node can interwork DCS transparency information between the three signaling protocols.

  An ISDN-PRI DCS Gateway node provides backward compatibility to existing traditional DCS networks.

- Integrated DCS network (public network access) — The same as D-channel DCS Network (Private Network Only), but the D-channel of at least one ISDN- PRI facility uses a public network ISDN-PRI.

DCS Features

Once you have connected and set up your DCS network, you can provide the following features across the network:

Alphanumeric Display for Terminals

This feature allows calling-name display, called-name display, and miscellaneous identifiers to be transferred from a terminal on one node to a terminal on another node.

Attendant Control of Trunk Group Access

DCS Attendant Control of Trunk Group Access allows an attendant at any node in the DCS to control an outgoing trunk group at an adjacent node in the cluster. The attendant uses a remote-tgs feature button on the console for this purpose.

To use this feature, you must have a DCS Trunk Group between the local and remote switches, and the trunks in that trunk group cannot insert digits on incoming calls. If you need digit insertion on these trunks, it should be added on the outgoing trunk based on the dialed string.

Note: DCS Attendant Control of Trunk Group Access is not available if you are using D-channel DCS.

Attendant Direct Trunk Group Selection

DCS Attendant Direct Trunk Group Selection allows attendants at one node to have direct access to an idle outgoing trunk at a different node in the DCS. This feature functions the same as regular Direct Trunk Group Selection. However, the attendant uses a remote-tgs feature button on the console for this purpose.

Note: DCS Attendant Direct Trunk Group Selection is not available if you are using D-channel DCS.

To use this feature, you must have a DCS Trunk Group between the local and remote switches, and the trunks in that trunk group cannot insert digits on incoming calls. If you need digit insertion on these trunks, it should be added on the outgoing trunk based on the dialed digits.

You can assign a Trunk Hundreds Select button to access a trunk group at the local node or a trunk group at a remote node. A Trunk Group Select button assigned to access a remote node is referred to as a remote Trunk Hundreds Select button. Pressing a remote Trunk Group Select button is the same as dialing the tie trunk group access code for the remote node and the trunk access code of the selected trunk.

Attendant Display

The DCS attendant console displays calling-party ID and called-party ID information for calls to and from remote switches in the network.

Automatic Callback

DCS Automatic Callback allows a user at one node to make an automatic callback call to a user at another node in the DCS.

A DCS Automatic Callback call can be initiated from a terminal at one node to a terminal at another node in the same way as if at a local node under the following conditions.

- ~ If the called party is at a System 85, Generic 2, or Enhanced DIMENSION PBX node, the callback call can only be activated if the called node is returning busy tone or special audible ringback.

- ~ If the called party is at a Generic 3, Generic 1 or System 75 node, the callback call can be activated if the called node is returning busy tone, Call Waiting ringback tone, or ringback tone.

- ~ The calling party must disconnect within 6 seconds after hearing the confirmation tone for Automatic Callback activation.

Note: If the calling party is on a System 85, Generic 2, or Enhanced DIMENSION PBX node and is unable to receive the callback call (for example, a busy single-line voice terminal without Call Waiting), Automatic Callback is reactivated by the calling party's node. If the calling party is on a Generic 3, Generic 1, or System 75 node and is unable to receive the callback call, the callback call is canceled.

Automatic Circuit Assurance

DCS Automatic Circuit Assurance (ACA) allows a voice-terminal user or attendant at a node to activate and deactivate ACA referral calls for the entire DCS network. This transparency allows the referral calls to originate at a node other than the node that detects the problem.

If referral calls are generated at a node for one or more remote nodes, the remote nodes are notified when ACA referral is activated or deactivated.

Busy Verification of Terminals and Trunks

DCS Busy Verification of Terminals and Trunks allows attendants and multiappearance voice-terminal users to make test calls to voice terminals and trunk groups that are located at other nodes in the DCS.

To use this feature, you must have a DCS Trunk Group between the local and remote switches, and the trunks in that trunk group cannot insert digits on incoming calls. If you need digit insertion on these trunks, it should be added on the outgoing trunk based on the dialed digits.

Multiappearance voice terminal users can busy-verify an adjunct at a remote location by pressing Verify and dialing the TAC of the tie trunk group to the remote node. Then they must press Verify a second time and dial the desired TAC and the trunk group member number to be verified. Verification of the trunk then continues as if the trunk is on the same node.

Call Coverage

DCS Call Coverage provides DCS messaging required for calls to be covered on remote systems when there is a DCS signaling link (BX.25, PPP, or ISDN-PRI) for the trunk groups. Calls to an extension on one system are covered by extensions on remote systems that are administered as coverage points.

Figure 4 shows an example of DCS Call Coverage.

Figure 4.   DCS Call Coverage
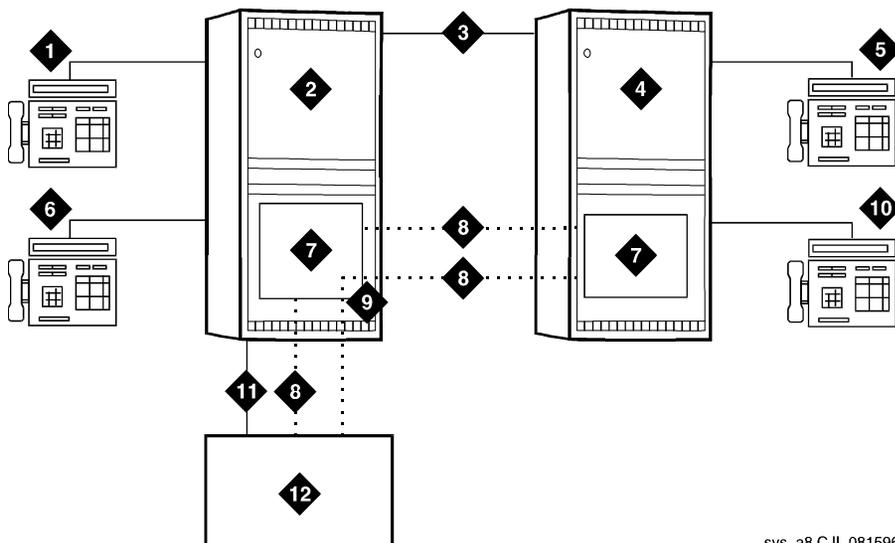
sys_a8 CJL 081596

1. **Station A**	7. **PGATE or PI Board**
2. **System A - DEFINITY ECS**	8. **X.25 or ISDN PRI DCS Signaling Link**
3. **DCS Tie Trunk Groups**	9. **Hop or ISDN TSC Gateway**
4. **System B - DEFINITY ECS**	10. **Station D**
5. **Station C**	11. **AUDIX Voice Lines**
6. **Station B**	12. **AUDIX - x34000**

In Figure 4, calls to Station A can be covered first by Station B, then by Station C or D, and finally by the AUDIX on system A. Alternatively, calls could be covered by Station C, then Station B, then Station D, and so on.

If the called party answers after the call goes to coverage and the coverage point has answered, then the called party, calling party, and coverage point are all conferenced together.

If the called party answers and the coverage point has not answered, the call to the coverage point drops and the called party connects to the calling party.

Exceptions to DCS Call Coverage

DCS Call Coverage is similar to Call Coverage, with the following exceptions:

~ Coverage Answer Groups across nodes are not supported.

~ Under the following error conditions, a call follows the coverage point's coverage path.

Error Condition	Action
DCS link not up. or DCS trunk is not available. or DCS Call Coverage feature is not activated on the remote system.	The call is routed to the remote coverage point. If the call is answered, it is treated as Call Coverage Off Premises (also called Remote Call Coverage). If the call is redirected at the remote coverage point before the DCS SRI expires, the remote point's path is followed. If the call is not answered within the DCS SRI time-out period, the next coverage point is tried with DCS Call Coverage from the local system.
All trunks to the remote system, DCS or otherwise, are busy	The next coverage point is tried with DCS Call Coverage from the local system.

~ When the DCS link is down, call consult operates differently. If Station A calls Station B but the call covers to Station C, then Station C consults back to Station B and Station B receives the consult call on the next call appearance.

~ DCS Call Coverage does not support Coverage Call Back from a remote node.

Additionally, in some DCS Call Coverage situations, call coverage operation may deviate, including:

~ A call to the principal redirects to the remote coverage point, which is unavailable. The coverage point is considered unavailable when:

- The coverage point is not a valid extension, QDN, or VDN.

- The coverage point is busy with no hunting, forwarded, or has send all calls activated, or activates send all calls after ringing.

- The coverage point has no staffed agents or an invalid vector.

When the coverage point is unavailable, the local system determines the availability status from a time-out or from a message from the remote system. When the local system discovers that the coverage point is unavailable, it tries the next coverage point. If the last coverage point is unavailable, the previous coverage point rings until it is answered or until the caller hangs up. If only one coverage point exists in the path and it is unavailable, the principal's station rings until it is answered or until the caller hangs up.

~ A call to the principal is forwarded and the forwarded-to extension is not available. In this case, the first coverage point in the principal's path is tried. Note that the coverage does not follow the forwarded-to extension's coverage path.

~ A call to the principal redirects to the remote coverage point, which answers. Subsequently, the principal goes off hook. In this case, the local system bridges the principal onto the call between the calling party and coverage point creating a conference among the three. The principal receives the call on the same call appearance as the original call.

~ A call to the principal redirects to the remote coverage point. While the remote coverage point is ringing, the principal answers the call. In this case the call is not cut through to the coverage point. Instead, ringing and ringback is removed from the coverage point and the call is cut through to the principal.

Call Forwarding

DCS Call Forwarding allows all calls to an extension to be forwarded to a selected extension in the DCS network or to an external (off-premises) number.

If the Call Forwarding and DCS Call Forwarding are both active, and if a call is forwarded between extensions on the same node, the Call Forwarding coverage path is used. If the nodes are different, the DCS Call Forwarding coverage path is used.

Voice-terminal users in the DCS can activate/deactivate this feature with a dial access code or with a Call Forwarding button.

Note: Calls can be forwarded to a Vector Directory Number (VDN) anywhere in the DCS network. An attendant cannot activate/deactivate Call Forwarding for a VDN.

Call Waiting

DCS Call Waiting allows calls from one node to busy single-line voice terminals at another node to wait until the called party is available to accept the call. With DCS Call Waiting, a single-line voice terminal user, by knowing a call is waiting, can quickly process calls from locations within the DCS. DCS Call Waiting functions the same as normal Call Waiting.

DCS Call Waiting includes the following features:

~ Attendant Call Waiting
~ Call Waiting — Termination
~ Priority Calling

DCS priority calling from the attendant station is *not* available.

Distinctive Ringing

DCS Distinctive Ringing activates the called-terminal alerting or ringing device to indicate the type of incoming call to the user before they answer it. Distinctive Alerting functions in a DCS environment the same as it does within a single system.

By default, internal calls are identified by a1-burst ringing pattern, external calls by a 2-burst ringing pattern, and priority calls by a 3-burst ringing pattern. However, you can administer these patterns.

Leave Word Calling

LWC transparency in a DCS configuration allows messages from a DEFINITY switch to another node, depending on the storage capability of the remote node.

Multiappearance Conference/ Transfer

DCS Multiappearance Conference/Transfer provides transparency for transferring calls and conferencing calls within a DCS network. A user in the DCS can initiate conference calls among or transfer calls originated from extensions in the DCS network to another extension within the DCS by dialing the UDP extension. (For transferred calls, the destination need not be within the DCS.)

In a DCS, if a party in a conference hangs up or completes a transfer leaving only outgoing trunks on the call, the system attempts to preserve the connection if any of the remaining parties on the call is a DCS tie trunk.

Trunk Group Busy/Warning Indication

DCS Trunk Group Busy/Warning Indication provides attendants with a visual indication that the number of busy trunks in a remote group reached an administered level. A visual indication is also provided when all trunks in a trunk group are busy.

Note: DCS Trunk Group Busy/Warning Indication is not available if you are using DCS over ISDN-PRI.

To use this feature, you must have a DCS Trunk Group between the local and remote switches, and the trunks in that trunk group cannot insert digits on incoming calls. If you need digit insertion on these trunks, it should be added on the outgoing trunk based on the dialed digits.

Except for System 75, System 85, and DEFINITY G2 switches, you can administer DCS Trunk Group Busy/Warning Indication only for remote trunk groups that are directly connected to the local switch. Trunk group access codes for these trunk groups must be 3 digits or less and cannot include trunk members 100 through 999.

DCS with Rerouting

DCS with Rerouting allows a call's connection between two DEFINITY systems to be replaced by a new connection. All of the trunks used in the original path must be DCS and the new path utilizes only DCS trunks. DCS with Rerouting provides the following capabilities:

- ~ Attempts to obtain a better (generally less expensive) connection.
- ~ May replace the current path of a call with a route that is better in terms of Automatic Alternate Routing/Automatic Route Selection (AAR/ARS) routing preferences administered on a DEFINITY ECS.
- ~ Frees up resources being used unnecessarily.

DCS with Rerouting primarily provides you with the ability to attempt to be more effective with the usage of Trunk groups administered for Supplementary Services Protocol Option E (SSE) during the existence of an active call. This means using a more preferred route (in terms of UDP/AAR/ARS routing preferences administered on the PBX) between the PBXs involved.

Your users invoke DCS with Rerouting by Call Transfer, Transfer out of Audix, and dial 0 out of Audix. DCS with Rerouting must be enabled on a switch-wide basis and the trunk groups involved must be administered as SSE.

Interactions

- When interworking with non-ISDN trunks or non-Supplementary Service Option E ISDN trunks, DEFINITY acts as a gateway in the following sense:
    - When a call is tandeming through a DEFINITY system from a non-ISDN trunk to an SSE trunk or from a non-Option E to an SSE trunk, the system acts as an incoming gateway.
    - When a call is tandeming through a DEFINITY system from an SSE trunk to a non-ISDN trunk or from an SSE trunk to a non-Option E trunk, the system acts as an outgoing gateway.

        As an example, when calls come in from the public network to the DCS network and then are transferred to another extension within the private network, DEFINITY functions as an incoming gateway and rerouting occurs.

- If a conference call is transferred, rerouting will not occur.

Italian DCS Protocol

Italian DCS Protocol (also known as Enhanced DCS) adds features to the existing DCS capabilities.EDCS is used primarily in Italy. EDCS adds the following features:

- Exchanging information to provide class of restriction (COR) checking between switches in the EDCS network
- Providing call-progress information for the attendant
- Allowing attendant intrusion between a main and a satellite
- Allowing a main PBX to provide DID/CO intercept treatment rather than the satellite PBX.

Note: EDCS is not compatible with DCS Over/Under ISDN-PRI. With EDCS, all nodes must use EDCS. If used with ISDN-PRI, configure the switch as a DCS node. Also, DCS-ISDN display enhancements are not currently available in EDCS.

How to administer Enhanced DCS

Form	Field
Feature-Related System Parameters	• Enhanced DCS Enabled? • Apply Intercept Locally? • Enforce PNT-to-PNT Restrictions?

ISDN/X.25 gateway

DEFINITY ECS can serve as an interface between PBXs that support the D-channel signaling feature and those that do not support this feature. The switch providing this interface is known as the ISDN-DCS Gateway node and provides backward compatibility to existing traditional DCS networks.

It maintains a mapping between processor channels and Administered NCA-TSCs. When a DCS D-channel message arrives on an Administered NCA-TSC acting as a gateway, it is converted to a traditional DCS message and sent out through the processor channel that has been administered to map to this Administered NCA-TSC. Likewise, when a traditional DCS message arrives at the gateway node on a processor channel acting as a gateway, it is converted to a DCS D-channel message and sent out through the Administered NCA-TSC that has been associated with this processor channel on the ISDN Gateway Channel form.

In summary, a gateway is required whenever a transition is being made from BX.25 signaling to D-channel signaling. When the transition takes place at a switch that sits between that part of the network that supports D-channel DCS and that part that does not, that switch is an ISDN-DCS Gateway. A DCS network consisting entirely of switches that support D-channel DCS never requires an ISDN-DCS Gateway because none of the switches require "translation" to/from BX.25.

DCS Over ISDN-PRI D-channel

DCS Over ISDN-PRI D-channel (DCS+) enhances DCS by allowing access to the public network for DCS connectivity between DCS switch nodes. With this feature, DCS features are no longer restricted to private facilities.

The ISDN-PRI B-channel is used for voice communications, and the ISDN-PRI D-channel transports DCS control information. DCS Over ISDN-PRI utilizes the Message-Associated User-to-User Information (MA-UUI) and Temporary Signaling Connections (TSC) to transport certain DCS control information. MA-UUI allows additional user-specific information to be transported along with certain ISDN call-control messages.

> **Note:** Use this feature only over DS1/E1 or T1 circuit packs that are administered to Country Protocol Option 1, Protocol Version A (even in a private network environment) independent of what country the system is in.

**How to administer DCS
Over ISDN-PRI
D-channel**

Form	Field
Signaling Group	• Max number of NCA TSC • Max number of CA TSC • Trunk Group for NCA TSC • Administered NCA TSC Assignment fields • Service/Feature • Inactivity Time-out (min)
ISDN TSC Gateway Channel Assignments	• All
Trunk Group (ISDN-PRI)	• Used for DCS Node Number DCS Signaling • NCA TSC Trunk Member
Route Pattern	• TSC • CA TSC Request
Processor Channel Assignment	• Application
Feature-Related System Parameters	• Record TSCs for CDR

Note: There are several differences in administration between switches. For example, PRI is translated a little differently in G3r when traditional DCS and this feature are used in combination. On systems with AUDIX in a DCS environment, an additional column has been added to the Signaling Group form so you can specify which AUDIX and switch to use. When traditional DCS and DCS over ISDN are used in combination, translations are also different.

Detailed description　　A TSC provides a temporary signaling path through ISDN switches for exchanging supplementary service information on ISDN-PRI D-channels. There is no B-channel related to the connection; no data or voice transmissions take place.

There are two types of temporary signaling connections:

• Call Associated (CA-TSC)

• Non-Call Associated (NCA-TSC)

CA-TSC

A CA-TSC refers to a service for exchanging USER INFORMATION messages associated with an ISDN B-channel connection by the call reference value of the call control data packets. On DEFINITY ECS, this type of TSC is used only for DCS features on ISDN-PRI Signaling Groups administered with Supplementary Service Protocol a.

NCA-TSC

An NCA-TSC is a connection not related with any ISDN B-channel connections. DECINITY ECS supports two types of NCA-TSC that conform to two different protocol standards:

- The QSIG type of NCA-TSC is used for certain QSIG features such as Call Completion (Automatic Call Back). This type of NCA-TSC is referred to in the QSIG protocol standards as a Call-Independent Signaling Connection (CISC). Only ISDN-PRI Signaling Groups administered with Supplementary Service Protocol *b* support QSIG NCA-TSCs. For further information, see NCA-TSC (page 370).

- The AT&T type of NCA-TSC is used for the DCS Over ISDN-PRI D-channel and DCS AUDIX applications. Only ISDN-PRI Signaling Groups administered with Supplementary Service Protocol *a* support AT&T NCA-TSCs.

  An AT&T NCA-TSC is an administered virtual connection established for exchanging USER INFORMATION messages on the ISDN D-channel. Once an AT&T NCA-TSC has been administered and enabled, it is active for an extended period of time. There are two types of administered NCA-TSCs depending on their setup mechanism:

  - Permanent (can be established by Near-end or Far-end)
  - As-needed

  Once enabled, a permanent NCA-TSC remains established while the system is running. If the permanent NCA-TSC drops for any reason, the system attempts to reestablish the connection. An as-needed administered NCA-TSC is established based on user request and the availability of TSC facilities. The connection drops after an administered period of inactivity.

  The system can transport DCS or DCS AUDIX messages over an ISDN-PRI D-channel and over BX.25 data links when functioning as a gateway between a switch equipped with DCS Over ISDN-PRI D-channel and a switch equipped with traditional DCS using BX.25 data links. In this situation, the messages travel from the gateway through the NCA-TSCs or CA-TSCs to TSC-capable switches and from the gateway to switches that support only traditional DCS via a BX.25 logical channel.

  At least one switch must be configured as an ISDN DCS Gateway node in a DCS network that consists of switches that support DCS Over ISDN-PRI D-channel and PBXs that do not support the feature. Switches directly connected to AUDIX serve as Gateway nodes.

DCS feature considerations

Attendant
- If you call an attendant on another switch in the DCS network, your display shows the attendant's name, but does not show the attendant's extension, instead you see a zero where the extension should be.

Alphanumeric Display considerations
- On outgoing DCS calls, display of the called name may be delayed for a few seconds until the required information arrives from the distant node. The called name display only works between DEFINITY ECS, DEFINITY Generic 1 and Generic 3 Systems, and System 75s.

Attendant Control of Trunk Group Access considerations
- This feature is not available for trunk groups with 4-digit trunk access codes or for trunk members 100 through 999.
- If the remote node (where the trunk group to be controlled resides) is a System 75, Generic 1, or Generic 3, it is not necessary for that node to have an attendant console with corresponding three-lamp Trunk Hundreds Select button. However, if the remote node is a System 85, Generic 2.1, or Enhanced DIMENSION PBX, control of the trunk group is not allowed unless an attendant at that node has a corresponding three-lamp Trunk Group Select button.
- The attendant must use the Remote Trunk Hundreds Select button to directly access the controlled remote trunk group. If an attendant controls a remote trunk group, and that attendant dials the trunk access codes of the DCS tie trunk and the controlled remote trunk group, the call is routed to the attendant at the node where the trunk group resides.
- If Attendant Control of Trunk Group Access is activated, and no attendant is assigned, or the attendant is later removed, calls to a controlled trunk group route to the attendant queue.

Attendant Direct Trunk Group Selection considerations
- This feature is not available for trunk groups with 4-digit trunk access codes or for trunk members 100 through 999.

Attendant Display considerations
- CORs for a DEFINITY switch may not correspond to those used by an Enhanced DIMENSION PBX, System 85, or DEFINITY system Generic 2.1. Therefore, if the DCS network contains nodes other than Generic 1 or Generic 3, the display CORs may be misinterpreted. If it is important that certain CORs between various systems correspond with each other, those CORs should be administered accordingly.
- On outgoing calls, the display of called party information may be delayed a few seconds until the required information arrives from the remote node. The called party information is displayed only if both nodes are Generic 1 or System 75.
- DCS tie trunks between nodes must be administered with the Outgoing Display enabled. This enables the called party's name to be displayed at the calling attendant's display.

Automatic Callback considerations
- An Automatic Callback request is canceled automatically if the called party does not become available within 40 minutes, or if the calling party does not hang up within six seconds after activating Automatic Callback.

| **DCS Over ISDN-PRI D-channel considerations** | • The gateway node serves as the terminating node to the D-channel DCS network as well as the terminating node to the traditional DCS network. |

A PBX serving as an ISDN DCS Gateway node introduces some interesting situations when administering processor channels in an associated traditional DCS PBX. In a traditional DCS network, (BX.25 processor channel links) **Remote Port** in the "Processor Channel Assignments" form refers to the processor channel of the destination PBX. In an Integrated DCS network, **Remote Proc Chan** in the "Processor Channel Assignments" form refers to the processor channel of the Gateway PBX (if the destination PBX is an ISDN DCS PBX), *not* the destination PBX.

On the contrary, **Machine-ID** in the "Processor Channel Assignments" form refers to the destination PBX, either an ISDN DCS PBX or a traditional DCS PBX. The Gateway PBX number must not be used in this field if the destination PBX is an ISDN DCS PBX.

Enhanced DCS considerations

• If the DCS link fails, the administrator can choose to allow calls to continue without class of restriction checking or to block all DCS calls to inward-restricted stations.

LWC considerations

• LWC cannot be successfully activated toward any system that is not capable of storing the messages, either internally or in an associated adjunct.

• Messages from one node, through an intermediate node, to a remote node do not require storage capability at the intermediate node.

• LWC transparency is supported for all DCS configurations except for cases when either the activating node or the remote node is either an ENHANCED DIMENSION PBX or a System 85 R2V1.

• Retrieval of LWC messages is permitted only from a terminal at the node where the messages are stored.

• DCS LWC cannot be activated from an attendant console.

Trunk Group Busy/Warning Indication considerations

• Trunk Group Busy and Trunk Group Warning Indication is particularly useful with the Attendant Control of Trunk Group Access feature. The indicators alert the attendant when control of access to local and remote trunk groups is necessary.

DCS Interactions

Alphanumeric Display   The following features allow transparency with respect to Calling or Called Name Display and miscellaneous ID.

- Call Coverage

  At the calling terminal, the miscellaneous id "cover" is not displayed.

- Call Forwarding

  When a system user calls a party on a different node in the DCS and the call is forwarded, the miscellaneous ID "forward" is not displayed. At the covering (forwarded-to) user's terminal, only the calling party's name is shown; the called party's name is not displayed.

- Call Park

  When a DCS call between a local system user and a user on another node is parked by the remote user, the miscellaneous ID "park" is not displayed at the local terminal.

- Call Pickup

  When a DCS call from a system user to another node is answered by way of Call Pickup, the miscellaneous ID "cover" is not displayed at the caller's terminal.

- Call Waiting

  When a DCS call from a system user to another node is waiting at the called terminal, the miscellaneous ID "wait" is not displayed at the caller's terminal.

- CAS

  When a user dials the extension for CAS, a RLT is seized or the caller is queued for an RLT. The caller's terminal displays the trunk group identifier, such as OPERATOR.

- ISDN-PRI

  If both DCS and ISDN-PRI features are provided with a system, the ISDN-PRI display information displays in DCS format.

DCS Attendant Control   - DCS Attendant Display
of Trunk Group Access

  When a user attempts to access a controlled trunk group and is routed to the local attendant, the display shows the reason the call was redirected. If the call is routed via CAS or the Inter-PBX Attendant Calls feature, the display does not show the reason the call was redirected.

- UDP

  DCS tie trunks should not be attendant controlled. This would result in all UDP calls on the controlled tie trunk being routed to the controlling attendant instead of to the desired destination.

Attendant Display	• When both ISDN and DCS display information, or only DCS display information, is received, the switch displays the DCS display information in the DCS format. If ISDN display information is received, and no DCS display information is received, then the ISDN display information displays in the ISDN formats.
Automatic Callback	• Attendant Control of Trunk Group Access and DCS Attendant Control of Trunk Group Access
	Automatic Callback cannot be activated if the call uses a controlled trunk group.
Busy Verification	• If the Trunk Identification by Attendant feature is used during busy verification of a trunk (Trunk ID button is pressed), the trunk access code and trunk group member number of the DCS tie trunk being used is displayed.
	• DCS Busy Verification of Terminals and Trunks transparency is lost if the routing pattern is administered to not delete the RNX and the AAR prefix is inserted on the terminating switch trunk group. The voice terminal display at the terminating switch displays only **a=station name**. **Extension** is left blank.
Call Coverage	DCS Call Coverage has the same interactions as Call Coverage plus the following additional interactions.

* Call Coverage Off Premises

    If the coverage point is a non-UDP number in the remote call coverage table, Call Coverage Off Premises is applied to the call rather than DCS Call Coverage, even if a DCS link exists to the remote system.

* Coverage Answer Groups

    DCS Call Coverage to Coverage Answer Groups on remote systems are not supported by DCS Call Coverage. Coverage answer groups cannot be administered on a system other than the principal's system.

* Coverage Call Back

    DCS Call Coverage does not support Coverage Call Back from a remote node.

* Displays

    The displays on the DCS Call Coverage point's terminal may be different than those associated with the Call Coverage feature in the following situations:

    ~ When the call from the calling party to the principal or the redirected call to the coverage point travel over ISDN-PRI trunk groups.

    ~ When the calling party is on a System 85 or Generic 2.

    ~ When the DCS name message is not received by the remote (coverage point's) system.

* Go to Cover

    Go to Cover is not supported over DCS and therefore is not supported with DCS Call Coverage.

- Leave Word Calling Back to Principal

    With DCS Call Coverage, a covering user on a different node cannot press their LWC button to leave a message for the principal to call the covering user.

- Queuing

    DCS Call Coverage interacts with queuing in the following way. If a call is queued to a coverage point, such as a queue to a hunt group or an ACD split, and the queue is not full, the call remains in the queue without subsequent redirection until answered or until the caller hangs up.

Call Forwarding

- If the forwarding extension and the designated extension are at different nodes, and the designated extension's coverage criteria are met on a forwarded call, the call is redirected to a point in the designated extension's coverage path.

- If the forwarding extension and the designated extension are at different nodes, LWC and Coverage Callback cannot be activated at the designated extension for a forwarded call.

- There is a 30-second interval during which calls forwarded from the DEFINITY switch to another DCS node is denied. This prevents forwarded incoming trunk calls from being forwarded ad infinitum between two extensions.

Call Waiting

- DCS Call Waiting is denied when the following features are activated at the single-line voice terminal:
    - Automatic Callback (to or from the voice terminal)
    - Data Privacy
    - Data Restriction

- On incoming trunk calls to the attendant extended over DCS trunks, Attendant Call Waiting interacts with the EDCS feature.

DCS Over ISDN-PRI D-channel

- ASAI

    For incoming calls on DCS over ISDN-PRI, ASAI applications receive the ISDN-PRI Calling Party Information, not the DCS Calling Party Information.

- Attendant DXS with Busy Lamp Field

    An attempt by the attendant to directly select an extension that has been previously administered as belonging to a administered NCA-TSC results in intercept tone being received.

- CDR

    CDR records both the status and the utilization of TSCs. Both CA-TSCs and NCA-TSCs can be recorded. For more information, consult the CDR description in this manual or the CDR manual.

- D-channel Backup

  In the event of a D-channel switchover (primary to secondary or secondary back to primary) in a private network, administered NCA-TSCs that were active are assumed to have remained active. Any unacknowledged user-user service requests are assumed to be rejected, and administered NCA-TSCs which were in the process of being established at the time of the switchover are dropped when the switchover occurs. Those administered NCA-TSCs that were dropped are reattempted again.

  If a D-channel switchover occurs on a D-channel going to the public network then all TSCs are dropped. A maintenance-provided "heartbeat" message periodically is sent over each permanent administered NCA-TSC to ensure that such a situation is detected and recovered from.

- Distributed Communications System AUDIX (DCS AUDIX)

  The DCS over ISDN-PRI D-channel feature can be used to support DCS AUDIX. (The connection between G3si and AUDIX should be BX.25.)

- GRS

  GRS selects TSC compatible facilities when routing NCA-TSCs. In other words, a NCA-TSC request can only select a routing preference that supports TSCs.

  In a tandem node, GRS first selects facilities that support TSCs if the call falls into any one of the following two conditions:

  ~ It requests a CA-TSC explicitly
  ~ It contains a DCS information element in the SETUP message

  Once a trunk group with available members is selected, the call proceeds even if all the TSCs belonging to the associated signaling group are active. In other words, the completion of a call is given priority over DCS transparency.

- SDN

  The DCS over ISDN-PRI D-channel feature allows the system to access public networks such as SDN. SDN supports all DCS features except for the following:

  ~ DCS Attendant Control of Trunk Group Access
  ~ DCS Attendant Direct Trunk Group Selection
  ~ DCS Busy Verification of Terminals and Trunks

- Voice Terminals

  An attempt to dial an extension that has been previously administered as belonging to an administered NCA-TSC results in intercept tone being received.

Distinctive Ringing   • Distinctive Ringing

  Distinctive Ringing treats a call from another switch in a DCS arrangement as external; DCS Distinctive Ringing treats such calls as internal. If both features are administered, DCS Distinctive Ringing takes precedence. If EDCS is activated, DID treatment may be different. See Example DCS configurations (page 329).

Enhanced DCS	• Class of Restriction
	When a call goes to coverage, it is the called party's (not the covering party's) restrictions that are used.

LWC	• DCS Multi-appearance Conference/Transfer
	Activation of LWC is denied after a DCS call has been conferenced or transferred.

Multiappearance Conference/Transfer	• Voice Terminal Display
	No display transparency is provided for DCS Multi-Appearance Conference/Transfer.
	• EDCS
	On calls to or from Public Network Trunks, calling/called party restrictions are checked when EDCS is active.

Trunk Group Busy/Warning Indication	• Loudspeaker Paging Access
	If Trunk Hundreds Select buttons are assigned for Loudspeaker Paging Access zones, Trunk Group Busy Indicators provide a visual indication of the busy or idle status of the zones at the remote location as well as at the local node.

Example DCS configurations

The following two examples provide details for setting up two basic DCS networks. The first is a two-node network and the second is a three-node network. These examples use BX.25 and D-Channel signaling connections. For examples of TCP/IP signaling for DCS, see Chapters 2 and 3 in this book.

2-Node private network with AUDIX

Figure 5 shows a 2-node DCS/AUDIX D-channel network. In this configuration, DCS feature transparency is achieved exclusively through the exchange of user-to-user information on the D-channel using one of the three methods discussed earlier — MA-UUI, CA-TSCs or NCA-TSCs. Although NCA-TSCs are nothing more than virtual connections on the D-channel, they are shown as independent entities in the diagram for the purposes of clarity. Administered TSC 2/1 (that is, the first Administered NCA-TSC of signaling group 2) of Switch A is connected to TSC 4/1 of Switch B. This virtual connection is used in the exchange of user-to-user information for DCS features not associated with any current B-channel connection.

Notice that for AUDIX, a BX.25 data link is no longer required between the host switch and the remote switch(es). AUDIX messages between the AUDIX and the remote switch will use the AUDIX Gateway functionality of the host switch and will be transported to the remote switch via an NCA-TSC. Specifically, AUDIX messages destined for Switch B will arrive at Switch A on Link 1, Channel 2 (processor channel 57), be converted to ISDN-PRI Q.931 format and sent out via Administered NCA-TSC 2/2.

This is accomplished by administering processor channel 57 as a gateway and mapping it on the gateway form to Administered NCA-TSC 2 of signaling group 2 that is also administered as a gateway.

Figure 5.   2-Node private network
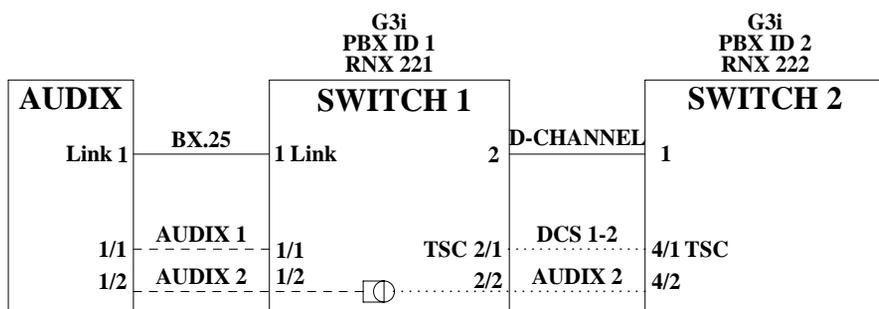
The following tables show you how you would complete each of the necessary forms.

AUDIX administration

• AUDIX Translations form

Switch Number	AUDIX Port	Switch Port*	Logical Channel	Data Link
1	1	59	1	1
2	2	57	2	1

* Switch Port refers to the processor channel that is used for AUDIX in the PBX.

Administration for switch 1

• Dial Plan form

Start Dig.	Len	Usage
4	4	ext
5	4	ext

• Uniform Dial Plan form

Ext Code	Type	Location Code
5xxx	UDPcode	222

• AAR Digit Conversion form

Matching Pattern	Min	Max	Del	Replacement String	Net	Conv
221	7	7	3	-	ext	n

• AAR Analysis Table

Dialed String	Min	Max	Rte Pat	Call Type	Node Num
222	7	7	2	aar	2

- Signaling Group form (signaling group 2)

TSC	Local	Enabled	Establish	Dest.	Far-end	Appl.
Index	Ext.			Ext.	PBX-ID	
1	4900	y	permanent	5900	2	dcs
2	4901	y	permanent	5901	-	gateway

- Trunk Group form

Group #	Grp Type	Used for DCS?	DCS Sig. Method	PBX ID
2	isdn-pri	y	d-chan	2

- Routing Pattern form

Routing Pattern #	Trunk Group #	FRL	Del	TSC	CA-TSC Request
2	2	0	3	y	at-setup

- Gateway Channel form

Signaling Group	TSC Index	Processor Channel	Application
2	2	57	audix

- Processor Channel form

Proc Channel	Application	Inter. Link	Channel	Remote Proc. Channel	PBX ID
57	gateway	1	2	2	-
59	audix	1	1	1	1

Administration for switch 2

- Dial Plan form

Start Dig.	Len	Usage
4	4	ext
5	4	ext

- Uniform Dial Plan form

Ext Code	Type	Location Code
4xxx	UDPcode	221

• AAR Digit Conversion form

Matching Pattern	Min	Max	Del	Replacement String	Net	Conv
222	7	7	3	-	ext	n

• AAR Analysis Table

Dialed String	Min	Max	Rte Pat	Call Type	Node Num
221	7	7	1	aar	1

• Signaling Group form (signaling group 4)

TSC Index	Local Ext.	Enabled	Establish	Dest.	Far-end Ext.	Appl PBX-ID
1	5900	y	permanent	4900	1	dcs
2	5901	y	permanent	4901	-	audix

• Trunk Group form

Group #	Grp Type	Used for DCS?	DCS Sig. Method	PBX ID
1	isdn-pri	y	d-chan	1

• Routing Pattern form

Routing Pattern #	Trunk Group #	FRL	Del	TSC	CA-TSC Request
1	1	0	3	y	at-setup

3-Node public/private network with AUDIX

The D-channel signaling feature expands the domain of DCS networks by supporting configurations that include public network ISDN facilities utilizing network services including Software Defined Network (SDN). By eliminating the need for dedicated private line facilities, this feature allows geographically dispersed DCS networks to be cost effective. Figure 6 shows a 3-node network.

Figure 6.　3-Node public/private network
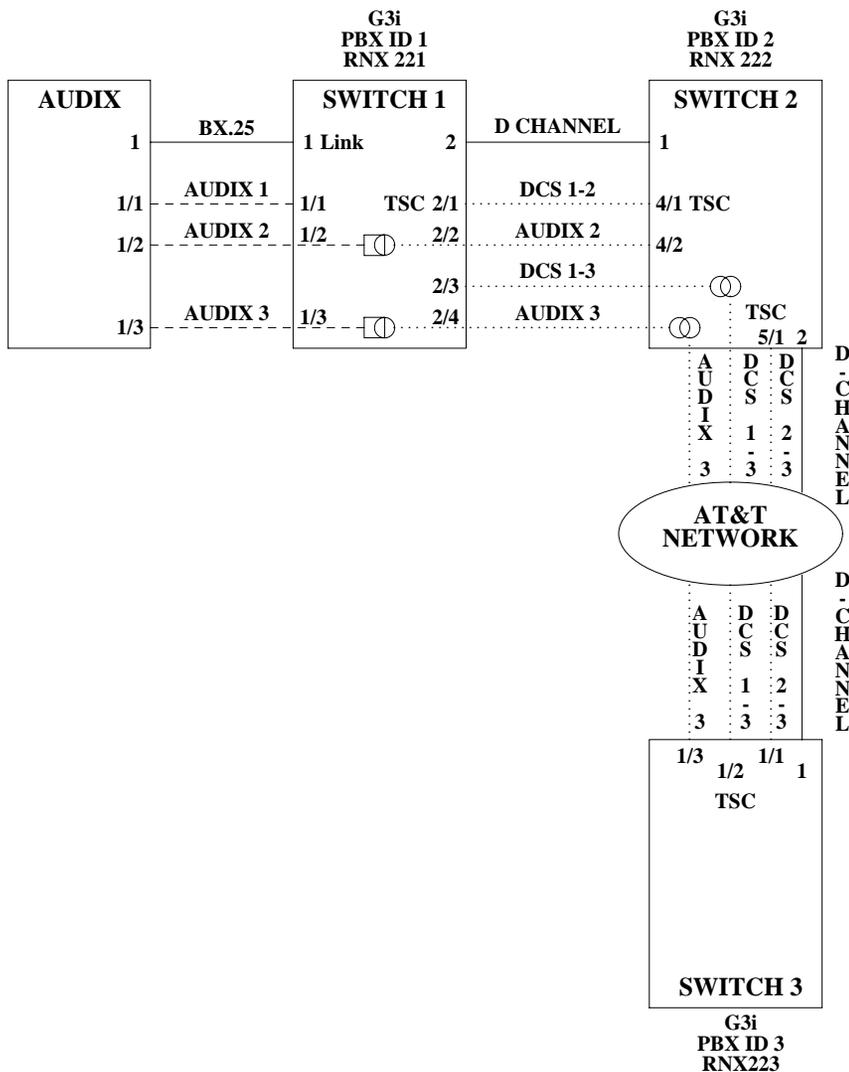
The following tables show you how you would complete each of the necessary forms.

AUDIX administration

- AUDIX Translations form

Switch Number	AUDIX Port	Switch Port*	Logical Channel	Data Link
1	1	59	1	1
2	2	57	2	1
3	3	58	3	1

* Switch Port refers to the processor channel that is used for AUDIX in the PBX.

Administration for switch 1

- Dial Plan form

Start Dig.	Len	Usage
4	4	ext
5	4	ext
6	4	ext

- Uniform Dial Plan form

Ext Code	Type	Location Code
5xxx	UDPcode	222
6xxx	UDPcode	223

- AAR Digit Conversion form

Matching Pattern	Min	Max	Del	Replacement String	Net	Conv
221	7	7	3	-	ext	n

- AAR Analysis Table

Dialed String	Min	Max	Rte Pat	Call Type	Node Num
222	7	7	2	aar	2
223	7	7	3	aar	3

- Signaling Group form (signaling group 2)

TSC Index	Local Ext.	Enabled	Establish	Dest. Ext.	Far-end PBX-ID	Appl
1	4900	y	permanent	5900	2	dcs
2	4901	y	permanent	5901	-	gateway
3	4902	y	permanent	6902	3	dcs
4	4903	y	permanent	6903	-	gateway

- Trunk Group form

Group #	Grp Type	Used for DCS?	DCS Sig. Method	PBX ID
2	isdn-pri	y	d-chan	2
3	isdn-pri	y	d-chan	3

• Routing Pattern form

Routing Pattern #	Trunk Group #	FRL	Del	TSC	CA-TSC Request
2	2	0	3	y	at-setup
3	3	0	3	y	at-setup

• Gateway Channel form

Signaling Group	TSC Index	Processor Channel	Application
2	2	60	audix
2	4	61	audix

• Processor Channel form

Proc Channel	Application	Inter. Link	Channel	Remote Proc. Channel	PBX ID
59	audix	1	1	1	1
57	gateway	1	2	2	-
58	gateway	1	3	3	-

Administration for switch 2

• Dial Plan form

Start Dig.	Len	Usage
4	4	ext
5	4	ext
6	4	ext

• Uniform Dial Plan form

Ext Code	Type	Location Code
4xxx	UDPcode	221
6xxx	UDPcode	223

• AAR Digit Conversion form

Matching Pattern	Min	Max	Del	Replacement String	Net	Conv
222	7	7	3	-	ext	n

• AAR Analysis Table

Dialed String	Min	Max	Rte Pat	Call Type	Node Num
221	7	7	1	aar	1
223	7	7	3	aar	3

• Signaling Group form

Signaling group 4

TSC	Local	Enabled	Establish	Dest.	Far-end	Appl.
Index	Ext.			Ext.	PBX-ID	
1	5900	y	permanent	4900	1	dcs
2	5901	y	permanent	4901	-	audix

Signaling group 5

TSC	Local	Enabled	Establish	Dest.	Far-end	Appl.
Index	Ext.			Ext.	PBX-ID	
1	5905	y	permanent	6905	3	dcs

• Trunk Group form

Group #	Grp Type	Used for DCS?	DCS Sig. Method	PBX ID	NCA-TSC Sig. Group[*]
1	isdn-pri	y	d-chan	1	-
3	isdn-pri	y	d-chan		5

* This field is only used for tandeming.

• Routing Pattern form

Routing Pattern #	Trunk Group #	FRL	Del	TSC	CA-TSC Request
1	1	0	3	y	at-setup
3	3	0	3	y	at-setup

Administration for switch 3

• Dial Plan form

Start Dig.	Len	Usage
4	4	ext
5	4	ext
6	4	ext

- Uniform Dial Plan form

Ext Code	Type	Location Code
4xxx	UDPcode	221
5xxx	UDPcode	222

- AAR Digit Conversion form

Matching Pattern	Min	Max	Del	Replacement String	Net	Conv
223	7	7	3	-	ext	n

- AAR Analysis Table

Dialed String	Min	Max	Rte Pat	Call Type	Node Num
221	7	7	1	aar	1
222	7	7	2	aar	2

- Signaling Group form (signaling group 4)

TSC Index	Local Ext.	Enabled	Establish	Dest. Ext.	Far-end PBX-ID	Appl.
1	6905	y	permanent	5905	2	dcs
2	6902	y	permanent	4902	1	dcs
3	6903	y	permanent	4903	-	audix

- Trunk Group form

Group #	Grp Type	Used for DCS?	DCS Sig. Method	PBX ID
1	isdn-pri	y	d-chan	

- Routing Pattern form

Routing Pattern #	Trunk Group #	FRL	Del	TSC	CA-TSC Request
1	1	0	3[*]	y	at-setup

* Should be blank if SDN network routing requires 7 digits.

Centralized Attendant Service

Centralized Attendant Service (CAS) allows attendants in a private network of switching systems to be concentrated at a central or main location. Thus, CAS reduces the number of attendants required at a branch. For example, a chain of department stores can have a centralized attendant location at the main store to handle calls for the branch stores.

Form	Field	Page
System-Parameters Customer-Options	Async. Transfer Mode (ATM) PNC?	5-289
Synchronization Plan	Synchronization Source Synchronization Reference Stratum	
Duplication-Related System Parameters	Enable Operation of PNC Duplication	5-106
Fiber Link Administration		
ATM-PNC	All	
Circuit Packs		
Cabinet		

How to administer CAS

Form	Field	Page
Attendant Console	• Feature Button Assignments — cas-backup -trunk-name	5-38
Console-Parameters	• CAS • RLT Trunk Group Number • CAS Back-Up Ext • Timed Reminder on Hold • Return Call Timeout (sec)	5-90

Station (multi-appearance)	• Feature Button Assignments
	  — cas-backup
	  — flash
	  — trunk name
	  — night serv
		6-30

Trunk Group (RLT)	• All	7-238
Feature Access Code (FAC)	• CAS Remote Hold Access Code	5-120

Detailed description	Each branch in a CAS has its own LDN or other type of access from the public network. Incoming trunk calls to the branch, as well as attendant-seeking voice terminal calls, route to the centralized attendants over release link trunks (RLT).

The CAS attendants are at the main location. The main location can be a DEFINITY ECS, a DEFINITY System Generic 1 or 3, a DEFINITY System Generic 2.1, a System 85, a DIMENSION PBX, or a System 75 (V3).

The CAS main switch operates independently of the CAS branch switches. Operation for CAS main-switch traffic is identical to operation of a stand-alone switch.

Each branch in a CAS network connects to the main by way of RLTs. These trunks provide paths for:

- Sending incoming attendant-seeking trunk calls at the branch to the main for processing and extending them back to the branch (both parts of a call use the same trunk)

- Returning timed-out waiting and held calls from the branch to the main

- Routing calls from the branch to the main

A branch can connect to only one main.

CAS Queues

Two queues are associated with CAS calls: one at the main and one at the branch. If idle RLTs are available from the branch to the main, RLTs are seized and CAS calls are queued at the main along with other attendant-seeking calls. If all RLTs are in use, CAS calls to the attendant are queued at the branch in a RLT queue. The length of the queue can vary from 1 to 100, as set during administration of the RLT group.

CAS Backup Service

Backup service sends all CAS calls to a backup extension in the branch if all RLTs are maintenance-busy or out of service, or if the attendant presses a backup button that is not lighted.

- To activate the feature and provide notification that backup service is in effect, assign the backup extension to a Backup button and associated status lamp.

- The status lamp remains lighted as long as backup service is in effect.

- To deactivate the feature, the attendant presses the Backup button while the status lamp is lighted.

Calls are not sent to the backup extension unless all RLTs are maintenance-busy or out of service.

CAS Remote Hold

The attendant can put a CAS call from a branch on Remote Hold. The branch holds the call and drops the RLT. After a time-out (same as the timed reminder for an attendant-held call), the branch automatically attempts to route the call back to the attendant. The returning call can queue for the RLT. Attendants should use Remote Hold when they have to put a call on hold to keep RLTs from being tied up unnecessarily.

Branch-generated call-identification tones

The branch in a CAS network generates call-identification tones and transmits them to the CAS attendant by way of the RLT. These tones indicate the type of call coming from the branch or the status of a call extended to or held at the branch. The attendant hears these tones in the console handset before being connected to the caller. The tones may vary by country. See *DEFINITY ECS Console Operations* for information on these tones.

CAS Outgoing Call Routing

The centralized attendant at the main has access, through RLTs, to all outgoing trunk facilities at the branches in a CAS network. The attendant can extend an incoming LDN call to an outgoing trunk at a branch by dialing the access code and allowing the caller to dial the rest of the number or by dialing the complete outgoing number.

CAS Incoming Call Routing

Calls extended to busy single-line voice terminals at the branch wait automatically. If there is a call in queue, the user hears a busy signal. When station hunting and send all calls is administered, the call routes along the administered path. Not answering any waiting extended call within an administered interval causes the branch switch to return the call to the attendant. Call Waiting does not apply to multiappearance terminals; if no appearances are available, busy tone is sent to the attendant, who tells the caller that the line is busy.

Calls from voice terminals at the branch to an attendant also route over RLTs seized by the branch switch. A branch caller reaches the attendant by dialing the attendant-group access code. The access code is administrable; the default is **0**. The conversation between the branch caller and the attendant ties up the seized RLT, but calls of this type are usually short.

If an extended call returns to the main attendant unanswered, the called party at the branch does not drop but continues to be alerted until the caller releases. This allows the attendant to talk to the caller, then extend the call again, if the caller wishes, without redialing the number.

Considerations   **Branch Attendants**

- A branch can have an attendant. Access to the branch attendant must be by way of an individual attendant extension. Incoming trunk calls in a CAS network can bypass branch attendants but can be routed back to them by the centralized attendant.

- Branch calls terminate on the CAS main switch based on the incoming RLT trunk-group day-destination or night-service destination. An attendant console is not always answering or extending incoming CAS calls. If someone other than an attendant answers a CAS call, that person can extend the call back to the branch by pressing the FLASH button on a multiappearance voice terminal or flashing the switchhook on a single-line voice terminal. The branch reaction to Flash Signals and the branch application of tones is the same whether an attendant or someone other than an attendant answers or extends the call.

- When an analog-station call goes to coverage, the station drops from the call. This is the exception to the branch leaving the extended-to party ringing. If the main attendant extends a call to an analog station and that call goes to coverage and later returns to the main attendant, the call is treated as an incoming LDN call and the attendant must re-extend the call, if requested by the user.

- On an incoming CAS call to the main attendant, the Name field from the trunk-group form for that RLT displays to the attendant. Therefore, you should administer the field to provide meaningful branch identification information.

- Music-on-Hold feature at branch applies to two stages of LDN calls: during call extension and Remote Hold.

Interactions
- Abbreviated Dialing

  The main attendant can use an Abbreviated Dialing button to extend CAS calls after obtaining branch dial tone.

- Attendant Auto-Manual Splitting

  The SPLIT lamp and button do not function on CAS main calls extended via the RLT trunk. Attendant conference does not function on CAS calls.

- Attendant Control of Trunk-Group Access

  If a branch attendant has control of an outgoing RLT trunk group, new attendant-seeking calls route to the branch attendant.

- Attendant Override of Diversion

  Use Attendant Override of Diversion with CAS.

- Attendant Serial Calling

  Attendant Serial Calling does not work for CAS calls.

- Automatic Alternate Routing and Automatic Route Selection

  CAS calls can be routed using AAR and ARS.

- Busy-Indicator Buttons

  Busy indicators can identify incoming calls over an RLT. You can also use Busy indicators to dial after the attendant starts to extend a call.

- Call Coverage

  Redirect calls to a centralized attendant by Call Coverage. Do not redirect calls to a CAS backup extension for backup service via Send All Calls to the backup extension's coverage path.

- Call Detail Recording

  If the CAS main RLT trunk has the CDR option selected, CDR records generate for incoming CAS calls.

- Call Forwarding

  Do not forward calls to a CAS extension.

- DCS Operation

  If an RLT trunk group is administered as a DCS trunk, the following interaction applies: On an incoming CAS call to the attendant, the DCS message displays instead of the name of the incoming RLT trunk group. Upon answering the call, the attendant hears call-identification tones, indicating that the call is a CAS call. Use a TRUNK-NAME button to obtain the name of the RLT trunk group.

- DXS and DTGS Buttons

  DXS and DTGS buttons at the main attendant console can be used with CAS. However, with DXS buttons, it takes a few seconds before the attendant hears ringback tone.

- Emergency Access to the Attendant

  CAS Branch Emergency Access calls generated by a Feature Access Code route Off-Hook Alert to the branch attendant group. If there is no attendant in the branch, the call routes to the branch's administered Emergency Access Redirection Extension. When the branch switch is in CAS Backup Service, the calls route to the backup station and the call is treated as a normal call.

- Hunt Groups

  If an incoming CAS call directs to a hunt group, the call does not redirect to the hunt group's coverage path. Depending on the circumstances, the attendant can get a busy tone or ringing.

- Leave Word Calling

  If a message is left for a branch user and the attendant at the CAS switch tries to retrieve the message by using LWC message retrieval, permission is denied.

- Night Service — Night Console Service

  When the CAS main enters night service, CAS calls terminate at the CAS main night-service destination. When the branch enters Night Service, CAS calls route to the branch night console, the LDN night station, or the TAAS.

- Night Service — Trunk Answer from Any Station

  In a multiswitch DCS environment with CAS, the result of transferring incoming trunk calls via Night Service Extension or Trunk Answer from Any Station varies depending on the home switch of the transferred-to station, the home switch of the connected trunk, and the type of night-service function chosen (Night Service Extension, Trunk Answer From Any Station, or both).

- Nonattendant Console Handling of CAS Calls

  The CAS branch calls terminate at the CAS main based on the incoming RLT trunk-group day destination or night-service destination. You can also answer a CAS call by the Trunk Answer Any Station feature.

Emergency (911) Calls

The Enhanced 911 (E911) systems installed in many jurisdictions in the U.S. are equipped so that by dialing a service code (911 in the U.S.) a victim of a fire, accident, crime, or medical emergency may quickly access a public safety agency that will dispatch the appropriate response. The public E911 system maintains a database that stores location and background information to aid public safety agencies in responding quickly with the appropriate assistance. Information about the calling party can be triggered by the transmission of a Caller's Emergency Service Identification (CESID) number over Centralized Automatic Message Accounting (CAMA) trunks when the call originates from behind a PBX. 911 calls from a station on a PBX not equipped with CAMA trunks (or an adjunct computer system associated with CAMA trunks) will not provide the E911 system with the information required to identify the location of the person placing the call. Instead, the E911 system will only be able to identify the location of the trunk termination at the PBX.

This feature allows transmission of identifying information in the form of the CESID over CAMA trunks as to the extension number of a DID station associated with the calling party. The calling party may be at or near a station on a remote port network, or may be at a remote location served by an off-premises station.

How to administer Emergency (911) Calls

Form	Field
ARS Digit Analysis Table	• All
CAMA Numbering Format	• All
Class of Restriction	• Calling Party Restriction
Feature Access Code	• ARS Access Code1
	• ARS Access Code2
Route Pattern	• All
Trunk Group (CAMA)	• All

Interactions   None.

Extended Trunk Access

Use Extended Trunk Access (ETA) in conjunction with Uniform Dial Plan (UDP) to allow DEFINITY ECS to send any unrecognized number (such as an extension not administered locally) to another switch for analysis and routing. Such unrecognized numbers can be Facility Access Codes, Trunk Access Codes, or extensions that are not in the UDP table. Non-UDP numbers are administered on either the First Digit Table (on the Dial Plan Record form) or the Second Digit Table. They also are not administered on the ETA Call Screening Table. ETA helps you make full use of automatic routing and UDP.

How to administer ETA

Form	Field
Dial Plan Record (First Digit and Second Digit Tables)	• ETA Routing Pattern • ETA Node Number
ETA Call Screening Table	• Call Screening Entry

⚠ CAUTION:

Switches can be chained together using ETA. However, you must ensure that switches do not route in a circular ETA call setup. Switch A can route to switch B, and switch B can route to switch C. But, if switch A routes to switch B and switch B routes to switch A, you create a circular ETA call setup.

Detailed description

Historically, ETA has been used by satellite switches to access stations, trunks, and features at the main switch. ETA frees you from having to enumerate the entire dial plan for the main or satellite complex. Calls that would get intercept treatment without ETA are routed to a remote switch to be reprocessed. The following processing takes place when ETA is administered:

- ETA call is identified because it fails all other routing possibilities.
- The dialed string is not in the ETA Call Screening Table.
- An available route pattern is selected based on the Dial Plan form ETA Routing Pattern or ETA Node Number entries.
- The dialed string is sent to the remote switch.

Examples of ETA administration

CASE #1

- ETA Route Pattern — Not administered
- ETA Node Number — Not administered

In this case, ETA is not active. It is not used to route undefined dialed strings.

CASE #2

- ETA Route Pattern — Administered
- ETA Node Number — Not administered

In this case, the ETA Route Pattern routes undefined dialed strings. However, since an ETA Node Number is not specified, non-call-related DCS messages are not routed.

CASE #3

- ETA Route Pattern — Not administered

- ETA Node Number — Administered

In this case, the ETA Node Number provides the route pattern. Non-call-related DCS messages also can route since a node number is supplied.

CASE #4

- ETA Route Pattern — Administered

- ETA Node Number — Administered

In this case, the ETA Route Pattern routes undefined dialed strings while the ETA Node Number routes DCS messages. Nodes themselves do not have to be administered for ETA. ETA should not be used over tandem-tie trunks.

Interactions

- Abbreviated Dialing

  Abbreviated Dialing calls are routed via ETA.

- Attendant

  Attendants calls are routed via ETA.

- Data-Call Setup

  Analog and digital endpoints can access ETA. The digit string goes to the remote switch like any other digit string is sent. The remote switch handles the data-call setup from that point forward.

- Facility Restriction Levels

  It is possible to restrict trunks that are being used in conjunction with ETA by assigning FRLs.

- Last Number Dialed

  If a number is routed via ETA to a remote switch and you want to reaccess that number, then reaccess uses ETA.

- Modem Pooling

  Modems in Modem Pools are treated like all other trunks.

- Remote Access

  Remote-access trunks are able to access the ETA feature just as any other trunk or station does.

Extension Number Portability

Extension Number Portability (ENP) gives you the ability to assign any extension to any switch in an ENP subnetwork. Stations can be moved across switches while retaining the original extension number, as long as the switches are part of the ENP subnetwork. EPN is used in conjunction with Automatic Alternate Routing (AAR) and Uniform Dial Plan (UDP).

How to administer ENP

Form	Field
AAR and ARS Digit Conversion Table	• All
Extension Number Portability Numbering Plan	• All
Node Number Routing	• All
Uniform Dialing Plan	• Ext Code

- *AAR Digit Conversion form* — Assign all 3-digit ENP codes as home, and if using a 5-digit UDP, associate the ENP codes with the leading, or 10 thousands, digit (that is, the fifth digit of the extension). For example, for extension number 73446, "7" is the 10 thousands digit.

- *ENP Numbering Plan form* — Associate the leading one or two digits of extensions in the ENP subnetwork with a 3-digit ENP code, used to construct a 7-digit AAR-like ENP number.

- *Node Number Routing form* — Associate a route pattern with each node in the ENP subnetwork.

- *Uniform Dialing Plan for*m — Enter the number of digits in the plan (4 or 5) and the Extension Codes for non-home extensions in the ENP subnetwork as ENPNode (node number routed).

Detailed description   The ENP Numbering Plan allows you to set 4- or 5-digit extensions in the ENP subnetwork to a 7-digit AAR-like number that is sent to other nodes in the network. Only the first 1 or 2 leading digits of the extension are significant.

ENP Codes are distinguished from AAR location codes because ENP Codes are home on every node within the ENP subnetwork, and ENP Codes are administered in the ENP Numbering Plan table as well as in the AAR Analysis table. Since ENP Codes are home on every node, they cannot be used as AAR location codes.

UDP extensions are converted to ENP numbers if node number routing is specified for the extensions in the UDP table.

Note: One ENP code is required for a 4-digit ENP subnetwork. A 5-digit UDP requires one ENP code for each leading digit of extensions used within the ENP subnetwork.

DCS message signaling links are not required to support ENP. As a result, many multiple switch configurations are possible with ENP. Typically the ENP network will be a subnetwork of a UDP or Electronic Tandem Network (ETN).

Interactions   • Distributed Communications System

 If you use DCS, the ENP node numbers must correspond to DCS node numbers.

Inter-PBX Attendant Service

Inter-PBX Attendant Service (IAS) allows attendants for multiple branches to be concentrated at a main location. Incoming trunk calls to the branch, as well as attendant-seeking voice-terminal calls, route over tie trunks to the main location.

How to administer Inter-PBX Attendant Service

Form	Field
Tie Trunk Group (Main)	• Incoming Destination
Console Parameters (Branch)	• IAS (Branch)
	• IAS Tie Trunk Group No.
	• IAS Att. Access Code
Tie trunk group (Branch)	• All

Detailed description   Inter-PBX Attendant Service calls are incoming tie-trunk calls from a branch location to the main-location attendant group. If no attendant in the group is immediately available, the calls are queued. When an attendant becomes available, the call routes to that attendant. Extended calls are treated as incoming calls to the main location.

DEFINITY ECS can be a branch or main location. Users at each branch can access other branch locations through the main location. A branch can have local attendants. Users access these local attendants normally.

Interactions   • Attendant Control of Trunk-Group Access

 If a call at a branch attempts to access a controlled trunk group, the call routes to a branch attendant, if there is one. If there is no branch attendant, the call routes to the attendant group at the main location.

• Attendant Display and DCS Attendant Display

 In a DCS environment, an incoming call from a branch displays at the attendant console at the main location as a local call.

 In a non-DCS environment, an incoming call displays at the attendant console at the main location as an incoming tie-trunk call.

• Attendant Recall

 If an attendant at the main location holds a call, the calling parties at the branch cannot recall the attendant.

• Call Coverage

 A call redirected to a coverage path with the attendant group as a coverage point skips that coverage point. It goes to the next coverage point at the branch, if administered, or continues to ring at the previous coverage point. If the attendant group 0 is the only coverage point, it continues to ring at the principal's extension.

- Centralized Attendant Service

   CAS and Inter-PBX attendant calling cannot be used at the same time.

- Dial Access to Attendant

   Administer Dial Access to Attendant via the dial platform to the same digit on both the IAS main switch and the IAS branch switch. On the branch switch, administer the PBX attendant access code (Console Parameters form) to match the main PBX attendant-group dial access code.

- Night Service

   Inter-PBX Attendant Calls deactivates when a branch goes into night service, and reactivates when the branch comes out of night service.

Private Network Access

Use Private Network Access to allow calls to other switching systems in a private network. These calls do not use the public network. They are routed over customer-dedicated facilities.

How to administer Private Network Access

Form	Field

Trunk Groups
 	
  Access
  APLT
  ISDN-BRI
  ISDN-PRI
  Tandem
	• All

Class of Restriction	• Advanced Private Line Termination
Feature Access Code (FAC)	• Automatic Alternate Routing Access Code
AAR and ARS Digit Analysis Table	• All
AAR and ARS Digit Conversion Table	• All
Node Number Routing	• All
Station	• COR

- Trunk Group Forms — Set the **Group Type** field to **access**, **aplt**, **tandem**, **tie**, or **isdn** and the **Service Type** field to **access**, **tie**, or **tandem**. Complete COR digit treatment and common type fields for tie trunk groups associated with a private network.

Detailed description   Private networks can include:

- Common-control switching arrangement (CCSA)

- Distributed Communications Systems (DCS) and Enhanced DCS (EDCS)

- Electronic tandem network (ETN)

- Enhanced private-switched communications service (EPSCS)

- Tandem-tie-trunk network (TTTN)

- Italian Traslatore Giunzione Uscente/Entrante/Interno (TGU/TGE/TGI) trunks

Unless prohibited by the COR, all incoming private network trunks, except CCSA, can access outgoing trunks without attendant or terminal-user assistance. All incoming CCSA calls must route to an attendant or a terminal user.

When off-network calling is part of the CCSA and EPSCS, long-distance calls route as far as possible over these networks before terminating on the public network. Thus, charges for toll calls are reduced. The COR you administer to individual system users determines whether access to this capability is allowed or denied.

In Italy, TGU/TGE/TGI trunks provide private network access between 2 switching systems. They also provide some feature transparency for COR (Inward Restriction), DID (when reaching busy stations), and Intrusion.

Interactions   - Attendant Call Waiting

    Call Waiting is provided via Italian TGU/TGE (main and satellite) trunks. Call Waiting also is provided in Italy and all other countries through DCS.

- Attendant Intrusion

    Attendant Intrusion is provided on satellite switches via TGU/TGE trunks. Attendant Intrusion also is provided through DCS.

Uniform Dial Plan

Uniform Dial Plan (UDP) provides a common 4- or 5-digit dial plan (specified in the Dial Plan Record) that can be shared among a group of switches. Interswitch dialing and intraswitch dialing both require 4- or 5-digit dialing. UDP is used with an electronic tandem network (ETN); main, satellite, and tributary switches; and Distributed Communications Systems (DCS). In addition, UDP can provide uniform 4- or 5-digit dialing between 2 or more private-switching systems without ETN, main, satellite, and tributary switches, or DCS.

How to administer UDP

Form	Field
Dial Plan Record Second Digit Table	• Uniform Dial Plan • UDP Extension Search Order
Uniform Dial Plan	• All
AAR and ARS Digit Analysis Table	• All
AAR and ARS Digit Conversion Table	• All
Node Number Routing	• Route Pat
Extension Number Portability Numbering Plan	• All
Route Pattern	• All

Note: On the Uniform Dialing Plan form, if you change the **Ext Code** and **Type** fields from a 4-digit or 5-digit extension number to **none**, a warning message informs you that all UDP extension codes will be lost. The same warning message displays when you change the **Ext Code** and **Type** extension numbers from 4-digits to 5-digits or from 5-digits to 4-digits.

Detailed description   UDP routes calls off the local switch by converting the extension number into a private-network number with 7 digits. This number is formed by prepending a 3-digit code (of the form XXX) to the (last) 4 digits of the extension number. 3 types of conversion are supported: UDPCode, AARCode, and ENPNode.

• For UDPCode and AARCode, XXX is a 3-digit private-network location code, and the result is analyzed and routed via Automatic Alternate Routing (AAR). UDPCode conversion prohibits digit conversion via AAR; AARCode conversion permits it, just as if you dialed the AAR number instead of the extension.

• For ENPCode, XXX is called an Extension Number Portability (ENP) code. It is not used for routing; node-number routing is used instead. The ENP code is chosen based on the first 1 or 2 digits of the dialed string. Because it is not used for routing, the ENPCode can be independent of location.

UDP conversion is specified for individual extensions or groups of extensions sharing the same leading digits, via the UDP form and extension codes. An extension code is the desired leading digits of an extension followed by an "x" (wildcard). For example, "123xx" "12345"is the extension code for all 100 possible extensions beginning with "123" plus two wild cards. "12345" is an extension code specifying one extension.

Each extension code can be assigned to 1 of 6 possible treatments.

- UDPCode — Conversion to AAR with given location code, further conversion suppressed

- AARCode — Conversion to AAR with given location code, further conversion allowed

- ENPCode — Conversion to private network number (via ENP form), route to given node number routing

- TempOOS — Temporarily out of service, give reorder

- Local — Local range of extensions

- blank — Similar to local, however, this extension is not chosen when the system is asked to "add a station"

When a user at a switch that is included in a UDP dials an extension, DEFINITY ECS first checks to see if the extension is assigned to a local station on that switch. If so, the call is routed to the station, and UDP is not invoked. If the extension is not found locally, the system checks to see if the extension matches an assigned extension code. If the extension matches an assigned extension code, the system performs the specified conversion into a private network number and routes the call as specified. If more than one extension code matches, the "best" match (most explicit digits) is used. For example, 1234x is chosen over 123xx if 12345 is dialed. However, 123xx is chosen if 12355 is dialed. If no matching extension code is found, the user receives intercept treatment. Or, if Extended Trunk Access (ETA) is enabled, the call routes via ETA.

Example of how UDP works

To administer, assign each UDP code:

- To a private network location code (RNX) or node number. (The RNX is equivalent to an office code of a central office in a public network. This RNX determines how a UDP call is routed.)

- Assign each UDP code as either local or remote to the switch.

To understand the function of a UDP, review the following example.

A given station is called using the same 5-digit extension regardless of where in the ETN the call originates. Three switches are included in the example. Each has been assigned a list of RNX and UDP codes. See Figure 7.

SWITCH	RNX	UDP CODE
A	224	41
C	223	51
C	223	52
B	222	60
B	222	61

Figure 7.   UDP Example

r764905 CJL 062296

1. **Switch A**
   Dial Plan for extensions is
   41XXX
   RNX=224

2. **Switch B:**
   Dial Plan for Extensions is
   60XXX   and 61XXX RNX=222

3. **Switch C:**
   Dial Plan for extensions is
   51XXX   and 52XXX RNX=223

4. **Extension 41000**

5. **Extension 61234**

6. **Extension 60123**

7. **Extension 51234**

8. **Extension 5200**

If a user at extension 41000 wants to call extension 61234, there are two choices:

- Dial 61234

- Dial the AAR access code followed by 222-1234

If 61234 is dialed, the system recognizes 61 as a remote UDP, determines the associated RNX (222), and uses AAR to route the call to 222-1234.

If the AAR access code and 222-1234 are dialed, the system finds the route pattern for RNX 222 and routes the call to the switch associated with that RNX.

Whenever UDP is used to route a call to another switch, the correct digit deletion and insertion must be specified within the route pattern so that the receiving switch gets digits in the format it expects. DEFINITY ECS can be configured in several different ways.

- If AAR is available on the receiving switch, Subnet Trunking can be used to insert the AAR feature access code on the originating switch or digit insertion may be used to insert it on the receiving switch. The receiving switch then uses AAR digit conversion to convert 222 with 7 digits to an extension by deleting 3 digits and inserting a 6.

- If AAR is not available on the receiving switch, Subnet Trunking must be used on the originating switch to delete the 222 and insert the digit 6 at the beginning of the extension number so that the receiving switch can continue to route correctly.

If the user at extension 51234 on Switch C dials extension 61234, the call must first go through Switch A before proceeding to Switch B. When 61234 is dialed, the system recognizes 61 as a UDP code, determines the associated RNX (222), and uses AAR to route the call. The AAR feature access code plus 222-1234 are outpulsed to Switch A. Switch A then recognizes the RNX 222 as a remote switch and routes the call to Switch B and extension 61234. This same type of call routing occurs when an extension at Switch B calls an extension at Switch C.

If extension 61234 on Switch B calls extension 61235, the system recognizes 61 as a local UDP code and routes the call directly to extension 61235.

Considerations
- In North American network environments, extensions beginning with 0 may route to an attendant. You are encouraged to use another number as the leading digit when assigning extensions.

- When you call an extension on another switch, there may be a slight delay before call-progress tones are applied. This delay is due to the trunk signaling necessary to complete the call to the remote switch.

- When you select the option to look at the UDP table first, calls that might otherwise terminate at a local extension route over the network. This is easily reversed. When you remove the extensions from the UDP table, the local extension can be dialed again.

- If AAR is active, FRLs and Traveling Class Marks (TCMs) can be sent along with the private network number. UDPCode and AARCode conversions use the FRL assigned to the caller. ENPNode conversion always raises the FRL to the maximum (7).

  If an FRL is insufficient to access the facility, access is denied. There is no prompt for an authorization code even if authorization codes are enabled and administered.

- If AAR is not active, tandem-tie trunks should not be used to transport UDP numbers. The TCM is not recognized at the terminating switch.

  Note: Never use tandem-tie trunks to transport UDP numbers (the TCM and Hop count will not be recognized as such following the extension received at the receiving switch).

Interactions
- Automatic Alternate Routing

  AAR routes UDP calls. (Included with UDP is the required AAR subset.) If AAR is enabled in addition to UDP, then the 7-digit AAR number provides the same routing as UDP.

- Dial Plan
  - All of the extension numbers on a switch are not necessarily part of UDP. Any that do not belong to UDP are handled by a regular, non-UDP Dial Plan associated with the switch.
  - When administering the Dial Plan form and designating a group of extensions as UDP non-local, you can specify whether you want to search for local extensions first or last. This allows flexibility to change extensions from local to non-local and vice-versa.

- DID Trunk Group

  DID calls to 5-digit UDP extension numbers require that the DID trunk group insert enough digits to make a 5-digit extension number.

- Distributed Communications System

  UDP is required when DCS is provided. The necessary UDP software is provided with the DCS software.

- Extension Number Portability

  If an extension code is administered to use ENP node routing, ENP routes the call to the correct switch. If AAR is enabled in addition to UDP, the 7-digit AAR number provides the same routing as UDP (that is, via ENP).

ISDN Feature Plus

This feature allows you to have basic feature transparency over public networks without having a dedicated leased line. This provides a lower cost option for using the switched public network.

How to administer ISDN Feature Plus

> **Note:**   Only Lucent representatives perform step 1.

1 On the System-Parameters Customer-Options form, set the:

   ~ **G3 Version** field to **V8**.
   ~ **ISDN Feature Plus** field to **y**.

2 On the same form, set either or both of the following:

   ~ **ISDN-PRI** field to **y**, or
   ~ **ISDN-BRI Trunks** field to **y**.

3 Set either or both of the following:

   ~ ISDN-BRI Trunk Group — Set the **Supplementary Service Protocol** field to **f**
   ~ ISDN-PRI Trunk Group — Set the **Supplementary Service Protocol** field to **f**.

4 On the Feature Related System Parameters form, set the **Feature Plus Ext** field to the local extension used to terminate Feature Plus signaling for ISDN Feature Plus.

5 On the Hunt Group form, to add a centralized AUDIX, set the **Message Center** field to **fp-mwi**.

To start administration for Message Waiting Indication at the Message Center PBX:

1 On the Feature Related System Parameters form, set the **MWI - Number of Digits per AUDIX Subscriber** field to the desired number.

2 On the Processor Channel Assignment, set the **Application** field to **fp-mwi**.

3 Administer the Message Waiting Indication Subscriber Number Prefixes form. To start the Calling Name feature:

4 On the ISDN-BRI or ISDN-PRI trunk group form (whichever you are using), set the **Send Name** field to **y**.

Description

ISDN Feature Plus uses a DEFINITY ECS proprietary signaling protocol. The features do not function in the same way as their QSIG or DCS counterparts.

To use Feature Plus, Phase I, you need DID extensions. In addition to the general Feature Plus call handling, Feature Plus includes the following features:

- Centralized AUDIX — A simple, one step "coverage" to voice mail. If voice mail is unavailable for any reason, the call does not cover elsewhere.

- Call Diversion — You can divert (or forward) calls unconditionally, upon busy or no reply, to another extension including forwarding voice mail.

- Calling Number ID — You can display the calling party's number to the called party during alerting and after answer.

- Calling Name — You can assign the Calling Name Feature Plus identifier with a maximum size of 15 bytes or the maximum network subaddress size, whichever is lower.

- Connected Line Identification Presentation (COLP) — You can assign display forwarded-to party information to the calling user's display.

- Call Transfer - Basic — You can assign transfer calls between parties across the public network is supported. Display updates at the time of transfer or upon completion of transfer, however, are not supported.

- Served User PBX for Centralized AUDIX — Determines where to send messages destined for the AUDIX hunt group.

- Message Waiting Indication — You can assign display a message waiting indication on a user's voice terminal.

Differences in Inserted Digits field

There is a difference in how the **Inserted Digits to form Complete Number** field on the Message Waiting Indication Subscriber Number Prefixes form is used for QSIG and Feature Plus. This difference is due to the difference in how the Feature Plus and QSIG-TSC platforms operate.

For Feature Plus, the Feature Plus extension must be included in the **Inserted Digits to form Complete Number** field, while for QSIG, only the higher order digits need to be included. (In QSIG MWI, the subscriber number is appended to the inserted digits and the resulting number is used to route over a QSIG TSC.) For example, Dallas is a Message Center PBX and Chicago is a remote PBX:

- If Feature Plus is running between Dallas and Chicago and the Feature Plus extension in Chicago is 82000, the **Inserted Digits to form Complete Number** field administered in Dallas to get to Chicago must be 3035382000. The **Routing Digits (AAR/ARS Access Code)** field also needs to be filled in appropriately.

- If QSIG is running between Chicago and Dallas, the **Inserted Digits to form Complete Number** field must contain 30353. The **Routing Digits (AAR/ARS Access Code)** field also must be filled in appropriately.)

Interrogation

When performing an audit, the Served User PBX sends a request towards the Message Center PBX. As a Message Center PBX, the DEFINITY ECS receives the request message, maps it into a MW STATUS REQUEST - SINGLE STATION message, and sends it to AUDIX on the BX.25 link. When AUDIX replies to the DEFINITY on the BX.25 link with a MW STATUS UPDATE, the Message Center PBX sends the information on to the appropriate Served User PBX.

- If it is a Message Center PBX, the MW STATUS UPDATE indicates whether there are any messages waiting, not how many messages are waiting or what media types are these messages. If the MW STATUS UPDATE indicates that there are new messages, then the Message Center PBX sends a message telling the Served User PBX to activate the message waiting indication. Similarly, if the MW STATUS UPDATE indicates that there are no new messages, then the Message Center PBX sends a message telling the Served User PBX to deactivate the message waiting indication.

- If it is a Served User PBX, when the Served User PBX receives the result, it makes sure that the result received from the Message Center matches the state of the Served User's light.

Interactions

- Automatic Circuit Assurance

  Automatic Circuit Assurance (including Referrals) is not activated for calls terminating at the Feature Plus extension.

- Distributed Communication System (DCS)

  Feature Plus signaling links do not support DCS.

- Feature Plus Centralized AUDIX
  - ~ Calling Line Identification Presentation (CLIP)

    If the public network supports CLIP and the called user has subscribed to the service, calling party information is available to the called user when messages are retrieved.

  - ~ Feature Plus Diversion

    Feature Plus Centralized AUDIX relies upon Feature Plus Diversion. When a call covers to AUDIX, it must invoke Feature Plus Diversion to identify the called party to AUDIX.

  - ~ Feature Plus Message Waiting

    When a calling party leaves a message using Feature Plus Centralized AUDIX, Feature Plus Message Waiting engages and turns on that subscriber's message waiting indicator.

- Feature Plus Forwarding (Diversion)

  - Calling Line Identification Presentation (CLIP)

    If the public network supports CLIP and the forwarded-to user has subscribed to the service, then calling party information is available to the forwarded-to user's display.

  - Connection Line Identification Presentation (COLP)

    If the public network supports COLP and the calling user has subscribed to the service, then forwarded-to party information is available to the calling user's display.

  - Feature Plus Centralized AUDIX

    Feature Plus Centralized AUDIX relies upon Feature Plus Diversion. Invoke Feature Plus Diversion first to enable the Centralized AUDIX feature.

  - Call Coverage

    - Terminating call has coverage active

      If a call is forwarded off-switch, and the terminating switch has call coverage activated and the criteria is met, the call will not go to the forwarding coverage path. It goes to the terminating coverage path.

    - Forwarding and Coverage

      If the last coverage point in the coverage path is a number that routes over an ISDN SSF trunk, no Feature Plus Diversion information passes to the coverage PBX.

  - Automatic Callback

    If automatic callback was activated before the called voice terminal user activated Call Forwarding over an ISDN SSF trunk, the callback call attempt is redirected to the forwarded-to party over the SSF trunk.

  - Call Park

    If a forwarded-to (diverted-to) extension user parks a call that has been forwarded from an ISDN SSF trunk, the call normally is parked on the forwarded-to extension, not on the forwarded-from (called user) of the ISDN SSF trunk.

- Feature Plus Message Waiting Indication
  - ~ Audio Information Exchange (AUDIX)

    Feature Plus MWI depends on the presence of a Message Center. Whenever DEFINITY ECS acts as a Message Center switch, there is an interaction between DEFINITY ECS and AUDIX. DEFINITY ECS must be able to receive messages from AUDIX then, if applicable, send the appropriate Feature Plus MWI message to the network. Similarly, if DEFINITY ECS receives a Feature Plus MWI message, DEFINITY ECS translates the Feature Plus message into the appropriate AUDIX message and passes it to AUDIX.

    The only messages that DEFINITY ECS handles are AUDIX messages along the BX.25 link. Feature Plus MWI can interwork with Basic AUDIX, including INTUITY AUDIX, and with DEFINITY AUDIX with the DCIU control link. Feature Plus MWI does not work with the DEFINITY AUDIX that emulates a DCP voice terminal or with versions of AUDIX that communicate to DEFINITY ECS mode codes.

    DEFINITY ECS implementation requires that all users on a Served User PBX use the same Feature Plus Message Center. Some of the served users can use a Feature Plus Message Center, while others use a local message center and/or a DCS Remote Message Center and/or a QSIG Message Center. However, some served users on a PBX cannot use one Feature Plus Message Center while other served users on the same PBX use a different Feature Plus Message Center.

  - ~ Off-Premise Station

    Feature Plus MWI does not work with an off-premise station implemented with a DS1 circuit pack.

- QSIG

  Feature Plus signaling links do not support QSIG.

QSIG

QSIG is the generic name for a family of signaling protocols. The Q reference point or interface is the logical point where signaling is passed between two switches in a private network. QSIG signaling allows certain features to work in a single-vendor or multi-vendor network. QSIG complies with the International Organization for Standardization (ISO) Integrated Services Digital Network (ISDN) private-networking specifications. QSIG is defined by ISO as the worldwide standard for private networks. QSIG uses ISO standard protocols as well as call independent signaling connections (CISCs), administered as non-call-associated temporary signal (NCA-TSCs).

DEFINITY ECS provides six levels of QSIG functionality (each level is turned on or off on page 6 of the Customer Options screen):

QSIG Category	Supported Features
Basic Call Setup	• Basic Call Setup • Number Transport
Basic Supplementary Services	• Called/Busy Name • Name Identification Services • Call Forwarding (Diversion) • Call Transfer • Centralized AUDIX • Call Offer • Call Completion (Automatic Callback)
Centralized Attendant	• Centralized Attendant Service (CAS).
Supplementary Services with Rerouting	• Call Forwarding (Diversion) with Reroute (using Path Replacement) • Call Transfer with Reroute (using Path Replacement)
Transfer into Lucent QSIG Voice Mail	• Call Transfer into QSIG Voice Mail
Value-Added Lucent (VALU)	• Displays of called party number to the calling party when the called number is ringing or busy (Called/Busy Number) • Distinctive Ringing to identify internal/external and priority calls • Call Coverage to networked switches.

QSIG Basic Call Setup

Transit Counter (ANF–TC)   DEFINITY ECS provides QSIG ANF-TC as defined in ISO/IEC 6B032 and 6B033. It prevents indefinite looping, connections giving poor transmission performance, and inefficient use of network resources.

ANF-TC is invoked automatically for ISDN basic calls and the Route Pattern form indicates the number of switches through which a call may be routed.

QSIG Basic Supplementary Services

Called/Busy Name   Enables the calling party to see the name of the called party at the following times:

- while the call is ringing at the called party's terminal.

- while listening to a busy tone because the called party's terminal was busy.

Called/Busy Name is similar to the display provided for local on-switch calls, as well as for the DCS calls, with the following exceptions:

- Names longer than 15 characters are truncated; only the first 15 characters display.

- The number does not display unless QSIG VALU is enabled.

QSIG Name and Number Identification   QSIG Name and Number Identification allows a switch to send and receive the calling number, calling name, connected number, and connected name. QSIG Name and Number Identification displays up to 15 characters for the calling and connected name and up to 15 digits for the calling and connected number across ISDN interfaces.

You can administer outgoing calls as "yes", "no", or "restricted." Restricted means that DEFINITY ECS sends the information but sends it "presentation restricted," which indicates to the receiving switch that the information should not be displayed. A received restricted number is included on the Call Detail Record (CDR).

Transit switch information

When DEFINITY ECS acts as a transit switch, the QSIG standards require it to pass on all supplementary service information that is not addressed to it. This includes name information. (A "transit" switch is a switch that routes an incoming call administered for Supplementary Services Protocol Bto a trunk also administered for Supplementary Services Protocol B.) However, Basic Call Setup and number information is subject to modification by the transit switch. This means that trunk group administration on a transit switch does not override incoming name information, but may override incoming number information (as long as this does not lower the restriction on the information).

Example

If a non-restricted calling name and number are received by a DEFINITY ECS acting as a transit switch, and if the outgoing trunk is administered for presentation restricted for both name and number, the number is passed on as "restricted" and name is passed on as "unrestricted."

Tandem switch information

However, in the case of tandemed calls (calls involving two ISDN trunks that are not both administered for Supplementary Service Protocol B), trunk group administration may override both incoming name and number information, as long as doing so does not lower the restriction on the information. For example, a tandemed call that comes in with restricted name information is sent out with restricted name information even if the outgoing trunk is administered for presentation unrestricted. However, non-restricted data is sent restricted if the trunk group administration is set for "presentation restricted."

ISDN numbering formats

Numbering is specified on the ISDN Public-Unknown-Numbering and/or ISDN Private-Numbering forms. The numbering form you use depends on how you administer the ISDN trunk group Numbering Format field.

However, if you format the Called Party Number with public numbering, the Calling/Connected Party Number is created in the public format even if you specify "private" on the ISDN trunk group form. This provides the caller or called party a number that can be used to reach the other party. Since the call routes through the public network, the public Calling/Connected Party Number is a more accurate address.

Call Forwarding (Diversion)

Call Forwarding works over a QSIG network.

When a call has already been forwarded 3 times over a QSIG trunk, it is not forwarded again but instead terminates at the final forwarded-to terminal. Remote activation and deactivation of this feature are not supported.

Call Transfer

QSIG Call Transfer is based on the current DEFINITY ECS Transfer and Trunk-to-Trunk Transfer features. QSIG Transfer signaling occurs as long as one of the calls involves a QSIG trunk between the two switches.

Once a call is transferred, the transferring switch is unnecessary. Additional Network Feature-Path Replacement (ANF-PR) is invoked automatically to connect the transferred call more efficiently in the private network. QSIG Call Transfer attempts to connect the two parties more efficiently and drops the unnecessary switches.

When you use this feature, you see no difference between QSIG Call Transfer and the standard DEFINITY ECS Transfer or Trunk-to-Trunk Transfer features.

QSIG Call Transfer differs from DCS Call Transfer in that additional call information is available for the connected parties after the transfer completes.

Depending upon QSIG Identification Services administration, the connected parties' displays show each other's name and/or number. If the name and number are not available, the display of a connected party updates with the name of the involved trunk group.

Call Offer	This feature is the QSIG equivalent of Call Waiting.

A Private Telecommunication Network (PTN) offers up to four ways of invoking QSIG Supplementary Service - Call Offer (SS-CO) (listed below). *DEFINITY ECS uses only the first way.*

- Network invocation (immediate) — the PTN automatically invokes SS-CO whenever the calling user makes a call to a user that is busy, if required by the service profile of the calling user.

- Consultation — the calling user, on being informed that a call has failed because it is busy at the destination and that SS-CO may be possible, is able, within a defined time period (consultation timer), to request invocation of SS-CO.

- Immediate invocation — the calling user is able to request invocation of SS-CO as part of the initial call set-up.

- Network invocation (delayed) — the network, having informed the calling user that a call has failed because it is busy at the destination, invokes SS-CO automatically unless the calling user initiates call clearing within a defined time period (automatic call offer invocation timer).

DEFINITY ECS The effect of QSIG SS-CO on the terminating end is similar to the DCS Call Waiting feature with the exception that for Call Waiting, the calling side (user or PBX) does not have to convey any special message to invoke the feature. The Call Waiting Termination feature is driven based on the terminating user (for instance, single line analog set user with Call Waiting enabled).

For QSIG Call Offer, DEFINITY takes advantage of the additional information available from the far end, if QSIG Call Offer invokes successfully, and provides similar information to the calling user as the Call Waiting feature provides for on internal calls, with the exception that the display update will be "offered" instead of "wait" to reflect invocation of QSIG Call Offer service.

On successful invocation of the QSIG Call Offer service, DEFINITY provides the following:

- To the busy analog set user, the same tone as Call Waiting Termination feature, or

- To the busy Multi call-appearance set (for instance, at least one call-appearance is busy for an active call and at least one call-appearance is available for incoming calls) user, the available appearance rings normally.

For incoming QSIG calls, the QSIG Call Offer service may use path retention which is a generic mechanism to retain the signaling connection so that the originating party can decide whether to invoke the supplementary service. The network connection can be retained for more than one of the supplementary services for which path retention has been invoked.

Call Completion	Use this feature to provide QSIG Supplementary Service - Call Completion (SS-CC).

The Supplementary Service - Completion of Calls to Busy Subscribers (SS-CCBS) and Supplementary Service - Completion of Calls on No Reply (SS-CCNR) are the equivalent QSIG features of Automatic Callback On Busy and Automatic Callback on No Answer, respectively.

An analog voice terminal user activates SS-CCBS or SS-CCNR by pressing the Recall button or flashing the switchhook and then dialing the Automatic Callback (ACB) Activation feature access code. An analog user can activate only one ACB call at any given time.

A multiappearance voice terminal user can activate SS-CCBS or SS-CCNR for the number of ACB buttons assigned to the terminal.

SS-CC Options

QSIG SS-CC has the following major options that are negotiated between the Originating and the Terminating PBX:

1 Path reservation — there are two methods of establishing the CC call:

   a path reservation method
   b non-reservation method

2 Retention of signaling connection — there are two ways in which SS-CC uses call independent signaling connections:

   a connection retention method
   b connection release method

3 Service retention — there are two possible behaviors when User B is found to be busy again after User A responds to SS-CC Recall:

   a service retention method
   b service cancellation method

As an originating PBX for QSIG SS-CC, DEFINITY ECS will select the following major options:

- *non-reservation method* for the Path Retention option

- *connection release method* for the Retention of Signaling connection option

- *service cancellation method* for the Service Retention option

As a Terminating PBX for QSIG SS-CC, DEFINITY ECS will select the following major options:

- *non-reservation method* for the Path Retention option

- either the *connection release method* or the *connection retention method* for the Retention of Signaling connection option depending on which the originating PBX requests.

- *service cancellation method* for the Service Retention option

QSIG Centralized AUDIX

QSIG allows users on a remote node to "cover" to an AUDIX on another node. The original calling and called party information is provided to AUDIX so that each is identified properly during message recording/retrieval.

To use centralized AUDIX, you must use QSIG Diversion. On a remote switch, the call covers using Diversion to the hunt group assigned to AUDIX on the host switch. Then the host switch sends all the appropriate information to AUDIX so that AUDIX correctly answers the call.

Other QSIG Centralized Messaging

With a QSIG centralized messaging system, the remote switch is called a served user switch. When an AUDIX system supports a QSIG network, the served user switch does not need to be a DEFINITY ECS, but the host, or message center, switch must be.

QSIG allows a DEFINITY switch to be a served user switch of a non-DEFINITY message center switch. Therefore, the messaging system connected to the message center switch can serve the DEFINITY switch if that messaging system has a QSIG interface. Octel Serenade is such a messaging system.

The users on a served user switch in a QSIG messaging network may use only one message center. However, the message center switch may served multiple served user switches, via DCS as well as QSIG.

What you get with QSIG Centralized AUDIX

- Calls to users on a remote PBX cover or forward correctly and are answered by AUDIX.
  - ~ With a personalized greeting
  - ~ With appropriate busy or not available greeting, depending upon the reason the call was redirected
  - ~ Caller can leave a message for the called party

- Once a subscriber logs into AUDIX (by dialing the AUDIX number and entering the extension and password), the subscriber can perform the following activities:
  - ~ Listen to or delete messages (voice, fax, or text)
  - ~ Leave a message for other subscribers on the same AUDIX without calling them
  - ~ Forward a message to another subscriber on the same AUDIX
  - ~ Access the AUDIX directory to address a message (*A)
  - ~ Access the AUDIX directory to find a subscriber's extension (**N)
  - ~ Record or change your greeting
  - ~ Transfer out of AUDIX (*T or 0)

- Message Waiting Indication (typically a lamp, but may be a stutter dial tone or display) indicates the presence of new messages. **l**

  If another vendor's switch, acting as a served user switch, does not provide this functionality, the call will not cover properly to a DEFINITY ECS message center switch complex.

- When a remote subscriber logs in to AUDIX from the subscriber's phone, the subscriber does not need to enter his or her extension. Instead of entering the extension, *, the password, and *, the subscriber can enter *, the password, and then #.

What you *do not* get

- Leave Word Calling does not work between served user switches, though users on the same switch can use it.

- Transfer into AUDIX does not work from a served user switch.

Path Retention	Path Retention is a generic mechanism for retaining a network connection that can be used by supplementary services during call establishment.

The Originating PBX invokes path retention for one supplementary service or for several simultaneous supplementary services. Invoking a particular supplementary service means retaining the network connection if the Terminating PBX encounters the appropriate conditions. The Originating PBX is informed of the reason for retaining the connection. It then decides (for example, by consulting the calling user) whether to invoke the supplementary service. Under some circumstances in which the network connection is retained, more than one of the supplementary services for which path retention has been invoked may be applicable.

Successive retentions of the network connection by the Terminating PBX following a single path-retention invocation by the Originating PBX are possible. This is a result of different conditions being encountered at the Terminating PBX. When an attempt is made to invoke a supplementary service for which the network connection has been retained, a further condition can be encountered that can cause the network connection to be retained again for the same or a different supplementary service.

Path retention is specified in terms of a Path Retention entity existing within the Coordination Function at the Originating PBX and at the Terminating PBX.

QSIG Centralized Attendant Services

QSIG Centralized Attendant Service (QSIG-CAS)	DEFINITY ECS supports two versions of CAS: RLT-CAS and QSIG-CAS.

The CAS feature enables one or more Branch PBXs to concentrate their attendants on one Main PBX. CAS provides transparency between PBXs of most features that are normally available to the basic attendant service.

RLT-CAS uses an analog RLT network to optimized trunk utilization. QSIG-CAS does not use RLT. By using QSIG Transfer and QSIG Path Replacement or QSIG Diversion with Rerouting, the same optimization as using RLT can be accomplished with QSIG-CAS. Using QSIG CAS, you eliminate the need to have a separate analog RLT network.

All current QSIG features and RLT-CAS features are available with QSIG-CAS.

Potential Drawbacks

There are a few potential drawbacks when using QSIG-CAS:

1 Unlike RLT, QSIG Path Replacement does not work immediately. This means that resources are being utilized longer during QSIG-CAS as opposed to RLT-CAS.

2 Unlike RLT, QSIG Path Replacement is not guaranteed.

3 Like RLT, QSIG Path Replacement does not enable a branch PBX to act as a gateway PBX.

4 No path replacement functionality takes place during or after a conference.

QSIG CAS functions in RLT-CAS

The following QSIG-CAS functions are currently in RLT-CAS:

- Attendant-seeking calls at a branch reach the attendant at the main

- Attendant splitting away and calling the extended to party

- Night Service

- Monitoring agents, per attendant group

QSIG CAS functions not in RLT CAS

The following QSIG-CAS functions are currently *not* in RLT-CAS:

- Announcements for attendant seeking calls

- Attendant calls enter the attendant queue, with priorities (calls that originate from the branch do not have different priorities in the queue)

- Attendant display of user's COR

- Attendant split/swap

- QSIG Path Replacement kicking in after the transfer

- Attendant Return Call (Release Loop Operation, returns to same attendant if available. If not, then attendant group)

- Display Enhancements

- Attendant Conference

QSIG Supplementary Services with Rerouting

QSIG Path Replacement

DEFINITY ECS provides QSIG Additional Network Feature Path Replacement (ANF-PR) as defined in ISO/IEC 13863 and 13874. With this feature, a call's connections between switches in a private network can be replaced with new connections while the call is active.

ANF-PR is invoked when a call is transferred and improvements may be made in the routes. For example, after a call is transferred, the two parties on the transferred call can be connected directly and the unnecessary trunks are dropped off the call. The routing administered at the endpoints allows for a more efficient route connection.

ANF-PR selects the best route based on the preference assigned to routes in the Route Pattern form. Least cost Supplementary Service B (SSB) routes must be first, followed by more expensive routes.

> **Note:** When routes to SSB trunks are included with routes to non-SSB trunks, SSB trunks must appear first on the Route Pattern form. This is because as soon as ANF-PR encounters a non-SSB trunk in the route pattern, it stops looking.

Class of Restriction (COR) and Facility Restriction Levels (FRL) are adhered to in routing calls. ANF-PR is not invoked on data calls because there is a period of time when information can be lost.

QSIG Call Forwarding (Diversion with Rerouting)	This feature allows a forwarded call can be rerouted in a private network to find a more cost-effective or resource-efficient path.

QSIG Transfer into Lucent QSIG Voice Mail

Transfer into QSIG Voice Mail	This feature uses QSIG Call Transfer, along with a manufacturer-specific information (MSI) message, to transfer a call directly into a subscriber's mailbox when the voice mail system is connected to the Message Center PBX via a QSIG link.

The voice mail system must be a Lucent system that supports the QSIG Transfer Into QSIG Voice Mail MSI operation.

> **Note:** This feature currently works only with the Serenade voice mail system. This feature does not work with QSIG Centralized AUDIX.

The entire route from the PBX activating Transfer Into Voice Mail to the voice mail system must be QSIG.

QSIG Value-Added Lucent (VALU)

Value-Added Lucent (VALU) adds three forms of feature transparency to QSIG networks.

- Called/Busy Number — The system sends and displays across the network the called party's number to the calling party during alerting. It updates the display to "connected number" when the called party answers the call. It also sends and displays a busy party's number. This serves to confirm to the caller that he or she dialed the correct number.

  The Called/Busy Number feature is an extension to QSIG Called/Busy Name. For additional information, see QSIG Name and Number Identification (page 361).

  The Called/Busy Number never displays alone; it displays only if the Called/Busy Name is available (for instance, received from the far end and marked "presentation allowed"). In contrast, upon receipt of a Calling Number without a Calling Name, the number displays with the words "CALL FROM."

- Distinctive Ringing — QSIG VALU provides two kinds of distinctive ringing across the network: internal and external.

- Call Coverage — The system allows calls to be covered by extensions across the network. This coverage operates similarly to DCS Call Coverage (page 315), though the connectivity of the network itself differs. If administered, path replacement is invoked after coverage.

These features work with phone users as well as for a centralized attendant service.

QSIG Protocols

QSIG signaling protocols are based on ITU-T (formerly CCITT) Q.931 access protocols across the Q reference point. QSIG standards are also supported by the ISDN Private Networking Specification (IPNS) Forum. DEFINITY ECS QSIG complies with a number of international regulations. For example, QSIG:

- Complies with ISO standard 11572 for layer 3 to support private-network connectivity.

- Meets requirements for the ISO Private Network Generic Functional Procedures (ISO standard 11582) for call-related supplementary services.

- Supports call-related supplementary service transport, Abstract Syntax Notation 1 (ASN.1)/Basic Encoding Rules (BER), and Remote Operation Service Element (ROSE) services/protocols.

- Provides the Name and Number Identification supplementary service as defined by ISO Standards 13864, 13868, and 11572.

- Provides Call Forwarding (Diversion) as defined by ISO Standards 13872 and 13873.

- Provides Call Transfer as defined by ISO Standards 13865 and 13869.

Temporary Signaling Connection (TSCs)

A Temporary Signaling Connection (TSC) provides a temporary signaling path through ISDN switches for exchanging supplementary service information (for example, exchange Facility Information Elements in call control messages, FACILITY messages, or a combination of both on ISDN D-channels. There is no B-channel related to the connection; no data or voice transmissions take place.

There are two types of temporary signaling connections:

- Call Associated (CA-TSC)

- Non-Call Associated (NCA-TSC)

CA-TSC (DCS only)   A CA-TSC refers to a service for exchanging USER INFORMATION messages associated with an ISDN B-channel connection by the call reference value of the call control data packets. On DEFINITY ECS, this type of TSC is used only for DCS features on ISDN-PRI Signaling Groups administered with Supplementary Service Protocol *a*.

NCA-TSC   An NCA-TSC is a connection not related with any ISDN B-channel connections.
                         DECINITY ECS supports two types of NCA-TSC that conform to two different
                         protocol standards:

                         • The *non-QSIG* AT&T type of NCA-TSC is used for the DCS over ISDN-PRI
                           D-channel and DCS AUDIX applications. Only ISDN-PRI Signaling Groups
                           administered with Supplementary Service Protocol **a** support AT&T NCA-TSCs.
                           For further information, see .

                         • The *QSIG* type of NCA-TSC is used for certain QSIG features such as Call
                           Completion (Automatic Call Back). This type of NCA-TSC is referred to in the
                           QSIG protocol standards as a Call-Independent Signaling Connection (CISC).
                           Only ISDN-PRI Signaling Groups administered with Supplementary Service
                           Protocol **b** support QSIG NCA-TSCs. In addition, BRI trunk D-channels support
                           QSIG NCA-TSCs.

                         An NCS-TSC for QSIG is not administered ahead of time, but is invoked
                         dynamically by the QSIG feature that needs it. Some QSIG features remove the
                         NCA-TSC when it is no longer needed; others leave the it active for a longer
                         period of time.

                         DEFINITY ECS does not provide gateway functionality between a QSIG
                         NCA-TSC and an AT&T NCA-TSC. For example, although a call can be routed
                         from a DCS network into a QSIG network, it is not possible for the caller in this
                         case to invoke an automatic callback.

Setting Up QSIG

Steps

Begin

1 Verify with your sales representative or project manager what QSIG capabilities the system should have. The following capabilities apply:

Table 1. QSIG capabilities

Capability Categories	*Cross-Networking Features*
QSIG Basic	• Calling/Connected Number
	• Calling Number Identification
	• Transit Counter
Interworking with DCS	• Called/Calling Name/Number delivered to and received from DCS networked switches
Basic Supplementary Service	• Called/Busy Name
	• Call Completion
	• Call Forwarding (Diversion)
	• Calling Name Identification
	• Call Offer
	• Centralized AUDIX
	• Call Transfer
	• Path Retention
	• Message Waiting Indication
Centralized Attendant Service	• Centralized Attendant
Supplementary Service with Rerouting	• Call Forwarding (Diversion) with Rerouting
	• Path Replacement
Transfer into Lucent QSIG Voice Mail	• Transfer into QSIG Voice Mail
Value-Added Lucent (VALU)	• Called/Busy Number Display
	• Distinctive Ringing
	• Call Coverage

2 Determine whether the system is using ISDN-PRI, ISDN-BRI, or ATM for the QSIG network connections. Your sales representative or project manager should know this. (If the system is using ATM trunking for QSIG, see *DEFINITY ECS R8.2 - ATM Installation, Upgrades, and Administration*, 555-233-124.)

3 Enter **display system-parameters customer-options** on the command line of your system administration screen.

4 On page 1, verify fields as follows:

   ~ **G3 Version** field is **V8** or later.

5 If the system is using ATM for QSIG, go to page 2 and verify the following field:

   ~ **Async. Transfer Mode (ATM) Trunking** field is **y**.

6 On page 3, verify fields as follows:

   If the system is using ISDN-BRI for QSIG:

   ~ **ISDN-BRI Trunks** field is **y**.

   If the system is using ISDN-PRI for QSIG:

   ~ **ISDN-PRI** field is **y**.

   If the system is using QSIG Supplementary Services with or without Rerouting:

   ~ **Restrict Call Forward Off Net** field is **n**.

7 On page 4, verify fields as follows:

   ~ **Basic Call Setup** field is **y**.

   If the system is using QSIG Supplementary Services:

   ~ **Basic Supplementary Services** field is **y**.

   If the system is using QSIG Supplementary Services with Rerouting:

   ~ **Supplementary Services with Rerouting** field is **y**.

   If the system is using QSIG VALU:

   ~ **Value-Added Lucent (VALU)** field is **y**.

8 (For ISDN-PRI only). Administer or check the QSIG DS-1 circuit pack (see Appendix A). Check for the following field entries:

   • Connect field - **pbx**

   • Interface - **peer-master** or **peer-slave**

   • Peer protocol - **q-sig**

   • Signaling mode - **isdn-pri** or **isdn-ext**

   • Channel Numbering - **sequential** or **timeslot** (This item must match between the local switch and receiving switch.)

9 (For ISDN-BRI only). Administer or check the QSIG ISDN-BRI circuit pack (see Appendix A).

10 Administer or check the QSIG ISDN trunk group(s) (PRI or BRI) connected to the DS-1 or BRI circuit pack (see Appendix A). Check for the following field entries on Page 1:

- Group type - **isdn**
- Supplementary service protocol- **b** or **d** where:

b	ISO QSIG standards (including the ETSI Version 2 and European Computer Manufacturer's Association (ECMA) standards aligned with the ISO standards)
d	ETSI Version 1 and ECMA standards issued prior to the ISO standards for QSIG private network (supports only Name Identification and Additional Network Feature Transit Counter (ANF-TC))

(For Supplementary Services with or without Rerouting)

- Outgoing Display? - **y**
- QSIG Value-Added Lucent - **y**

On Page 2 (Also for Supplementary Services with or without Rerouting):

- Hop Dgt - **y**
- Disconnect Supervision - **y**
- Numbering Format - **public**, **private**, **unknown**, **unk-pvt**
- NCA - TSC Trunk Member - The trunk member whose D-channel routes CISCs.
- Send Called/Busy/Connected Number - **y**
- Send Calling Number - **y**
- Send Name - **y**

End

Setting Up QSIG Supplementary Services	**Steps**

Begin

1 Administer or check the ISDN Numbering - Public/Unknown screen (see Appendix A).

2 Administer or check the ISDN Numbering - Private screen (see Appendix A).

3 Administer or check the Signaling Group screen (see Appendix A). Check for the following field entries to ensure proper operation of Call Completion:

- Supplementary Service Protocol - **b**

- Max Number of NCA TSC - greater than 0

4 Administer or check the Route Pattern screen. Check for the following field entries to ensure proper operation of Call Completion and Transit Counter:

- TSC - **y** (necessary if switch is a transit node for TSC)

- Hop Lmt - between 1 and 32

5 Administer or check the Feature-Related System Parameters screen. Check for the following field entries to ensure proper operation of Call Completion and Call Transfer:

- Trunk-to-Trunk Transfer - **y**

- QSIG TSC Extension - valid extension number to serve as TSC for both incoming and outgoing QSIG network calls.

- Automatic Callback - No Answer Timeout Interval (rings) - enter the number of times, 2 to 9, a callback call should ring at the caller's phone before the callback is cancelled

- (For AUDIX/Octel Serenade support only) MWI - Number of Digits per AUDIX Subscriber - enter the number of digits in messaging subscriber extensions, if any. The value in this field must match the value of the **Extension Length** field on the Switch Interface Administration form of AUDIX.

- (For AUDIX/Octel Serenade support only) Unknown numbers internal for AUDIX - **y** if, when the switch cannot identify a calling number as internal or external, the switch should treat it as internal for AUDIX use.

6 Administer or check the Class of Service (COS) screen for each COS that may be using the QSIG network. Check for the following field entries to ensure proper operation of Call Completion, Call Offer, and Call Forward:

- Restrict Call Forward Off-Net - **n**

- Auto Callback- **y**

- QSIG Call Offer Originations - **y**

Call Completion

In addition to the Basic QSIG Supplementary Services administration described above, complete the following administration:

- On the Trunk Group screen, page 1, set the Supplementary Service Protocol field to **b** and administer the trunk for Call Independent Signalling Connections.

Transfer into Voice Mail

In addition to the Basic QSIG Supplementary Services administration described above, complete the following administration:

- On the System-Parameters Customer-Options screen, page 6, the Transfer Into Lucent QSIG Voice Mail field must be set to **y**.

- On the Feature Access Code (FAC) screen, page 3, assign a Feature Access Code in the Transfer to Voice Mail Access Code field. (This field is called "Transfer to AUDIX Access Code" in pre-R8 systems).

- A hunt group must be in the coverage path of the user's mailbox to be transferred into, as administered on the Station and Coverage Path screens. On the hunt group screen, page 2, for this hunt group, **qsig-mwi** must be entered in the Message Center field and the number for the voice mail system must be entered in the Voice Mail Number field.

Setting Up Centralized Attendant Services	**Steps**

Begin

1 Enable QSIG Supplementary Services with Rerouting on the System Parameters Customer Options screen, page 6, as described above.

2 On the System Parameters Customer Options screen, page 6, enter **y** in the Centralized Attendant field.

3 On the Console Parameters screen, enter **QSIG-main** or **QSIG-branch** in the CAS field.

    a If **QSIG-branch** is entered in the CAS field, then enter a number for QSIG CAS Number.

    b If **QSIG-branch** is entered in the CAS field, then the field AAR/ARS Access Code is optional.

4 Administer the QSIG ISDN trunk groups screen with option **b** for Supplementary Service Protocol

5 Console Parameters screen.

6 Attendant Console screen.

7 Assign an extension to Attd on the Dial Plan Record screen at the main PBX.

8 Administer each QSIG Supplementary Service that will be used by attendants.

Setting Up QSIG VALU Call Coverage	**Steps**

Begin

1 Enable the QSIG Basic Supplementary Services on the Customer Options screen, page 6, described above.

2 Enable (enter **y**) Value-Added Lucent (VALU) on the System-Parameters Customer-Options screen, page 6, as described above.

3 On a Trunk Group screen, enter **y** in the QSIG Value-Added Lucent field, page 1, and sent **b** in the supplementary Service Protocol Option field, page 1.

4 Administer the System Parameters Call Coverage/Call Forwarding screen as normal, with the inclusion of the following fields:

- Immediate Redirection on Receipt of PROGRESS Inband Information, page 1 — Enter **y** to speed up redirection of subsequent coverage points or call processing. This may be necessary in cases where coverage path endpoints over non-Lucent switches are unavailable but the QSIG networked switch (or the public network) sends PROGRESS messages that delay the local switch from redirecting the call elsewhere. If the QSIG network contains only DEFINITY switches, enter **n**.

- QSIG VALU Coverage Overrides QSIG Diversion with Rerouting, page 1 — Enter **y** to ensure that the "coverage after forwarding" activation/deactivation defined at a user's phone (via Station screen) takes precedence over the system-wide "coverage after forwarding" activation/deactivation selection (via the System Parameters Call Coverage/Call Forwarding screen). With QSIG Diversion with Rerouting active, the system-wide selection takes precedence unless you enter **y**.

    See the examples in the following table: .

Table 2.   Coverage with QSIG Diversion with Rerouting

Cvg. After Fwd (Station Screen)	Cvg. After Pwd (Sys. Parms. Coverage Screen)	QSIG VALU Coverage Overrides QSIG Diversion	Then
y	n	n	Call doesn't go to local user's coverage after failed forward attempt. Call control passed to switch to which call forwarded.
y	n	y	Call goes to local user's coverage after failed forward attempt.
n	y	n	Call goes to local user's coverage after failed forward attempt.
n	y	y	Call doesn't go to local user's coverage after failed forward attempt. Call control passed to switch to which call forwarded.

- Maintain SBA at Principal - Enter **y** to allow the user who originally receives the call to have simulated bridged appearance capability in the event the coverage point(s) are unavailable. This capability allows the user to break into the call before it is answered by a coverage endpoint.

    Note: If Maintain SBA at Principal is enabled (**y**), then Path Replacement is disabled.

5 Define the remote QSIG users that you may include in coverage paths using the Remote Call Coverage Table. See *Defining Coverage for Calls Redirected to External Numbers* in the *Handling Incoming Calls* chapter of the Administrator's Guide. See also the Remote Call Coverage Table screen in the Administrator's Guide.

6 Define coverage paths for users as required.

Related Phone Administration

As you set up each user's phone, QSIG networking features allow the following.

- QSIG displays the user's name as entered in the Name field on the Station screen, both on the display of another networked phone when called by that user or when calling that user.

- QSIG allows call waiting from networked phone calls if you set the Call Waiting Indication field to **y**.

- QSIG allows auto callback from networked phones if you create an auto callback button for the user.

Related Hunt Group Administration

As you set up each hunt group, you must enter either **grp-name** or **mbr-name** in the ISDN Caller Disp field, page 1. This entry determines which of the following the system displays on a QSIG networked phone that calls the hunt group:

- The hunt group name/extension

- The hunt group member's name/extension

Related Administration of Terminating Extension Groups

As you set up each terminating extension group, you must enter either **grp-name** or **mbr-name** in the ISDN Caller Disp field. This entry determines which of the following the system displays on a QSIG networked phone that calls the terminating extension group:

- The group name/extension

- The group member's name/extension

Related Administration of AUDIX/Message Centers

For AUDIX administration generally, see one of the following:

- *Installation and Switch Administration for the DEFINITY AUDIX System R4.0*, 585-300-122, which appears on the CD-ROM entitled *DEFINITY AUDIX System R4.0 Documents*, 585-300-803.

- *Intuity Messaging Solutions LAN Integration with DEFINITY ECS*, 585-313-602.

- Switch integration section of the CD-ROM entitled *Intuity Messaging Solutions Release 5 Documentation*, 585-313-803

    Note: Set up QSIG TSCs before you administer messaging. See Call Completion (page 363).

See the Octel Serenade documentation for Serenade administration.

Steps

Begin

1 (Local node message center switch only) Complete the Processor Channel Assignment screen (see Appendix A).

2 (Local node message center switch only) Complete the Message Waiting Indication Subscriber Number Prefixes screen (see Appendix A).

3 (Local node message center switch only) Complete the Station screen as specified in the Intuity or DEFINITY AUDIX documentation. Ensure that Page 2 of the screen has the following field entry:

  • MWI Served User Type - **qsig-mwi**

4 (Served user switch only) On the Hunt Group screen, set the following fields for the AUDIX hunt group:

  • Message Center - **qsig-mwi**

  • Voice Mail Number - the desired number

  • Routing Digits (for example, AAR/ARS Access Code) - the desired number.

    Digits entered in these fields should be selected so that the processing of these digits by the served user switch results in a call being redirected to the message center switch by an ISDN-PRI supplementary service protocol "b" facility. For example, if the message center switch is a DEFINITY ECS, the digits entered should reroute the call to the AUDIX hunt group on the message center DEFINITY ECS switch.

  • Calling Party Number to AUDIX? - **y**

End

QSIG Interactions

Call Forwarding (Diversion)

The interactions that apply to the standard DEFINITY ECS Call Forwarding features also apply to Call Forwarding (Diversion) with QSIG. The following are additional interactions.

- Alternate Facilities Restriction Levels

  The AFRL of the original call is the AFRL used for Call Forwarding with Reroute.

- Authorization Codes

  Call Forwarding with Reroute is denied to calls that require an Authorization Code.

- Automatic Alternate Routing and Automatic Route Selection

  Call Forwarding with Reroute uses AAR and ARS to reroute the original call.

- Call Detail Recording

  Call Forwarding with Reroute is denied to calls that require Forced Entry of Account Codes.

- Call Transfer

  When a forwarded call transfers, the forwarding indication displays to the caller until the call is answered. This display includes the trunk group name and word "forward." When the call is answered, the word "forward" is removed and the name and number of the answering party displays.

- Distributed Communications Systems

  Call Forwarding feature transparency does not exist on calls tandemed between a QSIG (Supplementary Service protocol b) network and a traditional DCS network. However, the basic call continues.

- Facility Restriction Levels and Traveling Class Marks

  The FRL (and TCM) of the original call is the FRL used for Call Forwarding with Reroute.

- Forwarding and Coverage

  If a coverage point is a number that routes over an ISDN (Supplementary Service protocol b) trunk, QSIG diversion information is not passed to the coverage switch.

- QSIG Name and Number Identification

  Availability of name and/or number display at the originating and diverted-to users depends upon how QSIG Name and Number Identification has been administered for the switches involved.

- Terminating Call has Coverage Active

  If a call is forwarded off switch, the terminating switch has call coverage activated, and the criteria are met, the call does not route to the forwarding party's coverage path. It routes to the terminating station's coverage path.

Call Transfer	• Call Forwarding (Diversion)

When a call is forwarded and transferred or transferred and forwarded, the forwarding indication displays to the caller until the call is answered. This display includes the trunk group name and word "forward." When the call is answered, the word "forward" is removed and the name and number of the answering party displays.

• Distributed Communications Systems

The only DCS transparency that exists when a call is transferred in a DCS network and passed over a QSIG administered trunk is calling name.

• QSIG Path Replacement

ANF-PR is invoked whenever a QSIG transferred call is answered.

• QSIG Name and Number Identification

Availability of name and/or number display at the connected parties depends upon how QSIG Name and Number Identification has been administered for the switches involved.

Transfer Into QSIG Voice Mail

• QSIG Path Replacement

After a call is transferred into QSIG voice mail and the voice mail system answers the call, Path Replacement is attempted.

QSIG Name and Number Identification interactions

• Distributed Communications Systems (DCS)

DEFINITY ECS can display DCS called name/number information or ISDN connected name/number information in a DCS (ISDN) network.

When an incoming ISDN call is routed back out over a non-ISDN trunk group, DEFINITY ECS can send the name of the non-ISDN trunk group as the connected name if the **Send Non-ISDN Trunk Group Name as Connected Name** field is **y** on the Feature-Related System-Parameters form.

Path Replacement

• Basic Call Management System

If the old connection is monitored by a BCMS entity, ANF-PR is blocked due to BCMS measurements.

• Call Detail Recording

Codes for recording the new connections of ANF-PR calls are code J for incoming trunk calls and code K for outgoing trunk calls. When a path is replaced, you also may receive records for short-duration calls that are not directly linked to the J and K records.

• Call Management System

If the old connection is monitored by a CMS entity, ANF-PR is blocked due to CMS measurements.

• Call Vectoring

• A transferred call that terminates at a vector and is answered cannot have its path replaced.

- Data-Call Setup

  A data call is denied ANF-PR.

- Data Privacy

  If Data Privacy is active, ANF-PR is denied.

- Data Restriction

  If Data Restriction is active, ANF-PR is denied.

- Malicious Call Trace

  If MCT is active, ANF-PR is denied.

- Recorded Announcement

  A call that is receiving a recorded announcement cannot have its path replaced.

- Trunk Access Code

  The paths of outgoing calls made using a TAC are not replaced.

- Voice Terminals

  Voice terminal displays that show trunk group name should update with new trunk group information after ANF-PR occurs. Calling and connected party displays are not disturbed when ANF-PR takes place if the original display shows the connected party name, number, or both.

Transit Counter
- Call Forwarding (Diversion)

  When call forwarding (Diversion) occurs and the ANF-TC feature is enabled, the transit counter is set to zero.

- ISDN Trunk Group Administration

  If all of the conditions are satisfied for both the Tandem Hop Limitation and ANF-TC, ANF-TC takes precedence. In situations where DEFINITY ECS is an Incoming or Outgoing Gateway, either makes use of the hop count/transit count information provided by the other.

- Trunk Access Code

  ANF-TC does not apply to TAC calls.

Call Completion
- Adjunct Switch Applications Interface (ASAI)

  ASAI cannot invoke/initiate QSIG-CC.

- Attendant Calling Waiting and Call Waiting Termination

  If you activate QSIG SS-CC to a single line voice terminal, the Attendant Call Waiting and Call Waiting Termination features are denied.

- Attendant Console Group

  You cannot activate QSIG SS-CC toward the attendant console group or towards the individual attendant.

- Attendant Control of Trunk Group Access

  You cannot activate QSIG SS-CC if the call uses a controlled trunk group.

- AUDIX

  You cannot activate QSIG SS-CC towards AUDIX. SS-CC to any transferred-to station is not allowed.

- Automatic Call Distribution (ACD)

  You cannot activate QSIG SS-CC towards a voice terminal after dialing the ACD group extension. It is possible to invoke SS-CC towards a station when dialing the individual's extension number. You can activate SS-CC from any ACD agent.

- Bridged Call Appearance

  You cannot activate QSIG SS-CC from a bridged call appearance. When a call originates from a primary extension number, the return call notification rings at all bridged call appearances.

- Busy Verification

  After the called party in a QSIG SS-CC call hags up, neither extension number can be busy-verified until both the calling and called parties are connected or the callback attempt is canceled (by the activating party or by time-out of the callback interval).

- Call Coverage

  QSIG SS-CC requests are always activated at the principal user and not coverage points. Similar to ACB, QSIG SS-CC Call Completion calls to the called user can redirect to coverage.

- Call Forwarding

  You cannot activate SS-CCBS or SS-CCNR towards a called station that has Call Forwarding enabled.

- Call Pickup

  On recall at the originating side, a group member cannot answer a QSIG SS-CC call for another group member.

- Call Waiting

  Call Waiting is denied when QSIG SS-CC is activated to the single-line voice terminal.

- Conference and Transfer

  You cannot activate QSIG SS-CC towards a transferred-to party.

- Hold

  A single-line voice terminal cannot receive a QSIG SS-CC call while it has a call on hold.

- Hotline Service

  A hotline service cannot request SS-CC.

- Internal Automatic Answer (IAA)

  If the IAA feature is enabled, QSIG SS-CC calls are not answered automatically.

- Manual Originating Line Service

  A manual originating service cannot request QSIG SS-CC.

- Multimedia Endpoints

  You cannot activate QSIG-CC towards multimedia data endpoints.

- Restriction Features
  - Class of restriction (COR): Any terminal that is Origination-restricted cannot activate SS-CC. Any terminal that is Termination-restricted cannot have SS-CC activated towards it.
  - Class of Service (COS): To invoke SS-CC, the ACB field on the Class of Service screen of the calling terminal must be set to *yes*.

- Ringback Queuing

  Ringback Queueing and ACB share the same button to indicate that they are active. If the user has only one ACB button, then both features cannot be active at the same time.

- Outgoing Trunk Queuing

  Outgoing Trunk Queueing cannot be invoked after the calling party answers the priority call back call and no trunks are available. The SS-CCBS and SS-CCNR request cancels at both PBXs.

- Termination Extension Group (TEG)

  You cannot activate QSIG SS-CC towards a TEG extension, but QSIG-CC requests can be activated towards a single member in the group.

- Uniform Call Distribution and Direct Department Calling

  You cannot activate QSIG SS-CC towards a uniform call distribution group or a direct department calling group extension, but you can activate towards a single member in the group.

- Vector Directory Number (VDN)

  You cannot activate SS-CC towards a VDN extension.

Message Waiting Indications

- AAR/ARS Partitioning

  All QSIG MWI messages use Partition Group 1 for routing.

- Alternate Facilities Restriction Levels

  QSIG MWI messages have unrestricted COR.

- DCP and Mode Code links to AUDIX

  QSIG MWI does not work with the DEFINITY AUDIX that emulates a DCP phone. A Prologix that communicates with AUDIX by using mode codes cannot be a QSIG message center switch complex.

- Authorization Codes

  The authorization codes do not block routing because the routing of TSCs used for QSIG MWI uses FRL 7.

- Automatic Alternate Routing (AAR)

  AAR may be used to route the QSIG TSCs.

- Automatic Route Selection (ARS)

  ARS may be used to route the QSIG TSCs.

- Call Coverage Features

  The served user switch uses call coverage paths to route calls to users in the served user switch to the AUDIX hunt group on the Message Center switch.

- Class of Restriction

  QSIG MWI messages use the default COR of unrestricted.

- Class of Service

  QSIG MWI messages use the default COS of unrestricted.

- Facility Restriction Levels and Traveling Class Marks

  A QSIG MWI TSC always uses FRL 7 (unrestricted).

- Generalized Route Selection

  GRS uses the "TSC" column on the Route Pattern form to select a preference for carrying QSIG MWI TSCs.

- ISDN - QSIG - BRI

  QSIG MWI is dependent on QSIG TSCs. QSIG MWI is possible over QSIG BRI lines.

- Message Sequence Tracer

  MST traces QSIG MWI messages.

- Off-Premises Station

  If a DS1 is used to implement an off-premises station, QSIG MWI does not work with the off-premises station. DS1 off-premise stations do not receive system message waiting indicators.

- Uniform Dial Plan (UDP)

  It is possible to route QSIG MWI messages by using UDP.

Called/Busy Name	• Adjunct Switch Applications Interface (ASAI)

A Connected Number is sent in the Connected Event to ASAI adjuncts. Therefore, upon receipt of a Called/Busy Number, it is stored in such a way that it is not be sent accidentally as a Connected Number if no actual Connected Number is received in the CONNECT message when the call is answered.

• ISDN - QSIG

Call Diversion (including Reroute)

Both the Called Name and Called Number are sent to the ringing/busy extension.

Call Transfer

As is done for the Called Name, the Called Number of a ringing party is sent to the transferred-to party in the QSIG "Call Transfer Complete" message.

• Message Sequence Tracer (MST)

MST records facility IEs containing Manufacturer Specific Information (MSI), but is not yet able to decode this information.

VALU Call Coverage   The interactions that apply to DCS call coverage apply to VALU call coverage, with the exceptions listed below. See Call Coverage (page 326)

• Call Coverage Off Premises

Unlike DCS, QSIG-VALU can handle non-UDP numbers in the remote call coverage table. It is not limited to route only on UDP numbers.

• Coverage Answer Groups

Same as DCS Call Coverage (i.e. Coverage Answer Groups across nodes (on a remote system) are not supported).

• Consult

Consult from the remote covering user to principal user is not supported.

• Displays

When a Principal user bridges on the call, its display is updated with "CONFERENCE" and counted for the number of parties on the call. The remote covering user and calling user (local and remote) display is not updated with the word "CONFERENCE".

• Leave Word Calling back to Principal from Covering User

Same as DCS Call Coverage — not supported.

• Go to Cover

Same as DCS Call Coverage — not supported.

• Queuing (UDC/DDC/ACD/VDN)

Same as DCS Call Coverage.

• QSIG Call Forwarding/Diversion

Same as DCS Call Coverage — call forwarding has a higher priority than Call Coverage with QSIG-VALU.

- QSIG Centralized Attendant Service (CAS)

  The calls that cover from a QSIG CAS branch to main are not treated as QSIG-VALU Coverage calls. This is because calls covered to "attd" (administered as a coverage point on a Coverage Path form) do not utilize Remote Call Coverage table and QSIG-VALU Call Coverage is supported only for coverage points associated with Remote Call Coverage table. The implication of this is that the attendant on the main will lose QSIG-VALU Call Coverage display information and QSIG Path Replacement will not be invoked after the call is answered by the covering attendant.

- Coverage of Calls Redirected Off-Net (CCRON)

  If both QSIG-VALU coverage is enabled and CCRON is enable, the QSIG-VALU coverage will have a higher precedence then CCRON.

- Privacy - Manual Exclusion

  With Call Coverage feature, when the principal user bridges onto a call that went to coverage and has been answered at the coverage point, the user is not dropped when Privacy - Manual Exclusion is activated by the Covering user.

  With QSIG-VALU Coverage, if the Principal bridges on the call after the remote covering user has answered the call. then the remote coverage user stays bridged until the call clears or the covering user goes on-hook.

- Simulated Bridge Appearance (SBA)

  With QSIG-VALU, maintaining SBA for Principal user will be based on the administration of the field "Maintain SBA at Principal" on the System Parameters - Call Coverage / Call Forwarding form.

- Temporary Bridge Appearance (TBA)

  Same interaction as Simulated Bridge Appearance.

- AUDIX / Centralized AUDIX

  AUDIX is usually specified as the last coverage point. When a call is routed to AUDIX (local or remote centralized place), the TBA (Temporary Bridge Appearance) is not maintained for the Principal user (i.e. the Principal user can not bridge on to the call after it routes to AUDIX).

  For the last coverage point, which do not require control at the Principal user's PBX, the QSIG-VALU Coverage shall route the call as QSIG Diversion by Rerouting instead of QSIG Diversion by forward-switching and let the remote calling user's PBX route the call directly to the remote covering number. If the Rerouting PBX indicates failure, then the Principal user's PBX (i.e. Served User's PBX in terms of QSIG Diversion) shall revert to the normal QSIG-VALU Coverage handling. The advantage of this approach is that it saves the trunk resources and provide path optimization without QSIG Path Replacement.

- QSIG Call Transfer

  If a call that is transferred using QSIG Call Transfer transfer-by-join to a secondary user (i.e. Principal user for QSIG VALU Call Coverage) and the call is routed to a covering user by QSIG VALU Call Coverage and if the Principal user has a Simulated Bridge Appearance (SBA) and if a call goes through a QSIG Path Replacement successfully, the Principal user will loose the SBA.

- Integrated IP Trunking

  An incoming call over an IP trunk that goes through more than 2 tandem nodes, and is compressed and decompressed at each entry and exit point on the trunk, may suffer voice-quality degradation.

Centralized Attendant Service (CAS)

- Abbreviated Dialing

  The main attendant can use abbreviated dialing buttons to extend QSIG-CAS calls.

- Administration without Hardware

  Administration without hardware for attendant consoles for QSIG-CAS functions as for RLT-CAS.

- Attendant Auto-manual Splitting

  The attendant can split away from a call to privately call another party by pressing the START button.

- Attendant Auto Start and Don't Split

  Attendant Auto Start and Don't Split functions as for RLT-CAS. The attendant can initiate a call while on an active call by pressing any button, without pressing the START button first. The system automatically splits the call and dials the next call. To deactivate Auto Start, press the Don't Split button.

- Attendant Backup Alerting

  Attendant Backup Alerting for QSIG-CAS functions as for RLT-CAS. If attendant backup alerting is turned on, other users on the main PBX may have the ability to answer attendant seeking calls.

- Attendant Call Waiting

  Attendant call waiting is available for calls that originate on the main.

- Attendant Calling of Inward Restricted Stations

  Attendant calling of inward restricted stations for QSIG-CAS functions as for RLT-CAS. That is, a user who is inward restricted cannot receive an attendant originated or extended call unless that user has field Restriction Override on the COR form set to "attd."

- Attendant Conference

  By using the attendant split/swap feature, it is possible for the attendant to conference join the attendant, calling party, and extended party together in conference. If the attendant drops out of the conference, leaving just the calling party and extended party, path replacement is not attempted.

- Attendant Control of Trunk Group Access

  Attendant control of trunk group access for QSIG-CAS functions as for RLT-CAS.

- Attendant Crisis Alert

  Attendant crisis alert for QSIG-CAS functions as for RLT-CAS.

- Attendant Direct Extension Selection With Busy Lamp (standard and enhanced)

  For QSIG-CAS the DXS allows attendants to use the DXS for monitoring and placing calls to users on the main PBX and for placing calls to users on a branch PBX only when UDP is used.

- Attendant Group and Tenant Partitioning

  Attendant Group and Tenant Partitioning are local features that do not require QSIG signaling on the main.

  Attendant Group and Tenant Partitioning do not function on a CAS branch. You can administer tenant partitioning and multiple attendant groups on a branch PBX. However, all attendant-seeking calls at the branch PBX are directed to the QSIG-CAS number, as administered on the console-parameters form, regardless of any tenant partition. If the QSIG-CAS number corresponds to the Dial Access to Attendant number at the main or to a VDN that eventually routes to the Dial Access to Attendant number at the main, the call is directed to the attendant group assigned to the tenant partition of the incoming trunk to the main.

- Attendant Interposition Calling and Transfer

  Attendant Interposition calling and transfer is a local feature that remains unchanged by QSIG-CAS. Attendants on the main still have the ability to call and transfer to each other using Individual Attendant Extensions.

- Attendant Intrusion

  As with RLT-CAS, Intrusion is not be available in QSIG-CAS to calls that are incoming from a branch.

- Attendant Misoperation

  Misoperation is used only in France and Italy. It is a local feature and functions as for RLT-CAS. If the system goes into Night Service while an attendant has a call on hold, the call realerts at the attendant console. If it is unanswered after an administrable amount of time, the call begins alerting at the night service destination.

- Attendant Override of Diversion

  As with RLT-CAS, Override of Diversion is not available in QSIG-CAS for calls incoming from a branch.

- Attendant Recall

  As with RLT-CAS, Attendant Recall is not available in QSIG-CAS to calls incoming from the branch.

- Attendant Release Loop Operation

   Attendant Release Loop Operation is a local switch feature. It allows an unanswered extended call on the main to return to the attendant after an administrable amount of time. The call first tries to return to the same attendant that originally answered the call and, if that attendant is not available, the call goes to the next available attendant (waiting in the Attendant Queue if necessary).

- Attendant Return Call

   Attendant Return Call functions in the following manner: Suppose a call comes into the attendant from a branch PBX. If the attendant extends the call and it is unanswered after an administrable amount of time the call returns to the attendant. Initially, the call attempts to return to the same attendant that originally handled the call. If that attendant is unavailable, then the call goes to the next available attendant (waiting in the Attendant Queue if necessary).

- Attendant Serial Calling

   As with RLT-CAS, Attendant Serial Calling is not available in QSIG-CAS to calls incoming from the branch.

- Attendant Tones

   Call identification tones are not heard by attendants answering calls from a QSIG-CAS branch.

- Attendant Trunk Group Busy/Warning Indicators

   As with RLT-CAS, the attendant can only receive busy/warning indicators for trunks at the main PBX. The attendant cannot receive information about branch PBX trunks.

- Attendant Vectoring

   The attendant vectoring feature is available to QSIG-CAS at the branch and the main. An attendant-seeking call terminating at the main PBX follows any vector steps that are defined at the main.

   The QSIG-CAS Number should not contain the number of a remote VDN. Note that there is no admin check to block such administration, but QSIG CAS may not function correctly.

- Automatic Circuit Assurance

   As for RLT-CAS, the CAS attendant cannot receive ACA referral calls from a branch because any administered ACA referral extension must be on the local PBX.

- Call coverage

  The attendant group is allowed to be a coverage point.

  If the call covers from the branch to the main over a non-QSIG ISDN trunk, then the call is treated as a forwarded call. That is, Call Coverage Off Net (CCRON) procedures do not apply and the call is not brought back to the branch PBX.

  Note: In order to obtain the full functionality of QSIG CAS, it is recommended that routing patterns are set up so that a QSIG trunk is used when sending a call from the branch to the main.

  If the call covers from the branch to the main over a QSIG trunk (not QSIG VALU), then QSIG Diversion procedures apply.

  If the call covers from the branch to the main over a QSIG VALU trunk, then QSIG VALU Call Coverage procedures apply.

- Call forwarding

  Forwarding calls to the QSIG-CAS number is allowed.

- Call park

  If a call is parked and the Call Park Timeout Interval (as set on the Feature Related System Parameters screen) expires, the call is sent to the attendant. This works the same as for RLT-CAS.

- Call Detail Recording (CDR)

  CDR functions with QSIG-CAS as for RLT-CAS.

- Call Record Handling Option

  Calls are sent to the attendant as non-CDR calls if the following conditions all hold:

  - the call is subject to CDR, **and**
  - the CDR buffer is full, **and**
  - the attendant is administered as the Call Record Handling Option on the CDR system parameters form.

- CDR Reports

  The format of the CDR data report is an administrable option on the CDR systems parameters form. Customers can select from a list of pre-defined formats or create their own. The content of the CDR records is unchanged by QSIG-CAS.

  CDR records generated at the main are covered by existing procedures. Calls incoming to the attendant look like incoming trunk calls. Calls originated or extended by the attendant look like outgoing calls.

- CAS Back-Up Extension

  The CAS Back-Up Extension is used in an RLT-CAS environment but has no benefit in QSIG-CAS.

- Conference

  If a user on a branch calls the attendant and conferences the attendant onto the call, the attendant's display is not updated with "conference". There is no QSIG standard defined for Conference and Definity has not implemented conference via MSI.

- Centralized AUDIX

  When a user zero's out of AUDIX, if the host PBX is a QSIG-CAS branch, then the call is sent to the QSIG-CAS attendant.

- DCS+

  On an incoming attendant-seeking call, calling-party information may be received at the branch if a call comes from another PBX in the network over a DCS ISDN trunk.

- Dial Access to Attendant

  When a user on a branch PBX dials the Dial Access to Attendant number, as administered on the Dial Plan Record screen, the call is sent to an attendant on the main PBX.

- DID/Tie/ISDN Intercept

  DID, Tie, and ISDN trunk calls that are intercepted are sent to the attendant on the main.

- Emergency access to attendant

  Emergency access may be administered so that if stations are off hook for an extended period of time, then a call is placed to the attendant, or a user can dial an Emergency access to attendant feature access code. Emergency access to the attendant does not go to the attendant on the main PBX. Instead, the call goes to an attendant on the branch PBX. If there is no branch attendant, the call is denied.

- Facility Busy Indication

  Facility Busy indication functions as for RLT-CAS.

- Individual Attendant Access

  An attendant may be assigned an individual extension so that it is possible to dial that attendant directly rather than dialing the attendant group.

- ISDN (non-QSIG)

  On an incoming attendant-seeking call, calling party information may be received at the branch for a call coming in over an ISDN trunk.

- Leave word calling

  LWC Message Retrieval is not available for the branch PBX.

- Malicious Call Trace (MCT)

  MCT is a feature that is performed on existing calls. MCT does not generate new attendant seeking calls. MCT will work in QSIG-CAS provided the attendants performing MCT-Activate, MCT-Control, and MCT-Deactivate are all on the same PBX. That is, an attendant on the main cannot work with an attendant on the branch to perform MCT.

- Multifrequency Signaling

  Calls coming into a branch over Multifrequency trunks are subject to intercept and may be sent to the attendant at the main. Multifrequency signaling can indicate that an incoming call on an MF trunk terminate at the attendant, regardless of the dialed extension.

- Night Service

  Night Service is available to QSIG-CAS. If a branch PBX is in night service, then all attendant-seeking calls for that branch are routed to the night service destination, not the CAS attendant. If the main PBX is in night service, then all attendant seeking calls at the main (either incoming from the main or branch) are routed to the night service destination. The night service destination for a PBX needs to be on that same PBX.

  DEFINITY supports the following night service features:

  - Hunt Group Night Service — allows an attendant to assign a hunt group to night service
  - Night Console Service — allows a console to be designated as the night service destination
  - Night Station Service — allows a station to be designated as the night service destination
  - Trunk Answer from Any Station (TAAS) — allows voice terminal users to answer attendant seeking calls
  - Trunk Group Night Service — allows an attendant or designated night service terminal user to assign one or more trunk groups to night service

- Non-attendant handling of CAS calls

  Non-attendant handling of CAS calls functions as for RLT-CAS.

- Outgoing Trunk Queuing

  Attendant-seeking calls from branch to main can be queued at the outgoing branch trunk group.

- QSIG

  All the existing QSIG features and services are available in QSIG-CAS. QSIG-CAS is available in any QSIG-CAS ISDN network (PRI, BRI, and PRI/ATM).

- QSIG Call Offer

  Calls extended by the attendant can invoke Call Offer. If a call invokes Call Offer, attendant return call procedures still apply.

- Extending a Call

  QSIG CAS ensures that QSIG Path Replacement is attempted after split/swap, provided that all three parties (original calling party, the attendant, and the called party) are never conferenced together. That is, if the attendant toggles between the other two parties for any number of times, never conferencing all three together, and then joins the two parties together (with the attendant now out of the picture and ready to go on and handle other calls), Path Replacement is attempted.

- Remote Hold

  Remote Hold is used in an RLT-CAS environment and has no benefit in QSIG-CAS.

- Controlled Restriction

  As for RLT-CAS, Controlled Restriction is not available in QSIG-CAS for users on the branch.

- Security Violation Notification

  As for RLT-CAS, the CAS attendant cannot receive SVN referral calls from a branch because any administered SVN referral extension must be on the local PBX.

- Special Application 8140 - Attendant Dial 0 Redirect

  Attendant Dial 0 Redirect allows calls to the attendant group to be routed to one of two attendant groups based on their call priority level, and to alert with emergency ring. The two groups are the default attendant group and the priority attendant group. Administration of whether a priority level routes to the priority group is done on the console parameters screen.

  Administration on the console parameters screen at the main determines which attendant group the priority level routes to and whether calls of that priority level alert with emergency tone.

- Special Application 8141 - LDN Attendant Queue Priority

  Calls coming to the main from a QSIG-CAS branch cannot be queued by LDN Priority at the main. Note that QSIG-CAS does not change the ability to of LDN Queue Priority to function for calls coming directly into the main.

- Special Application 8156 - Attendant Queuing by COR

  Calls coming to the main from a QSIG-CAS branch cannot be queued by COR Priority at the main. Note that QSIG-CAS does not change the ability to of Attendant Queueing by COR to function for calls coming directly into or originating at the main.

- Timed reminder and Attendant timers

  Attendant timers are:

  - ~ Timed Reminder on Hold — starts when an attendant puts a call on hold. When this timer expires, the held call alerts the attendant.
  - ~ Return Call Timeout — starts when a call is extended and then released from an attendant console. If this timer expires, the call is returned to the attendant.
  - ~ Time In Queue Warning — indicates the amount of time a call can wait in the attendant queue before activating an alert.
  - ~ No Answer Timeout — Calls that terminate at an attendant console ring with primary alerting until this timeout value is reached. When this timeout value is reached, the call rings with a secondary, higher pitch.
  - ~ Alerting — notifies, via secondary alerting, other attendants in an attendant group of an unanswered call. The Attendant Alerting Timed Reminder starts when a call reaches the Attendant No Answer Timeout maximum value.

- Transfer Out of AUDIX by Dialing 0

  Attendant seeking calls that transfer out of AUDIX by dialing 0, whose host switch is a branch PBX, are sent to the QSIG-CAS attendant on the main PBX whenever the dial 0 out of AUDIX destination corresponds to the attendant group.

Centralized Voice Mail Via Mode Code

You can use a single voice mail system to support multiple DEFINITY and Merlin Legend/Magix systems in a network via mode code. This capability is available for:

- DEFINITY ECS R8

- Prologix R3

- BCS Issue 6

- Merlin Legend R6.1

- Merlin Magix 1.0

    Note: DEFINITY One and Guestworks are not supported.

Voice mail systems that support these connections are:

- Intuity AUDIX R4.4 or higher running on a MAP5, with up to 18 ports

- Octel 100, with up to 16 ports

Configuration requirements

Centralized voice mail via mode code requires the following:

- A DEFINITY ECS switch as the hub of the voice mail network, with the voice mail system directly connected to it.

- Direct ISDN PRI tandem trunk connections, using DS1 service between the DEFINITY ECS hub and the switches the voice mail supports. The system uses the D-channel to transmit mode code signals to light message waiting lights on remote extensions.

- A uniform dial plan for all switches in the network, with a 4-digit plan if Merlin Legend/Magix is part of the network.

- One and only one mailbox for each extension in the network.

    Note: DCS software, X.25 hardware, and CLAN hardware/software are not required for this type of network. Additionally, you cannot network switches simultaneously using both mode code and DCS.

Configuration example   Figure 8 shows what a configuration of centralized voice mail via mode might look like.

In this configuration, DEFINITY system A is the hub. Voice mail system X is the centralized voice mail system. All other systems in the network are supported by voice mail system X *except* Legend system E and DEFINITY system D. These switches do not have a direct ISDN-PRI connection to the hub.

Figure 8.   Centralized Voice Mail Via Mode Code Example Configuration
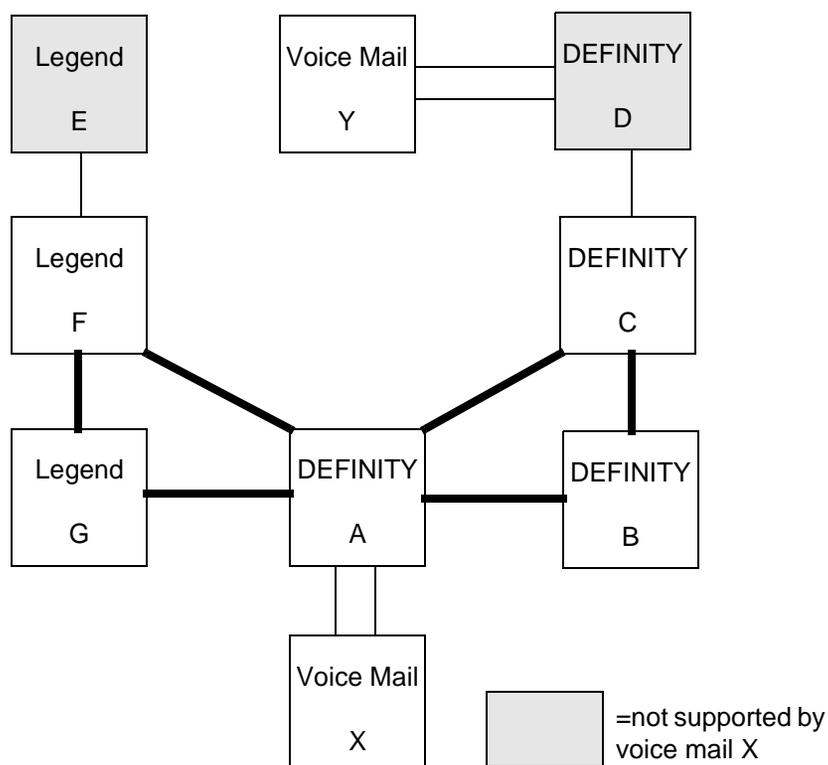
Feature Support

Features that are supported are:

- Calling party name/number sending/retrieval

- Message waiting light activation

- Remote coverage to voice mail

- Fax, as well as voice, mail

Features Not Supported   The following capabilities are not supported via mode code.

- Most DCS feature transparency.

- Centralized voice mail for a tandem switch (does not have a direct connection to the hub switch).

- Transfer into voice mail

Setting Up Centralized Voice Mail Via Mode Code

The following step describe how to set up DEFINITY switches to support centralized voice mail. For information on setting up Merlin Legend/Merlin Magix, see *Merlin Magix Integrated Systems Network Reference*, 555-715-114. For information on setting up INTUITY Messaging Solutions, see *INTUITY Messaging Solutions Integration with System 75, Generic 1 and 3, and R5/6.*

Begin

1 Enter **change system-parameters customer-options** on the command line of your system administration screen.

2 On page 3, verify fields as follows:

~ **ISDN-PRI** field is **y**.

~ **Mode Code for Centralized Voice Mail?** field is **y**.

~ **Mode Code Interface?** field is **y**.

~ **UDP** field is **y**.

3 On the hub switch, enter **add trunk group xxxx** on the command line of your system administration screen, where **xxxx** is the number of the ISDN-PRI trunk group connecting the hub with the remote switch.

4 On page 1, verify fields as follows:

~ **Group Typ**e field is **ISDN**.

~ **Service Type** field is **TIE**.

5 On page 2, verify fields as follows:

~ **Send Name** field is **y.**

~ **Send Calling Number** field is **y.**

~ **Numbering Format** field is **Private.**

~ **Send Connected Number** field is **y.**

6 On each remote switch, repeat steps 3-5.

7 On each DEFINITY switch in the network, enter **change dialplan** on the command line of your system administration screen.

8 Administer the dial plan for each node in the network (see Chapter 4 in this document for examples). Usually the hub is considered Node 1.

If the network contains Merlin Legend/Magix systems:

~ **Uniform Dialing Plan** field is **4** for each node.

If the network contains only DEFINITY systems:

~ **Uniform Dialing Plan** field is **4** or **5**.

9 For each DEFINITY node, enter **change feature-access-codes** on the command line.

10 On page 2, verify fields as follows:

   ~ **Leave Word Calling Send a Message** field is **#90**.

   ~ **Leave Word Calling Cancel a Message** field is **#91.**

   Note: All nodes in the system and the Voice Mail system must match this setting

11 For each DEFINITY node, enter **add ds1***UUCSS* on the command line, where *UUCSS* is the address of the DS1 circuit pack.

12 On page 1, verify fields as follows:

   ~ **Line Code** field is **B8ZS**.

   ~ **Framing** field is **extended superframe.**

   ~ **Signaling Mode** field is **ISDN/PRI.**

   ~ **Connect** field is **PBX.**

   ~ **Interface** field is **network** (for the hub) and **user (**for the remote switch).

   Note: Mode Codes *will not work* with D4 or SuperFrame

13 For each DEFINITY node, enter **change sign next** on the command line. Administer the signaling group (see example in Chapter 4 of this document).

14 For each DEFINITY node, enter **change isdn private-numbering**, and verify fields as follows:

   ~ **Set Network Level** field is **0**

   This setting overrides the signaling on the D channel, allowing the Message Waiting lamp activation signal to be sent

15 On the DEFINITY node, enter **change sys params mode-code** on the command line.

16 On the hub switch, set the **VMS Hunt Group Extension** field to the voice mail hunt group extension.

17 On the remote switches, repeat Step 15. Enter the voice mail hunt group extension in the **Remote VMS Extension - First** field.

18 For each DEFINITY node, enter **change aar an** on the command line.

19 Verify the following:

   ~ **Call Type** field is **lev0**

20 On the hub switch, enter **change station *extension*** for each port extension in the voice mail hunt group.

21 On Page 1, verify the following:

   ~ **Type** field is **vmi.**

22 On Page 2 of the Station screen, administer or verify the following:

- ~ **LWC Reception** field is **msa-spe** (Message Server Adjunct-System Processing Element).
- ~ **Leave Word Calling** field is **y.**
- ~ **Adjunct Supervision** field is **y.**
- ~ **Distinctive Audible Alert** field is **n**.
- ~ **Switchhook Flash** field is **y**.
- ~ **LWC Activation** field is **y**.

23 For each remote DEFINITY node, enter **change coverage remote** on the command line.

24 Administer or verify the following:

- ~ **01** contains the extension of the voice mail hunt group.

End

Japan TTC Q931-a Private Networking Protocols

The Telecommunications Technology Committee (TTC) of Japan defines national standards that are to be used in domestic public and private network facilities. The TTC typically modify other international standards as defined by ITU-T for use in Japan with additional national protocols to enhance operation for their customers.

Overview

The TTC has defined a family of Q931-a private networking protocols that allows for a level of feature transparency between different switches within a single vendor or multi-vendor private network. DEFINITY ECS provides connectivity into the Japanese private networking environment via two methods

- CAS (Channel Associated Signaling) — first developed in DEFINITY ECS R7 for the Japan market (See the description of TN2242 Japan 2Mbit Trunk in *DEFINITY ECS R8 System Description*, 555-233-200.)

- ISDN (Integrated Services Digital Network) PRI (Primary Rate Interface) — TTC specific protocol newly support in DEFINITY ECS R8. DEFINITY ECS supports Basic Call with Number Identification services.

TTC Basic Call Setup with Number Identification Supplementary Service

DEFINITY ECS allows the display of the calling party number to the called party. DEFINITY ECS also displays the connected number to the calling party after the call connects to the called number of another destination. For many protocols, Number Identification is considered to be part of Basic call; however, the TTC protocol defines Number Identification services to be part of their supplementary services offering. No additional supplementary services are supported at this time.

You can administer outgoing calls as "yes", "no", or "restricted." Restricted means that DEFINITY ECS sends the information but sends it "presentation restricted," which indicates to the receiving switch that the information should not be displayed. A received restricted number is included on the Call Detail Record (CDR).

TTC Q931-a Protocols

The TTC defined private networking ISDN protocol is largely based upon ITU-T Q.931 protocol. DEFINITY ECS supports the following TTC defined protocols:

Basic Call support as defined in JT-Q931-a "Digital Interface between PBXs (Common Channel Signaling) — Layer 3"

Number Identification Services as defined in JT-Q951-a "Digital Interface between PBXs (Supplementary Services) — Number Identification Services"

Differences from ITU-T Q.931 include:

- symmetrical operation as Peers similar to QSIG protocol, i.e. No Network/User definition

- different protocol discriminator

- Progress Indicator IE not supported in DISCONNECT messages

- Timers T310 and T313 are disabled

- Sending Complete IE not supported

- NOTIFY messages are not supported.

Setting Up TTC Q931-a

Complete the following steps to set up TTC connections.

Steps

Begin

1 Verify that you have the appropriate DEFINITY circuit pack for integration

2 Enter "**change system-parameters customer-options**" on the command line of your system administration screen.

3 On page 1, verify that the G3 Version field is **V8** or later

4 On page 2, verify that ISDN-PRI field is **y**.

5 Administer the TTC DS-1 circuit pack.

   Check for the following field entries:

   ~ Connect field — **pbx**
   ~ Interface — **peer-master** or **peer-slave**
   ~ Peer Protocol — **TTC**
   ~ D-channel: (*This item must match between the local and receiving switches*)
   ~ Channel Numbering — **sequential** or **timeslot** (*This item must match between the local and receiving switches*)

6 Administer or check the TTC ISDN trunk group(s) associated with the DS1 circuit pack.

   Check for the following field entries on page 1 of the Trunk Group screen:

   ~ Group type: **isdn**
   ~ Supplementary Service protocol — **a**
   ~ Outgoing Display? **y**

   Check for the following field entries On page 2

   ~ Disconnect Supervision — **y**
   ~ Numbering format — **public, private, unknown, unk-pvt**
   ~ Send Called/Busy/Connected Number — **y**
   ~ Sending Calling Number — **y**
   ~ Send Name — **n**

End

C Security Issues

This Appendix briefly discusses issues related to system security for DEFINITY ECS in a TCP/IP network environment.

Network Security Issues

This section describes a strategy to ensure the security of an intranet that is connected to DEFINITY ECS R7 or later systems.

Overview

The TCP/IP connectivity available with Release 7 and later of DEFINITY ECS makes it possible to connect one or more DEFINITY ECS systems in a network that includes connections to a company's existing data network (LAN or intranet). This integration of networks introduces the possibility of unauthorized access — to the DEFINITY network through the LAN/intranet and to the LAN/intranet through the DEFINITY network.

Security concerns

Security can mean many different things. The strategy described here focuses on three key concerns from a customer perspective:

1 How can a customer network be protected from unauthorized outside access through a DEFINITY ECS? That is, how can a hacker be prevented from dialing into a DEFINITY ECS and getting on the customer LAN?

2 How can a customer network be protected from unauthorized access by Lucent services personnel?

3 How can a DEFINITY ECS be protected from unauthorized access through the customer LAN?

Security solutions

The first and most important line of defense in any security strategy is *access control*. Damage to the network or theft of proprietary information by hackers can be prevented by completely denying access to unauthorized users.

Access control can be provided by three means:

- network topology
- network administration
- authentication

A second line of defense can be thought of as *damage control* — how to limit the amount of damage that can be done if someone does gain unauthorized access to the system? Damage control can be provided by application restrictions.

Each of these control methods is described below.

Access control — network topology

Network topology refers to how the DEFINITY ECS network is connected to the customer's network.

Private network

One option to restrict access is to make sure that the DEFINITY ECS network is not connected to any other network; that is, the DEFINITY ECS network is private. This topology clearly solves all three access security concerns mentioned above. However, a private network is not an option for all customers.

Private segment

Another topology is to put the DEFINITY ECS network on a private segment, behind a router or a firewall. This approach can also solve all three concerns above by implementing packet filtering in the router/firewall such that only legitimate traffic can pass through.

Open network

One other topology that may be chosen is a completely open network, where DEFINITY ECS nodes are placed on the customer network just like any other piece of data networking equipment. An open network topology addresses none of the three security concerns above, and other methods of access control must be used for these installations.

Access control — network administration

Network administration refers to how a DEFINITY ECS (specifically, the C-LAN circuit pack) is administered in terms of dial-up PPP ports and routing information. A carefully administered system has only dialup ports in service for DCS and adjunct sessions that will be established at boot time. This means that normally there will not be any ports available for a hacker to dial into. Additionally, the C-LAN circuit pack should be administered only with routes specific to the DCS and adjunct nodes. This ensures that anyone getting into a DEFINITY ECS can only get to other DCS or adjunct nodes, not anywhere else on the customer network. Careful administration will address concerns #1 and #2 above.

Note that no new access to the system access terminal (SAT), such as network-based SAT, is introduced in Release 7. As in earlier releases of DEFINITY ECS, all port and route administration can be done only via the SAT, and all changes are logged.

Access control — authentication

Authentication also plays a role in providing access control to dial-up PPP ports. All of these ports can be protected by Challenge Handshake Authentication Protocol (CHAP). This provides an extra level of assurance that no unauthorized user will be able to connect to a PPP port on C-LAN.

Damage control — **application restrictions**	Release 7 provides damage control by what can be termed *application restrictions*. This simply means that DEFINITY ECS R7 has been designed to support only specific applications; that is, DCS and adjuncts. Other applications that could present security risks have been deliberately disabled. Specifically, there is no support for *telnet* or *rlogin* into or out of a DEFINITY ECS, making it difficult for anyone to maneuver between the DEFINITY ECS network and the customer network.
	Additionally, because of the application restrictions, little damage can be done by someone attempting to hack into a DEFINITY ECS from the customer network (concern #3). It would be very difficult, via the network, to modify administration or perpetrate toll fraud. At worst, a hacker could cause a temporary interruption of DCS, CMS, or Intuity connections.
In Summary	All three security concerns presented above can be addressed by a combination of one or more of the security methods described here. Probably the two most important methods to prevent unauthorized access to a network are:

1 Choose a network topology for the DEFINITY ECS network that satisfies security needs.

2 Carefully administer the DEFINITY ECS network to minimize the possibility of the LAN or intranet being accessed by unauthorized personnel.

D Capacities and Performance

This Appendix discusses issues related system capacities and performance for DEFINITY ECS in an IP network environment. It provides a method of estimating the number of C_LAN and MedPro circuit packs that are needed to support various levels of traffic.

This appendix provides performance and traffic configuration guidelines for the C-LAN (TN799B) and the MedPro (TN802B) circuit packs. It assumes DEFINITY switch connections in which both signaling and voice data are carried over a LAN or WAN using TCP/IP.

Capacities and Resource Requirements

The following table gives capacity limits for IP connections for DEFINITY ECS and the IP Interface circuit packs.

For DEFINITY		Capacity Limits
Number of network regions	$\leq$	**10**
Number of C-LAN circuit packs	$\leq$	**10**
Number of MedPro circuit packs	$\leq$	**46** for the r **13** for the si and csi
Number of simultaneous TCP/UDP connections per C-LAN	$\leq$	**508**
Number of audio streams per TN802B	$\leq$	**22** using G.723.1 or G.729A codecs **31** using G.711 codec

The following table gives the number of sockets (connections) needed for IP softphones and H.323 trunks.

For C-LAN		Number of Sockets Required
Number of sockets per road-warrior application (The H.323 sockets are held up while registered if the endpoint is administered as a Permanent user or while the call is active if administered as an As Needed user)	=	**3** (1 DCP + 2 H.323) **2** (1 DCP + 1 H.323 with tunneling)
Number of sockets per telecommuter application	=	**1** (while registered)
Number of sockets per Native Mode station	=	**1** per call with tunneling **2** per call without tunneling
Number of sockets per H.323 Tie trunk (the numbers depend on whether signaling groups are shared by trunks and whether tunneling is used)	=	sharing & tunneling: **1** /sig grp (default) sharing, no tunneling: **1** /sig grp + **1**/call no sharing, tunneling: **1** /call no sharing, no tunneling: **2** /call
Number of sockets per H.323 DID trunk	=	**2** (while on call)

As a worst-case example of these limits, assume 1000 active H.323 endpoints, each requiring 3 C-LAN connections and G.723 codec processing. This configuration would require 3x1000/508 = 6 C-LANS and 1000/22 = 46 MedPros.

Performance

Overview

This section presents methods for estimating:

- the impact on the processor
- the impact on the TDM bus
- the number of C-LAN boards
- the number of MedPro boards

Given assumptions about:

- the number of H.323 endpoints:
  - ~ # of road-warrior applications
  - ~ # of telecommuter applications
  - ~ # of native H.323 phones
  - ~ # of H.323 Tie trunks
  - ~ # of H.323 DID trunks
- average number of C-LAN connections per H.323 endpoint
- number of audio streams per DSP
- grade of service (GOS)
- average call holding times

Definitions

Offered Load. The telephone traffic arriving at a system for processing. The offered load is equal to or greater than the carried load.

Carried Load . The telephone traffic actually processed by a system. The carried load is equal to or less than the offered load.

Endpoint Carried Load. The average number of IP Softphones + H.323 trunks on active calls to the DEFINITY system.

Socket Carried Load. The average number of active C-LAN connections between the local DEFINITY system and the IP Softphones + H.323 trunk-connected remote DEFINITY systems.

Socket. A software data structure associated with a connection between the C-LAN board and an endpoint.

Grade of Service (GOS). If the call load offered to a system can exceed its maximum capacity, there is a probability that some calls will be blocked. The GOS is a specification of the probability that one or more calls will be blocked. The probability is expressed in the form, *P0...0X*. For example, a GOS of P01 specifies that, in the long run, calls will be block 1% of the time; P0001 specifies that calls will be blocked 1/100th of 1% of the time.

Full Availability. The capacity is sized to the carried load.

Erlang. The Erlang is a unit of measure of the intensity of telephone traffic. It measures the average utilization of a set of system resources during a given time period. For example, if a server (trunk) is busy for 30 seconds over a measurement period of 2 minutes, the traffic intensity for that measurement period is 0.25 (30sec/120sec) Erlangs. An intensity of one Erlang represents the full utilization of one call server, or an average of 1/nth utilization of n servers, over the measurement time period. Since the Erlang is time divided by time, it is a dimensionless unit.

The maximum capacity of one trunk is one Erlang and the maximum capacity of a group of trunks is equal to the number of trunks in Erlangs. For example, the maximum capacity of a group of 30 trunks is 30 Erlangs. If, during a given hour the utilization of the trunk group was 10 Erlangs, on average 10 trunks were busy. This could have happened for 10 one-hour calls (unlikely) or 600 one-minute calls, or any combination of calls and durations that result in 36,000 call-seconds.

Another measure of traffic intensity is the CCS, or hundred (century) call-seconds per hour. Since one Erlang is equal to 3600 call-seconds per hour, one Erlang is equal to 36 CCS per hour.

Erlang B. The probability distribution used to estimate the number of trunks needed to carry a given amount of traffic for a "loss system." It assumes that when a call arriving at random finds all trunks busy, it vanishes and doesn't return ("lost calls cleared").

Erlang C. The probability distribution used to estimate the number of trunks needed to carry a given amount of traffic for a "delay system." It assumes that all calls will wait indefinitely to get through.

Processor performance The number of thousands busy-hour calls (KBHC) can be estimated as a function of the processor occupancy estimate (POE) and the time per call (T), in milliseconds, as follows:

$$KBHC \leq 36*POE / T$$

The following table gives the estimated BHC capacity for the G3r and G3si models given various values of POE and T.

G3r			G3si		
T(ms)	POE = 57%	POE = 65%	T(ms)	POE = 52%	POE = 60%
100	20,500	23,400	200	9,400	10,800
150	13,700	15,600	300	6,200	7,200
200	10,300	11,700	400	4,700	5,400

TDM bus performance The impact of H.323 voice-only calls on the TDM bus is the same as for circuit switch voice calls.

Number of MedPros needed

The following table gives the approximate carried load (CL_m), in Erlangs, for **m** MedPro boards installed. Carried loads are shown for **a** = 22 and 31 audio streams per MedPro board, corresponding to having the G.723 or G.729A (a=22) or the G.711 (a=31) codecs administered.

Number of MedPro boards	CL_m for GOS = P001		CL_m for Full Availability	
	a = 22	a=31	a = 22	a=31
1	10.5	17.0	22	31
2	26.9	41.4	44	62
3	44.7	65.7	66	93
4	63.2	94.3	88	124
5	82.1	121.7	110	155
6	101.4	149.5	132	186
7	120.9	177.6	154	217
8	140.5	205.9	176	248
9	160.4	234.3	198	279
10	180.3	262.9	220	310
15	281.4	407.6	330	465
20	384.1	554.0	440	620
25	487.7	701.5	550	775
30	591.9	849.7	660	930
35	696.7	998.6	770	1085
40	801.8	1147.9	880	1240
46	923.4	1327.6	1012	1426

Assumptions

This table assumes:

- In columns 2 and 3, the carried loads are calculated assuming an infinite source for Grade of Service (GOS) of P001. The carried loads are calculated as an average of Erlang B and Erlang C to account for retrials

- In columns 3 and 4, the carried loads are calculated assuming full availability (no blocking). Note that the carried load for the full availability case is just the number of audio streams times the number of MedPro boards.

Number of C-LANs needed

The number of C-LAN circuit packs needed can be estimated as follows:

1 Calculate the C-LAN socket carried load, for c sockets, **CLc**

2 The number of C-LANs needed is:

 # C-LANS = CL_c/448 for infinite source, GOS of P001

 # C-LANS = CL_c/508 for "full availability."

Assumptions

This formula assumes:

- 508 is the maximum number of simultaneous TCP/UDP connections per C-LAN.

- 448 is the average of Erlang B and Erlang C for GOS = P001 and 508 connections.

Example

Internet Call Center

A DEFINITY call center with all incoming connections originating as H.323 DID endpoints on the Internet. The customer requires 10,000 Busy Hour Calls (BHCs) be carried, with a GOS of P001. The average call holding time is 100 seconds and the codec is G723.1.

Problem

Calculate the DEFINITY resources required — the number of C-LANs and the number of MedPros.

Solution

The average number of C-LAN sockets per call (c), for H.323 endpoints, is 2.

The number of audio streams per MedPro (a), for the G723.1 codec, is 22.

The endpoint carried load is:

10,000(calls) x 1(CCS holding time per call)/36(CCS per Erlang) = 277.8 Erlangs.

From the MedPro table, **15 MedPro boards are required** (rounding up).

Since there are 2 sockets per call (for H.323 endpoints), the socket carried load is 2x277.8 = 555.6 Erlangs.

Using the C-LAN formula, 555.6/448 = **2 C-LAN boards are required** (rounding up).

E C-LAN Installation

This chapter provides instructions for installing and making the physical connections to the circuit packs that are new for R7 — the C-LAN (TN799) and the NetPkt (TN794) circuit packs. The C-LAN circuit pack is optional for R7 but required for TCP/IP connectivity in all switch models. The NetPkt circuit pack is required for R7 in the si model only.

These instructions are also included in the upgrades and installation documents for each switch model. They are duplicated here for convenience and completeness.

Overview

Systems in a DCS network are interconnected by both tie trunks (for voice communications) and data links (for control and transparent feature information). Various DS1 interface circuit packs (including TN464C, TN767C, TN722, and TN760) provide the voice-communications interface. For TCP/IP connectivity, the data-link interface is provided by a TN799 C-LAN circuit pack.

The C-LAN handles the data-link signaling information in one of two configurations; either 10BaseT ethernet or point-to-point (ppp).

- In the ethernet configuration, the C-LAN passes the signaling information over a separate 10BaseT TCP/IP network, usually via a hub. For this configuration, install the C-LAN circuit pack and connect the appropriate pins of the C-LAN I/O field to the hub as described below.

- In the ppp configuration, the C-LAN passes the data-link signaling to the DS1 for inclusion in the same DS1 bit stream as the DCS voice transmissions. For this configuration, install the C-LAN circuit pack; no other connections are needed.

In both configurations, the appropriate DS1 circuit packs must be installed if they are not already present.

Install the C-LAN Circuit Pack

The following sections describe the steps for installing the C-LAN circuit pack.

Insert C-LAN Circuit Packs

TCP/IP connections (10BaseT ethernet or ppp) require a TN799 C-LAN circuit pack. Complete the following steps to install these circuit packs.

1 Determine the carrier/slot assignments of the circuit packs to be added. Both types of circuit pack can go into any port slot with the following exceptions —

The C-LAN circuit pack cannot be installed in the A carrier for

- ~ the r model
- ~ a duplicated si model

2 Insert the circuit packs into the slots specified in step 1. You do not need to power down the cabinet to install a C-LAN circuit pack.

Administer the C-LAN Bus Bridge for csi models

For the *csi model only*, complete the following steps to administer the Bus Bridge for the new C-LAN circuit pack.

Note: If there are 2 C-LAN circuit packs installed in this csi switch, administer the Bus Bridge for *only one* of them.

1 Enter **change system-parameters maintenance**.

2 At the bottom of Page 2, enter **y** in the Packet Intf2 field.

3 Enter the location of the C-LAN circuit pack in the Bus Bridge field (for example, 01a08 for cabinet 1, carrier A, and slot 8).

4 Enter the port bandwidths or use the defaults in the Pt0, Pt1, and Pt2 Inter-Board Link Timeslots fields.

5 Submit the form.

6 Verify that the bus bridge LED is lit on the C-LAN circuit pack. This indicates that the packet bus is enabled.

Test the Packet Bus and C-LAN Circuit Pack

To test the packet bus and the TN799 C-LAN circuit pack, the cabinet needs a TN771D Maintenance/Test circuit pack.

1 If there is no TN771D circuit pack in the cabinet, place one in a port slot.

2 Enter **test pkt port-network 1 long**. For more information about these tests, refer to the "test pkt command" section in the maintenance book.

3 If the TN771D circuit pack was already in the cabinet, leave it there.

4 If you added the TN771D circuit pack to the cabinet in order to test the TN799 circuit pack, remove it from the cabinet.

Install C-LAN Cables   **Hub connection**

Install a cable from the backplane peripheral connector to a hub or wall field as required. See the figure below.

1 Connect the 259A connector to the backplane connector of the port slot containing the C-LAN circuit pack.

2 Connect the D8W cable between the 259A connector and a 10BaseT hub.

Figure 9.   Cable Connection for C-LAN 10BaseT Connectivity

cydflan2 EWS 101398
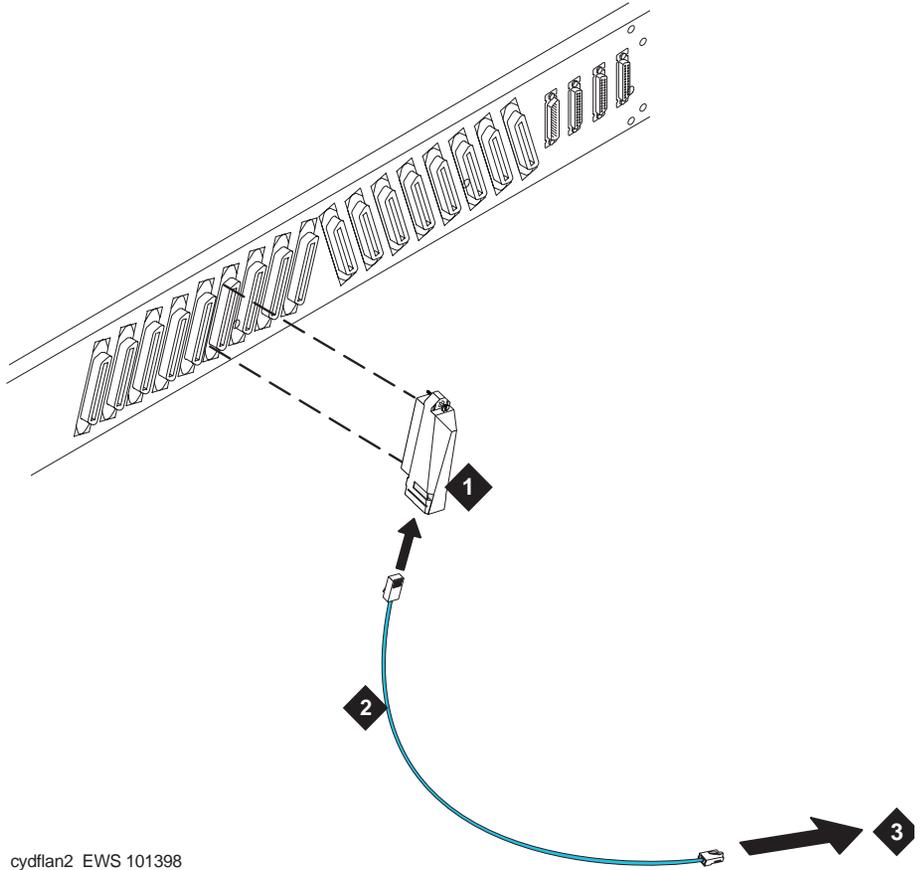
Figure Notes

1. 259A Connector

2. D8W Cable (max length 100m)

3. 10BaseT Hub or 110 (purple) wall field

This connects port 17 on the C-LAN circuit pack to the LAN.

The following table shows the relationship between the backplane and the peripheral (Amphenol) pinouts, and the RJ45 pinouts on the D8W cable, for the C-LAN circuit pack in any port slot.

Backplane Pin	25-Pair Wire Color	Lead Name	Peripheral Connector Pin	RJ45 Pin on the 259A Connector
103	White/Orange	TD+	27	1
003	Orange/White	TD-	2	2
104	White/Green	RD+	28	3
004	Green/White	RD-	3	6

Wall field connection

Instead of connecting a D8W cable to a hub, you could connect a standard Amphenol cable between the peripheral connector and the wall field. In this case, you would need to reverse the transmit and receive pairs. The transmit/receive reversal is done automatically by a hub.

Other Hardware Upgrades

Upgrades to DEFINITY ECS Release 7 require new processor circuit packs for the csi and si models (TN798B and TN790B, respectively) and the NetPkt (TN794) circuit pack for the si model.

For the si model upgrading to R7, the NETCON (TN777) and the PACCON (TN778) circuit packs must be removed and the NetPkt circuit pack assembly must be installed. The NetPkt circuit pack is attached to a TN2400 circuit pack as a double circuit pack assembly that is inserted in the NetCon/PacCon slots. The connections built into this assembly provide the necessary jumpers between the NETCON and PACCON slots.

Refer to the appropriate upgrades document for the procedures to install these circuit packs and upgrade the software.

F IP Trunk Installation and Administration

This appendix describes the procedures for installing and administering IP Trunk connections using the TN802 IP Interface circuit pack or the TN802B IP Interface set for IP Trunk mode. This appendix does *not* cover the TN802B IP Interface set for *medpro* mode for H.323 trunks — this material is covered in Chapter 2.

DEFINITY ECS with Internet Protocol (IP) Trunk allows you to route voice and fax calls over IP networks to other DEFINITY ECSs that also have this feature, or to other PBXs (Lucent or non-Lucent) equipped with the Internet Telephony Server–Enterprise (ITS-E). The IP Trunk service enables you to reduce long-distance charges and gives you added flexibility in routing traffic between sites. IP Trunk is implemented using the TN802 circuit pack.

IP Trunk connections can be used with Release 7 and Release 8 of all three DEFINITY ECS switch models — csi, si, and r.

To use the IP Trunk feature, the *IP Interface assembly* needs to be installed. The IP Interface assembly (J58890MA-1 L30) is a 3-slot wide TN802 (R7) or TN802B (R8) MAPD circuit pack.

The procedures in this appendix apply to the following software/circuit pack configurations:

- R8 with the IP Interface/TN802B in IP Trunk mode

- R8 configured as R7 (bugfix) with the IP Interface/TN802 or TN802B in IP Trunk mode

- R7 with the IP Interface/TN802

IP Trunk Installation

For IP Trunk installation procedures, see the upgrades or installation document that is appropriate for the switch model. There are five upgrades/installation documents on the DEFINITY Documentation Library CD-ROM. See *DEFINITY ECS R8.2 Documentation CD-ROM*, 555-233-813.

Title	Document Number	Issue Number
Upgrades and Additions for R8.2r	555-233-115	1
Upgrades and Additions for R8.2si	555-233-122	1
Installation and Test for Multicarrier Cabinets	555-233-114	1
Installation and Test for Single Carrier Cabinets	555-233-120	1
Installation, Upgrades, and Additions for CMC	555-233-118	1

IP Trunk Administration

This section tells you how to administer the IP Trunk service after all installation procedures are complete.

Prerequisites

Before you can administer an IP trunk group, you must have one or more TN802 circuit packs (or TN802B set to IP Trunk mode) and a right-to-use license for the number of ports you need. Refer to *DEFINITY ECS System Description* for information on the TN802 circuit pack.

The TN802 circuit pack contains the Windows NT™ operating system. The IP trunk software that sends and receives calls over a TCP/IP network resides on this NT server. You need to use a Windows NT application called Configuration Manager, and your DEFINITY ECS switch administration software to administer IP trunk groups.

In order to complete the administration for IP trunks, the following must also be in place:

- The TN802 circuit pack must be connected to an Ethernet 10/100 BaseT local-area network.

- In order to log on to the NT server on the TN802 circuit pack, a monitor, keyboard, and mouse must be connected directly to the circuit pack. Alternatively, you can access the NT server remotely via a dialup connection through a modem connected to the circuit pack.

Finally, remember that IP trunk provides service between specific sites: the switch at each site must have the DEFINITY Internet Protocol Trunk (IP trunk) application or Lucent's Internet Telephony Server-Enterprise (ITS-E) Release 1.2.

Administration overview

To administer IP trunks on DEFINITY ECS, you must complete the following tasks:

Planning Tasks
- Plan routes and dialing permissions for IP calls by following the Procedures for Extension Dialing Between Sites, , or by completing the Dial/Routing Plan Worksheets for remote off-premise dialing scenarios.

DEFINITY Tasks
- Administer the IP Trunk circuit pack by completing the DS1 circuit pack screen (the IP Trunk emulates a T1 or E1 connection)

- Create a trunk group for the IP trunks and assign trunk group members to ports on the IP Trunk circuit pack

- Administer the AAR and ARS Digit Analysis Table using the information from the Switch Admin tables on the worksheets

NT Tasks

- Log on to Windows NT and start the IP Trunk service

- Use the Configuration Manager to administer the routes and dialing permissions you defined on the Dial/Routing Plan worksheets or the procedures for extension dialing between sites.

- Use the Configuration Manager to set the IP Trunk service parameters

Plan call routing

Use the IP Trunk worksheets (shown at the end of this appendix) and/or the Procedures for Extension Dialing Between Sites to plan and coordinate your IP Trunk administration in Configuration Manager and DEFINITY ECS switch administration software.

You will create a dialing and routing plan, then use the information to administer DEFINITY ECS and the IP Trunk application. Read and follow these instructions carefully.

Using the Procedures for Extension Dialing Between Sites

Follow these procedures for administering extension dialing between several sites. This section includes the steps for administration as well as examples using three sites that show DCS and non-DCS scenarios.

Using the Dial/Routing Plan Worksheets

The worksheets are used for any two-site configuration allowing off-premise dialing. Worksheet 1 is used to capture general information about your site.

Worksheets 2–8 are used for different levels of off-premise dialing restrictions at the remote site, as listed in the following table.

Off-Premise Dialing at Remote Site:		
	Worksheet 2: No off-premise dialing at remote site.
Same Area Code	Worksheet 3: any exchange
	Worksheet 4: only exchange X
Same Country	Worksheet 5: any area code
	Worksheet 6: only area code X
	Worksheet 7: any different country
	Worksheet 8: only different country X

For any two-site configuration, you would fill out Worksheet 1 and one of the worksheets 2–8. Use the worksheets as follows:

1 Fill out the general information about your sites using Worksheet 1.

The Field Codes on Worksheet 1 consist of a number (1 or 2) that indicates the site, and a letter (A–J) that indicates a field on an administration screen. For each code, the *Field Value* column holds the specific value for that field for your switches. The field codes are used on all the other worksheets to indicate the values to enter from Worksheet 1.

For example, field code 1A corresponds to the field International Access code for site 1. You would enter the value in the *Field Value* column for the International Access code for your site-1 switch. Then, when 1A appears on a subsequent worksheet, you would enter the value corresponding to 1A from Worksheet 1.

2 Use the second and subsequent worksheets to plan switch and IP Trunk administration.

On each worksheet, in the *Fill in with your actual values* column, replace the indicated field codes with the corresponding values you entered on Worksheet 1.

For example, on Worksheet 2 there is a field called Different Country for each site. Its field code is 1A2B2D2E, which means that you would enter the values from Worksheet 1 as follows:

<Site-1 International Access Code><Site-2 Country Code><Site-2 Area Code><Site-2 Exchange>

Once you've done this, the result is the exact phone number that you'll enter in the matching field in the administration software.

Note: The IP Trunk application only recognizes digits. Don't use characters such as ~w, ~p, + and so on in dialed digit formats that will be sent to IP trunks: the application won't recognize these characters.

3 Use these worksheets to administer all your sites using IP Trunk. You can permit a different level of off-premise dialing for each site. For example, Site 1 may allow limited off-premise dialing, but Site 2 may not, and so on.

DEFINITY administration procedures

The following procedures must be performed on the DEFINITY ECS to administer IP Trunks.

⚠ CAUTION:

The fields described in the following procedure must be completed as shown. If they are not, the IP Trunk service may not work properly. Other fields may be completed as appropriate for your system.

DS1 Circuit Pack   As an example, administer the IP Trunk circuit pack at 01A09 to emulate T1 service for 24 channels. (See the table below for the settings to emulate E1 service for 30 channels). Note that you are administering the IP Trunk circuit pack in this procedure, not an actual DS1 circuit pack.

1 Type **add ds1 01A09** and press ENTER.

   01A09 is the address of the IP Trunk circuit pack. The DS1 Circuit Pack screen appears.

```
add ds1 1a09
                          DS1 CIRCUIT PACK

            Location: 01A09                       Name: T1-RB to ITS1
            Bit Rate: 1.544               Line Coding: ami-zcs
   Line Compensation: 3                   Framing Mode: d4
      Signaling Mode: robbed-bit



Interface Companding: mulaw
           Idle Code: 11111111


  MAINTENANCE PARAMETERS

      Slip Detection? n
```

2 Enter the field values as shown in the screen diagram above.

3 Press ENTER to save your changes.

More information

The table below summarizes field settings on the DS1 screen for the T1 and E1 service emulated for IP Trunk service.

Field	Setting for T1	Setting for E1
Bit Rate	**1.544**	**2.048**
Line Coding	**ami-zcs**	**ami-basic** or **hdb3**
Line Compensation	**3**	**3**
Framing Mode	**d4**	
Signaling Mode	**robbed-bit**	**cas**
Interface Companding	**mulaw**	**mulaw**
Idle Code	**11111111**	**11111111**
Slip Detection	**n**	**n**
Near End CSU type		**other**
Interconnect		**pbx**
Country Protocol		**1**

Creating an IP trunk group

Use this procedure to add a trunk group for IP trunks. You can administer multiple trunk groups on one IP Trunk circuit pack. Each trunk group is assigned to virtual ports, or channels, on the IP Trunk circuit pack, and your routing plan directs calls to certain trunks.

⚠ CAUTION:

The fields described in the following procedure must be completed as shown. If they are not, the IP Trunk service may not work properly. Other fields may be completed as appropriate for your system.

As an example, add trunk group 5 and assign 12 ports for a virtual connection to the IP Trunk circuit pack:

1 Type **add trunk-group 5** and press ENTER.

The Trunk Group screen appears.

```
                            TRUNK GROUP

Group Number: 5__                    Group Type: tie         CDR Reports: y
  Group Name: IP Trunk 01A09              COR: 85_     TN: 1__     TAC: 105_
   Direction: two-way_      Outgoing Display? y   Trunk Signaling Type: ____
 Dial Access? n             Busy Threshold: 99_           Night Service: ____
Queue Length: 0__                              Incoming Destination: ____
   Comm Type: voice                 Auth Code? n



TRUNK PARAMETERS
   Trunk Type (in/out): wink/wink___     Incoming Rotary Timeout(sec): 5_
    Outgoing Dial Type: tone_____            Incoming Dial Type: tone____
Wink Timer (msec): 300                    Disconnect Timing(msec): 500_
      Digit Treatment: insertion                           Digits: 9___
                                            Sig Bit Inversion: none
     Connected to Toll? n     STT Loss: low        DTT to DCO Loss: normal
    Incoming Dial Tone? y

 Disconnect Supervision - In? y  Out? n
 Answer Supervision Timeout: 0__           Receive Answer Supervision? y
```

Note: Depending on how the routing between sites is administered, inserting
            digits may be required. The example shows a "9" being inserted in front
            of any digits received from the IP Trunk. In most DEFINITY ECS
            switches, this is the access code for ARS and will allow the digits
            received on the trunk to be analyzed and rerouted based on ARS analysis
            table entries.

2 Enter the field values as shown in the screen diagram above.

Note: All IP trunk groups are administered as DS1 tie trunks (Group Type =
            tie).

3 Move to the Trunk Features page and type **n** in the Maintenance Tests field.

4 In the Suppress # Outpulsing field, type **y**.

Note: You may need to fill in other fields for your system.

5 Move to the Group Member Assignments page and add the ports (channels)
       you've purchased.

       You're assigning virtual ports, or channels, to the IP Trunk circuit pack. Each
       channel can carry one call at a time. The number of ports you can use is limited to
       the maximum number specified in your license.

```
                              TRUNK GROUP
                                  Administered Members(min/max):  1/12
                                  Total Administered Members: 12
GROUP MEMBER ASSIGNMENTS
      Port    Code   Sfx  Name          Night  Mode     Type   Ans Delay
 1: 01A0901  _____              _____ _____ _____ _____ ____
 2: 01A0902  _____              _____ _____ _____ _____ ____
 3: 01A0903  _____              _____ _____ _____ _____ ____
 4: 01A0904  _____              _____ _____ _____ _____ ____
 5: 01A0905  _____              _____ _____ _____ _____ ____
 6: 01A0906  _____              _____ _____ _____ _____ ____
 7: 01A0907  _____              _____ _____ _____ _____ ____
 8: 01A0908  _____              _____ _____ _____ _____ ____
 9: 01A0909  _____              _____ _____ _____ _____ ____
10: 01A0910  _____              _____ _____ _____ _____ ____
11: 01A0911  _____              _____ _____ _____ _____ ____
12: 01A0912  _____              _____ _____ _____ _____ ____
13: _____  _____              _____ _____ _____ _____ ____
14: _____  _____              _____ _____ _____ _____ ____
15: _____  _____              _____ _____ _____ _____ ____
```

6 Press ENTER to save your changes.

Administer AAR/ARS

You can use Automatic Alternate Routing (AAR) and Automatic Route Selection (ARS) to route calls over an IP trunk group just like any other trunk group. Unlike other trunk groups, however, *you must administer both the DEFINITY ECS switch software and Configuration Manager to route calls over IP trunks*. DEFINITY ECS uses the dialed digit string to select a route pattern — and thus a trunk group — for each call. The IP Trunk software matches each trunk line or each dialed string to a specific IP address.

The following administration needs to be performed on both the origin and destination switches — if you can't administer the remote switch, coordinate this work with the administrator at the other site. The following general instructions assume that you know how to use Automatic Alternate Routing (AAR) and Automatic Route Selection (ARS) to route conventional calls.

To administer IP call routing on DEFINITY ECS:

1 Administer the AAR and ARS Digit Analysis Table on DEFINITY ECS with the information you entered in the Switch Admin tables on the worksheet.

2 After you've assigned a route pattern in the AAR or ARS Digit Analysis Table, add the IP trunk group to that route pattern if you haven't already done so

3 Make the IP trunk group the first preference in the route pattern and perform any other administration required on the Route Pattern screen.

Note: If you want to route calls over the normal telephone network when transmission quality over the IP network is unacceptable, assign one or more conventional trunk groups to the route pattern as backups.

DEFINITY ECS will route appropriate calls to the IP trunk group. Now you need to administer Configuration Manager to route outgoing and incoming calls appropriately.

Backing up configuration manager

Lucent recommends you perform a backup to the Personal Computer Memory Card International Association (PCMCIA) flash disk whenever you make a change in the configuration manager. Keep the flash disk in a safe place so you can use the backup information if your MAPD circuit pack fails or if you want to restore to a previous known state.

Before you begin   Be sure your backup PCMCIA flash disk is inserted in the MAPD circuit pack.

Instructions   To perform a backup, begin at the Windows NT desktop:

1 Double-click the **IP Trunk Backup Restore** icon.

   The IP Trunk Backup/Restore Utility screen appears.

2 In the IP Trunk Backup/Restore Utility dialog screen, click **Files**, **Backup**.

   The IP trunk Backup screen appears.

3 In the IP Trunk Backup screen, click on the BACKUP button.

4 Remove the flash disk and store in a safe place.

Restoring IP trunk

Before you start   1 Remove the defective MAPD circuit pack from the switch.

2 Install the replacement MAPD circuit pack in the switch.

3 Insert the backup PCMCIA flash disk into the MAPD circuit pack.

Instructions   To perform a restore, begin at the Windows NT desktop:

1 Double-click the **IP Trunk Backup Restore** icon.

   The IP Trunk Backup/Restore Utility screen appears.

2 In the IP Trunk Backup/Restore Utility dialog screen, click **Files**, **Restore**.

   The IP trunk Backup screen appears.

3 In the IP Trunk Backup screen, click on the RESTORE button.

Confirming the number of available ports

To confirm that all ports allowed under your license are available, start at the Windows NT desktop:

1 Double-click the **Configuration Manager** icon.

IP Trunk Configuration Manager appears.

2 Click the **Telephony** tab.

The Telephony property page appears.

3 Click **Show All Ports**.

Verify that the number of enabled port matches the maximum your license allows. If not, contact your Lucent representative.

4 Click **OK** to close Configuration Manager.

NT administration procedures

The following procedures must be performed on the NT server to administer IP Trunks.

Administer call routing parameters on Configuration Manager

Outgoing calls

To administer routing for outgoing (originating) calls, start at the Windows NT desktop:

1 Double-click the **Configuration Manager** icon.

IP Trunk Configuration Manager appears.

2 Click the **Telephony** tab.

The Telephony property page appears.

3 In the Maximum Digits to be collected box, type the number of digits that the switch will forward to the IP Trunk software.

The Maximum Digits to be collected field entry will be determined by the type of dialing, or types of dialing that will be performed using IP Trunking. Refer to the Dial/Routing Plan Worksheets, or if extension dialing is used, this field would be the extension length in the DEFINITY private network.

⚠ CAUTION:

Set this field no higher than the maximum length of the digit string the switch sends. Otherwise, the IP Trunk application waits several seconds for additional digits and users experience delays.

4 Click the **Dial/Routing Plan** tab.

The Dial/Routing Plan window appears.
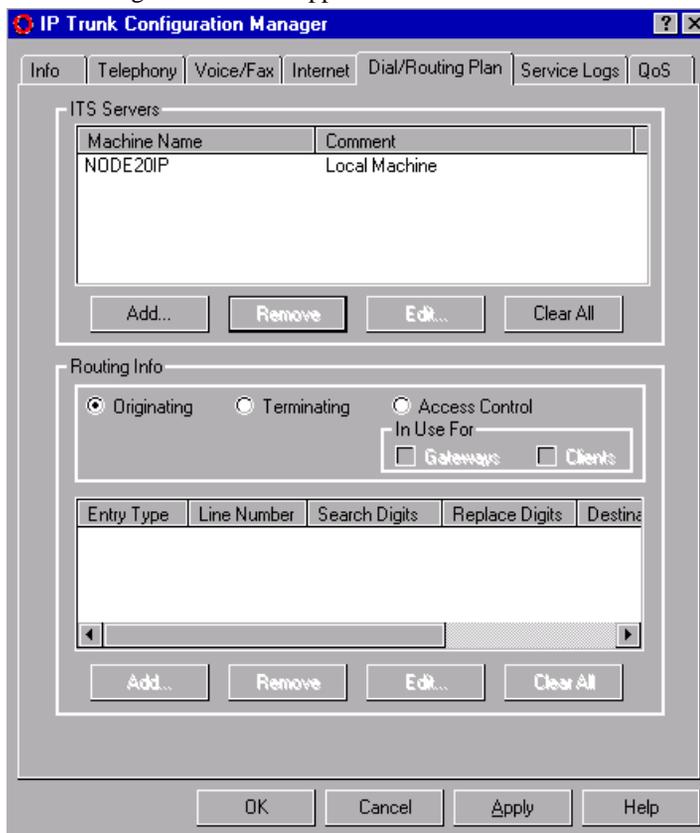
5 In the Machine Name list, select the machine name of the local IP Trunk server.

6 Select **Originating** and click **Add** (under Routing Info). The Add Originating Entry dialog box appears.
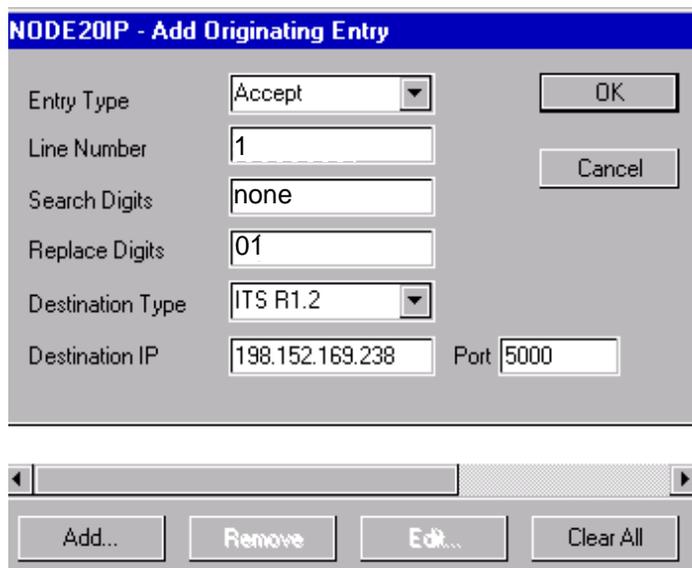
7   In the Add Originating Entry dialog box, you enter information that routes the call data between originating and terminating locations. You need to enter information that allows the IP Trunk to route calls based on dialed digits or on the line (port) that a call arrives on.

Note: It is not possible to mix dialing strategies in the IP Trunk software. Once line numbers are used to route calls, line numbers must be used on ALL entries in a routing table.

Routing information entered will be based on information that has been entered on the Dial/Routing Plan Worksheets, or on information collected based on the Procedures for Extension Dialing Between Sites.

Routing based on Dialed String

If routing will be based on dialed string, enter **any** in the Line Number field, then enter the information from the worksheets or a unique identifier for an extension range from the Procedures for Extension Dialing.

Routing based on Line Numbers

If routing will be based on line numbers that are dedicated to a specific location, you need to make sure that the same line number is used on both the originating and destination switches. This is done by prepending a string of digits unique to a line and associating it with that line number at both the originating and terminating IP Trunks. This code will be discarded at the terminating end.

For example, in the display above, the code number 01 is entered in the Replace Digits field as a unique digit string that will be associated with line number 1. If **none** is entered in the Search Digits field, no digits will be searched for. We don't need to search for dialed digits because the line numbers, which are associated with port numbers on the circuit pack, are dedicated in a DEFINITY trunk group to a particular location. Any digits received on these lines will always be routed to the same location. The only requirement is to prepend digits in the replace digits field to ensure that a call placed on a line (port) at the originating end can be terminated on the same line at the destination end. The digits prepended at the originating end and searched for at the terminating end must be the same.

Note: Any digits searched for must also be replaced if they are used to complete the routing of a call. If digit substitution will be needed, it may be necessary to put a digit string in the Search Digits field, and substitute those with new digits in the Replace Digits field.

8   For Entry Type, enter **accept** to allow incoming calls.

9   In the Search Digits field, type the digits entered in the Originating Search string box for this site in the Dial/Routing Plan Worksheets, or follow the Procedures for Extension Dialing Between Sites.

10   In the Replace Digits field, type the digits entered in the Originating Replace string box for this site in the Dial/Routing Plan Worksheets, or follow the Procedures for Extension Dialing Between Sites.

11   In the Destination Type field, select the appropriate value for the remote switch.

Select **ITS R1.2** if the other switch uses IP Trunk.

12 In the Destination Address (IP) field, type the Internet Protocol (IP) address of the destination IP Trunk on the remote switch.

13 In the Port field, type the port number to be used for this connection. The port number used in all IP Trunk servers is "5000".

14 Click **OK**.

The Add Originating Entry dialog box closes and the Dial/Routing Plan dialog box appears showing the information you entered.

Repeat the above steps for each originating entry (line or dialed string) specified in the Dial/Routing Plan Worksheets and/or the Procedures for Extension Dialing Between Sites.

Incoming calls

To administer routing for incoming (terminating) calls, start at the Windows NT desktop:

1 Double-click the **Configuration Manager** icon. The Configuration Manager appears.
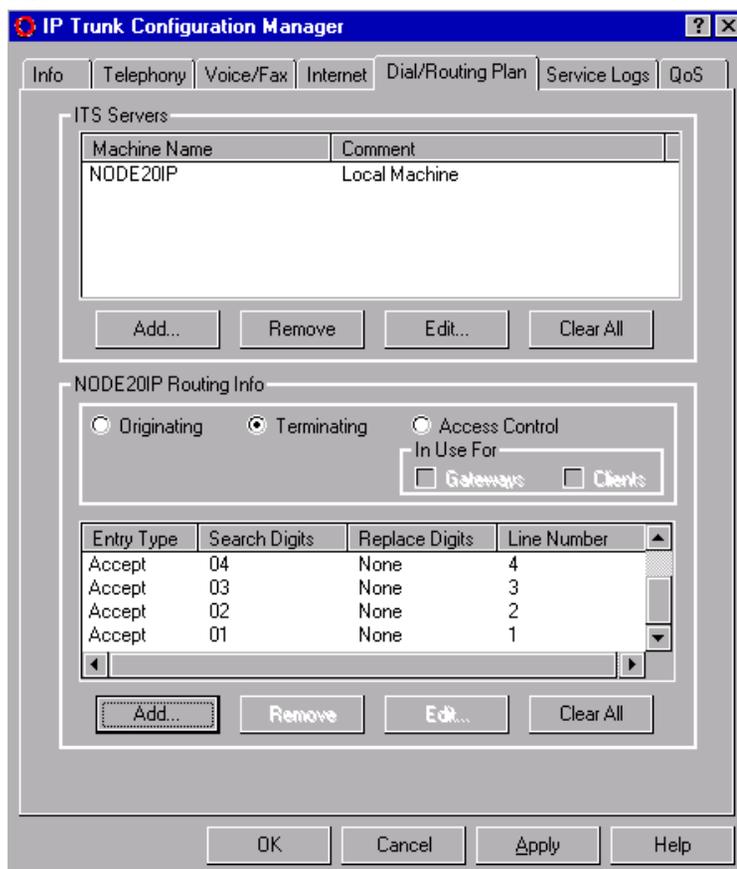
2 Click the **Dial/Routing Plan** tab.

The Dial/Routing Plan dialog box appears.

3 In the Machine Name box, select the local machine name for the local IP Trunk server.

4 Select **Terminating**

5 Click **Add** (under Routing Info).

The Add Terminating Entry dialog box appears.
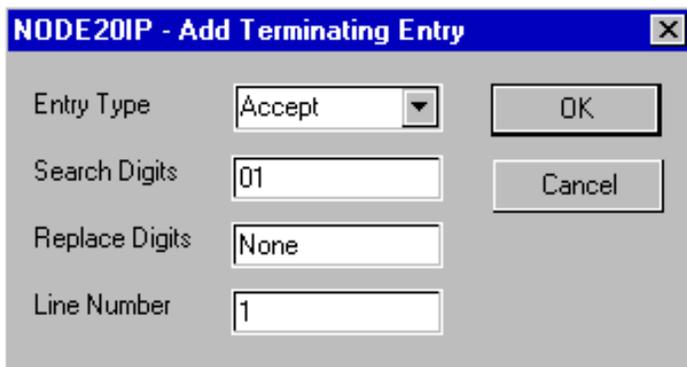
6 In the Add Terminating Entry dialog box, you enter information that routes the incoming call to a terminating location. You need to enter information that allows the IP Trunk to route calls based on dialed digits or on the line (port) that a call arrives on.

Note: It is not possible to mix dialing strategies in the IP Trunk software. Once line numbers are used to route calls, line numbers must be used on ALL entries in a routing table.

Routing information entered will be based on information that has been entered on the Dial/Routing Plan Worksheets, or on information collected based on the Procedures for Extension Dialing Between Sites.

Routing based on Dialed String

If routing will be based on dialed string, enter **any** in the Line Number field, then enter the information from the worksheets or a unique identifier for an extension range from the Procedures for Extension Dialing.

Routing based on Line Numbers

If routing will be based on line numbers that are dedicated to a specific location, you need to make sure that the same line number is used on both the originating and destination switches. This is done by prepending a string of digits unique to a line and associating it with that line number at both the originating and terminating IP Trunks. This code will be discarded at the terminating end.

For example, the code numbers 01, 02, ..., were prepended to the dialed string in the originating switch. For each line number, the code number is entered in the Search Digits field (as in the display above) as a unique digit string associated with the line number. Since the code number is not intended to be routed to the DEFINITY to complete the call, **none** is entered in the Replace Digits filed to prevent digit replacement. Remember, the digits prepended at the originating end and searched for at the terminating end must be the same.

Note: Any digits searched for must also be replaced if they are used to complete the routing of a call. If digit substitution will be needed, it may be necessary to put a digit string in the Search Digits field, and substitute those with new digits in the Replace Digits field.

7 For Entry Type, enter **accept** to allow incoming calls.

8 In the Search Digits field, type the digits entered in the Terminating Search string box for this site in the Dial/Routing Plan Worksheets, or follow the Procedures for Extension Dialing Between Sites.

9 In the Replace Digits field, type the digits entered in the Terminating Replace string box for this site in the Dial/Routing Plan Worksheets, or follow the Procedures for Extension Dialing Between Sites.

10 Click **OK**.

The Add Terminating Entry dialog box closes, and the Dial/Routing Plan property page appears showing the information you entered.

11 Repeat the above steps for each terminating entry (line or dialed string) specified in the Dial/Routing Plan Worksheets and/or the Procedures for Extension Dialing Between Sites.

12 Click **OK** to save your changes and close Configuration Manager.

The Dial/Routing Plan on the remote switch must be administered for the Originating and Terminating Routing Info in a similar manner.

The IP Trunk software is now configured without restrictions on remote access.

Stopping IP Trunk service

Note: Before you stop IP Trunk service, you must busy out the IP trunk group on the DEFINITY ECS; then, after you restart IP Trunk service, release the IP trunk group.

To stop IP Trunk service:

1 Busy out the IP trunk group on DEFINITY ECS.

2 Open the Windows NT Control Panel.

3 Double-click **Services**.

The Services dialog box appears.

4 In the Service column, select **IP Trunk Service**.

5 Click **Stop**.

Started disappears and the Status column does not show an entry beside Internet Telephony Server.

6 Click **Close**.

Starting IP Trunk service

Use this procedure only if you have manually stopped your IP Trunk service.

To start IP Trunk service:

1 Log onto the NT server.

2 Open the Windows NT Control Panel.

3 Double-click **Services**.

   The Services dialog box appears.

4 In the Service column, select **IP Trunk Service**.

5 Click **Start**.

   Started appears in the Status column.

6 Click **Close**.

7 Release the IP trunk group on DEFINITY ECS.

Change companding to A-Law

For systems that use A-Law instead of Mu-Law companding, you need to change two settings on the System Parameters Country Options screen and edit a .ini file in the Windows NT C: directory on the TN802.

On the SAT:

1 On the System Parameters Country Options screen, change the Companding Mode field to **A-Law** and change the Base Tone Generator Set field to **2**.

2 Busyout the trunk group associated with the IP trunk by typing **busyout board** *UUCSS* and pressing Enter.

In the Windows interface to TN802B:

3 Click on **Control Panel > Services.**

4 Highlight **IP Trunk Service**, then click on **Stop**.

5 In the lower left-hand corner, right-click **Start > Explore**.

6 Go to the c: drive and click on its, then bin.

7 Double-click on the its.ini file to open it in Notepad.

8 Under the [MediaLib] section, go to COMPANDING=MLAW. Change **MLAW** to **ALAW**.

9 Click on **File > Save** to save the file.

10 Click on **File > Exit** to exit Notepad.

11 Click on **Control Panel > Services.**

12 Highlight **IP Trunk Service**, then click on **Start**.

Note: Do not select Startup.

After service has started, go to the SAT:

13 Release the trunk group associated with the IP trunk by typing **release board** *UUCSS* and pressing Enter.

Procedures for Extension Dialing Between Sites

These procedures outline two different extension dialing configurations that may be used from a particular site to other IP Trunk sites. The first configuration is non-DCS, where one trunk group exists in DEFINITY and is routed through the IP Trunk server to many different IP Trunk locations. The second configuration is DCS, where the trunks are dedicated to specific locations — users are routed to a different trunk group; that is, different trunk ports, within the DEFINITY, based on the digits dialed. The IP Trunk server routes calls based on the ports or lines the call was placed on. Each of these configurations is outlined below and examples are provided.

Non-DCS Configuration
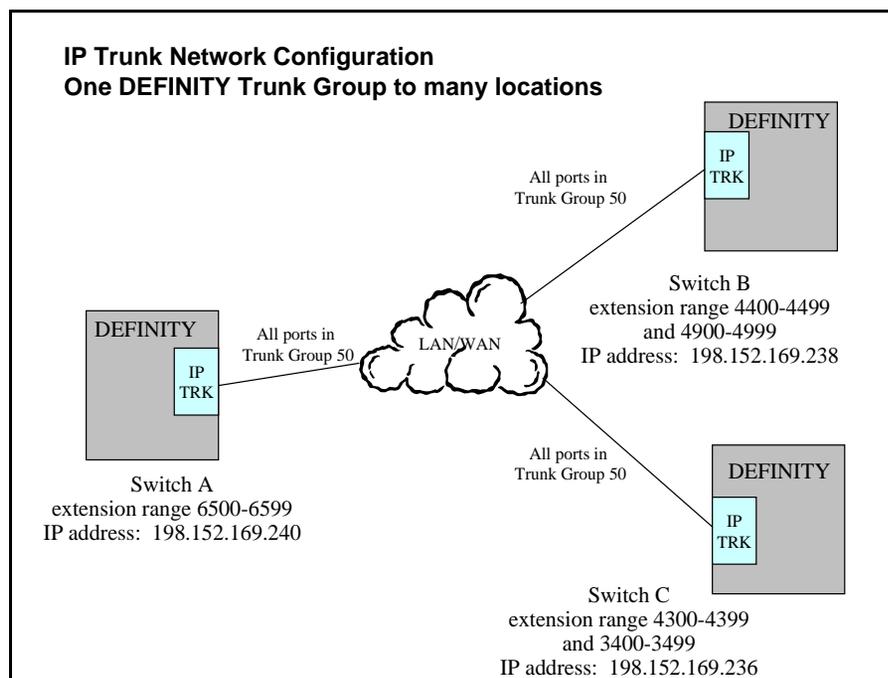
In the configuration above, each DEFINITY switch has all of the IP Trunk ports in one trunk group, trunk group 50. Extension calls to the other DEFINITY switches in the network are routed to this trunk group and the IP Trunk server's administration evaluates the dialed strings it receives and routes the calls to the appropriate IP address based on that dialed string.

To arrange a network in this configuration, an administrator will need to know each IP Trunk server's IP address and the range of extensions in the DEFINITY at that location.

In Switch A above, the IP Trunk server's originating entries will be as follows, in order for calls through that IP Trunk server to be routed to Switch B and Switch C appropriately.

Line	Search String	Replace String	IP Address	
Any	44	44	198.152.169.238	(Switch B)
Any	49	49	198.152.169.238	(Switch B)
Any	43	43	198.152.169.236	(Switch C)
Any	34	34	198.152.169.236	(Switch C)

These entries allow any line/port on the IP Trunk server to carry calls to the other two locations. It also allows each unique string (extension range) destined for one of the other two locations to be evaluated and routed to the appropriate location. There would need to be terminating entries in Switches B and C that correspond to the entries above, allowing the appropriate dialed strings to be terminated at those locations.

For example, in order for calls to be received at Switch A, from Switch B and C, the terminating entry in the IP Trunk would be as follows:

Line	Search String	Replace String	
Any	6	6	(From any switch to Switch A)

Only one digit is required to uniquely identify calls to this location, no other location has extensions that begin with "6," and since this encompasses the entire range of extension numbers, only this entry is required.

DCS over IP Trunk

IP Trunk supports most of the DCS features. DCS signaling with IP Trunk can be either X.25 or TCP/IP. For X.25 DCS signaling, the signaling data path is over a tie trunk connection between the switches. For TCP/IP DCS signaling, the signaling data is handled by the C-LAN circuit pack and can be either point-to-point (ppp) across a tie trunk facility or over the IP network. Figure 10 shows the voice and signaling data path options for IP Trunk with DCS.

Figure 10. IP Trunk with DCS
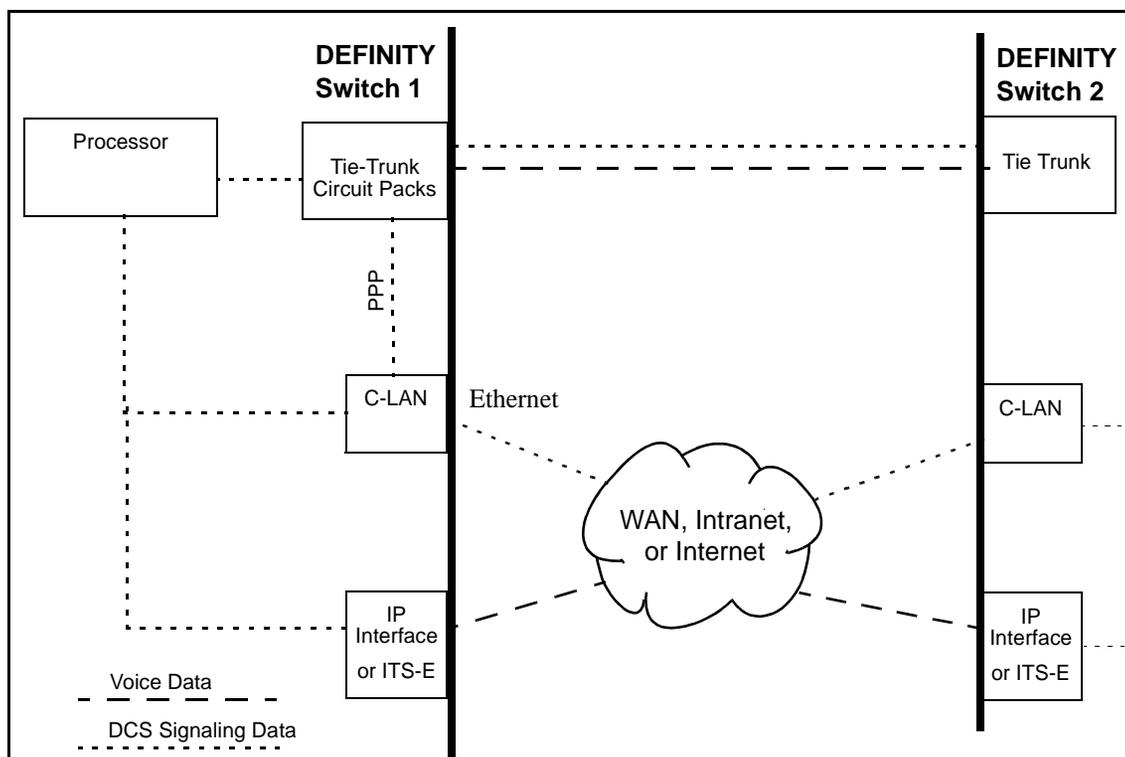
DCS Administration   The administration of DCS with IP Trunk is the same as for DCS without IP Trunk. You can set up IP Trunk connections for DCS using either X.25 or TCP/IP protocols for DCS signaling.

X.25 signaling

For X.25 DCS signaling, you administer the connection on the Data Module screen and the Processor Channel Assignment screen. The type of data module is **proc-intf** for an R7si or **x.25** for an R7r. Signaling via X.25 is not supported on the csi model.

TCP/IP signaling

For TCP/IP signaling, you administer the connection on the Data Module screen and the Processor Channel Assignment screen. The data module type is `ppp` for a point-to-point signaling connection or `ethernet` for signaling over an IP network.

In addition, TCP/IP signaling requires administration of the Node Names screen and, in some cases, the IP Routing screen.

Details of the administration procedures for signaling connections are given in Chapter 3 of this book.

DCS or Dedicated Trunks to Specific Locations Configurations

IP Trunk Network Configuration
DCS or dedicated DEFINITY Trunk Groups to specific locations

DEFINITY

IP TRK

Trk Grp 64
ports/lines 4, 5, 6

Switch B
extension range 4400-4499
and 4900-4999
IP address: 198.152.169.238

DEFINITY

IP TRK

LAN/WAN

Trk Grp 97
ports/lines 7, 8, 9

Switch A
extension range 6500-6599
IP address: 198.152.169.240

Trk Grp 31
ports/lines 1, 2, 3

DEFINITY

IP TRK

Switch C
extension range 4300-4399
and 3400-3499
IP address: 198.152.169.236

In the configuration above, each DEFINITY switch has a separate trunk group that is dedicated to being linked to another site, each of these trunk groups has a specified group of ports/lines that is coordinated at the other end. Extension calls to the other DEFINITY switches in the network are routed to unique trunk groups based on ARS/AAR digit analysis within the DEFINITY, the IP Trunk server's administration routes the calls to the appropriate IP address based on the port/line that the call arrives on. This configuration works whether DCS is administered between these locations, or if users simply dial extension numbers to be routed to the appropriate switch and do not wish to receive DCS features. To arrange a network in this configuration, an administrator will need to know each IP Trunk server's IP address, and the ports/lines that are dedicated to that particular address

On Switch A

Line	Search String	Replace String	IP Address	
1	None	01	198.152.169.236	(Switch C)
2	None	02	198.152.169.236	(Switch C)
3	None	03	198.152.169.236	(Switch C)
4	None	04	198.152.169.238	(Switch B)
5	None	05	198.152.169.238	(Switch B)
6	None	06	198.152.169.238	(Switch B)

On Switch B

Line	Search String	Replace String	IP Address	
4	None	04	198.152.169.240	(Switch A)
5	None	05	198.152.169.240	(Switch A)
6	None	06	198.152.169.240	(Switch A)
7	None	07	198.152.169.236	(Switch C)
8	None	08	198.152.169.236	(Switch C)
9	None	09	198.152.169.236	(Switch C)

On Switch C

Line	Search String	Replace String	IP Address	
1	None	01	198.152.169.240	(Switch A)
2	None	02	198.152.169.240	(Switch A)
3	None	03	198.152.169.240	(Switch A)
7	None	07	198.152.169.238	(Switch B)
8	None	08	198.152.169.238	(Switch B)
9	None	09	198.152.169.238	(Switch B)

These entries allow a specific line/port on the IP Trunk server to carry calls to a specific other location. No digits are searched for, as we already know that the DEFINITY has done the appropriate digit analysis. A unique string is applied in front of each dialed string by adding a replace string; each replace string is unique to that line/port, allowing for the terminating end to associate a call to the same line it left on at the originating end.

On Switch A

Line	Search String	Replace String	
1	01	None	(From Switch C)
2	02	None	(From Switch C)
3	03	None	(From Switch C)
4	04	None	(From Switch B)
5	05	None	(From Switch B)
6	06	None	(From Switch B)

On Switch B

Line	Search String	Replace String	
7	07	None	(From Switch C)
8	08	None	(From Switch C)
9	09	None	(From Switch C)
4	04	None	(From Switch A)
5	05	None	(From Switch A)
6	06	None	(From Switch A)

On Switch C

Line	Search String	Replace String	
1	01	None	(From Switch A)
2	02	None	(From Switch A)
3	03	None	(From Switch A)
7	07	None	(From Switch B)
8	08	None	(From Switch B)
9	09	None	(From Switch B)

When a call terminates on a line, we search for the unique string associated with that line, but we do not replace it. This reforms the digit string back to the way it left the originating DEFINITY, and passes the appropriate digits to the DEFINITY at the terminating end.

Rerouting calls when IP transmission quality is poor

When transmission quality over the IP network is unacceptable, use AAR or ARS with Configuration Manager to reroute calls over private and public telephone networks. This is called PSTN Fallback.

Before you start
Before you perform this procedure, complete the following tasks:

Instructions
As an example, let's administer PSTN Fallback for trunk group 80, which is already set up.

To start PSTN Fallback, begin at the Windows NT desktop:

1 Double-click the **Configuration Manager** icon.

   IP Trunk Configuration Manager appears.

2 Click the **QoS** tab.

   The Quality of Service property page appears.

3 Select Line Pool (trunk group) **80**.

4 Click **Properties**.

   The Line Pool Properties dialog box appears.

5 Click **Monitor and PSTN Fallback**.

   IP trunk will now monitor this trunk group and block access if either of the service quality criteria are exceeded.

6 Click **OK** to close the Line Pool Properties dialog box.

7 If you want to change the default criteria used to measure service quality, change the settings in the following fields on the QoS tab:

   ~ Sampling Interval (sec)
   ~ Samples to Average (number)
   ~ Packet Loss Threshold (%): Low
   ~ Packet Loss Threshold (%): High
   ~ Round Trip Delay Threshold (msec.): Low
   ~ Round Trip Delay Threshold (msec.): High

8 Click **OK** to save your changes and close Configuration Manager.

More information   The Packet Loss Threshold and Round Trip Delay Threshold fields work like this:

- If the value in either High field is exceeded, access to the IP trunk group is blocked.

- Access to the IP trunk group is only allowed again when the average for both measurements drops below the values in the Low field.

Placing a test telephone call

To place a test telephone call to the remote switch over IP trunk service:

1 Contact the switch administrator at the remote site to verify that IP trunk service is set up on the remote switch:

   ~ The connection between the MAPD circuit pack and the switch is configured
   ~ Dial plan and routing is administered
   ~ IP trunk service is started

2 Dial the telephone number of the remote site.

For example, if prior to installing IP trunk you dialed 9, then 011 plus the country code followed by the telephone number, then dial the number the same way to test IP trunk service.

If your call does not go through, refer to .

Setting up alerts on IP trunks

Whenever something happens on IP trunks that might affect service quality, Windows NT™ can display an alert in a popup window. You can select the IP address for the alert messages and notify a computer other than the IP trunk display screen. NT alerts allow you to monitor IP trunk service on one or more switches.

Instructions   To set up alerts on the IP trunk server, start at the Windows NT desktop:

1 Go to NT's Control Panel.

2 Double-click **Services**.

3 Select **Messenger** and click **Start**.

   Started appears in the Status column.

4 Select **Alerter** and click **Start**.

   Started appears in the Status column.

5 Click **Close**.

To specify the computers on which alerts should be received:

1 Go to NT's Control Panel.

2 Double-click **Server**.

3 Click **Alerts**.

   The Alerts dialog box appears.

4 In the dialog box, enter the NT networking computer names for the systems on which alerts should be received. For example: ICB189-85, ICB189-14.

Note: Do not specify the IP address of the system. You must specify the NT networking computer name. If another person is responsible for LAN administration, consider making this a joint activity.

To set up the receiving machines

1 On each system which received alerts, start the Messenger service. Refer to steps 1–3 in the first procedure above.

To receive alerts on systems in a different domain (from the IP trunk system that is generating the alerts) you must use LMHOST services

1 In Windows NT, go to the c:\winnt\system32\drivers\etc subdirectory.

2 Locate the lmhosts.sam file.

3 Edit this file. Add an entry (row) at the end of the file for each system that will receive alerts from this IP trunk application. Each entry (row) contains the IP address and NT networking computer name of the receiving system, separated by a tab character. Each entry (row) must be followed by a hard return.

Your entries might look like this:

> 135.17.189.85   ICB189-85
>
> 135.17.189.11   ICB189-11
>
> 135.17.189.14   ICB189-14

Every machine on which alerts should be received must have an entry (row) in this file.

Save the file and copy it to lmhosts (without any extension).

Note: Most text editors, such a NotePad, automatically add an extension to the file name when it is saved. You must save the file without an extension, or rename it to lmhosts with no file extension.

Alert types

IP trunk generates alerts when:

- The IP trunk service stops.

- The DSP card does not respond.

- The Dial Plan has changed.

- The access rules have changed.

- The initialization file (its.ini) is missing.

- The dial/routing plan file (gk.ini) is missing.

Testing Alerts

You can test alerts by generating a "dial plan has changed" alert.

To generate a "dial plan has changed" alert:

1 Open Configuration Manager.

2 Click the **Dial/Routing Plan** tab.

3 Add a new machine entry and click **Add**.

Viewing error messages

The IP trunk application logs error messages and stores the error messages and warnings in the Windows NT Event Viewer.

Note: Set System logs and the Application logs to *Overwrite Events as Needed* for the NT Event Viewer.

To view error messages and warnings in the Windows NT Event Viewer:

1 Click **Start**, **Programs**, **Administrative Tools**.

2 Click **Event Viewer**. If necessary, click **Log**, **Application** to view the application window.

   The Event Viewer application window displays with a list of events, the date and time the events occurred, and the source, category, and event number.

3 Double-click the event that you want to view.

   Details about the selected event display in the Event Detail dialog box.

4 Click **Close**.

Troubleshooting IP trunk

If IP calls are not going through, try these basic procedures before contacting an authorized Lucent Technologies Service Center for assistance.

Check the IP trunk service

Check that the IP trunk service is running.

1 Go to the Windows NT™ Control Panel

2 Double-click on the Services icon to launch the Services Control Manager.

3 Scroll down the list of NT services and make sure the status of IP Trunk service is "started."

If the service is not running, go to the Services Control Manager. Select **IP Trunk Service** and click the Start button. If the service does not start, note the error message displayed on the screen, launch the Windows NT Event Viewer and save the logs related to this error. Contact your Lucent representative for further assistance.

After the IP trunk service is started, proceed to the next section.

Check physical connections

Check the physical connections on:

~ RJ-45 connection to LAN

~ Analog telephone line to external modem

~ Video cable from monitor to video connection on switch (if applicable)

~ Keyboard/mouse cables (if applicable)

All the vital connections are labeled from the factory on the cable set used with the MAPD circuit pack.

Check LAN functions

Check LAN functions. The following table summarizes the basic tests. Execute the DOS test commands in your NT command window.

Network Test Function	DOS Test Command (type at the DOS prompt for your computer)	Reasons for Failure
Current network configuration settings	Use ipconfig or ipconfig /all	Settings typed incorrectly. Record settings and verify settings with network administrator
Network interface card functionality	Ping IP loopback address (or IP trunk's own IP address) For example, ping 127.0.0.1	• IP address typed incorrectly • Improper TCP/IP software installation • Duplicate network IP address (may happen with your own IP address)

1 of 2

Network Test Function	DOS Test Command (type at the DOS prompt for your computer)	Reasons for Failure
Local network connectivity	Ping IP address of default gateway (available from your LAN administrator) For example, ping 192.20.239.1	• IP address typed incorrectly • LAN cable not plugged into network card • Wrong gateway (default gateway on different subnet) • Gateway machine is down
Wide Area Network connectivity	• Ping IP address of known machine outside the local default gateway (can use remote IP trunk application or any machine) • Use **traceroute** to determine which intermediate gateway is malfunctioning For example, tracert 192.20.239.1	• Gateway machine error • Intermediate gateway machine errors

2 of 2

Maintaining the performance of the IP trunk server

Follow these guidelines to maintain optimal performance on your IP trunk server.

- Check that the server has at least 64 MB of RAM installed.

- Check that the C drive has the following virtual memory allocation:

- Initial Size (MB): 50

- Maximum Size (MB): 750

- Check that the performance boost for the foreground application is set to "None."

- Check that any applications that consume lots of CPU cycles and are not needed to run the server, such as screen saver utilities, are not running on the server.

- Check that CDR and/or trace files are not consuming all of the disk space.

- Is there little or no space available on the C drive? In Configuration Manager, Service Logs tab, check that the "free disk space" threshold parameter is set correctly (that is, to a value other than zero).

Configuring Microsoft NetMeeting™ on a PC

After NetMeeting 2.0 is installed, the first time you start it the Configuration Wizard prompts you to provide general information. After you provide the general information, you must change some audio settings. Procedures for these tasks follow.

Providing general information for the Configuration Wizard

The first time you start NetMeeting, follow these steps.

1 To start NetMeeting, from the Windows Task bar click Start>Programs>NetMeeting (default location).

Note: You may follow a different procedure to start NetMeeting depending on how your system is set up.

2 When prompted by the Configuration Wizard, respond as follows:

- Choose not to log on to a directory server.

- Provide your name, e-mail address, and other information.

- Categorize your information as "For Business Use" or as appropriate.

- Choose LAN or appropriate modem speed, (for example, 28.8.) for network connection.

- Click the Starting Recording button and speak into the microphone so that NetMeeting can adjust the audio settings. This can also be accomplished using the Audio Tuning Wizard from the main user interface.

Changing Audio Settings	To change the audio settings so that NetMeeting operates properly with the IP trunk application, follow these steps.

1 From the Tools menu choose Options and then select the Audio tab. The Audio tab settings appear as shown in Figure 5.

Figure 11.   Audio Tab Settings in Options Dialog Box
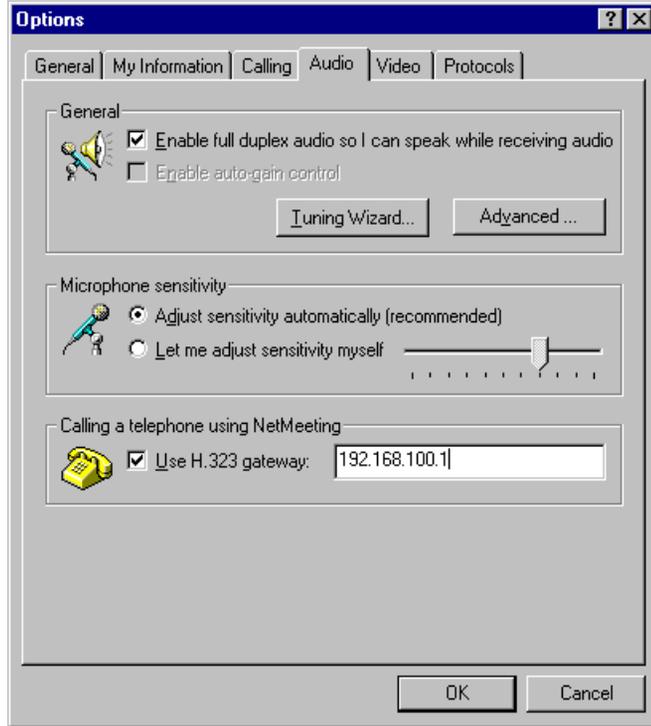
2 Click the check box for Enable full duplex audio so I can speak while receiving audio.

If this option is dimmed, it is not accessible to change. This means your sound card is not full duplex. You need to install updated sound card drivers to make the card full duplex.

3 Click the check box for Use H.323 gateway and type the IP address of the IP trunk in the corresponding field.

4 In the same Options window, select the Calling tab and clear the Refresh directory listing check box.

5 Click OK to save your changes and close the Options dialog box.

Making Calls to the IP trunk application from NetMeeting

Before you place a call, make sure the following settings are correct.

- If You Have a LAN Connection:

- Make sure the TCP/IP settings are correct on the client machine. To verify this, open an NT command window and ping the IP trunk.

- If You Have a Modem Connection:

  Make sure you have the correct dial-up networking settings for the remote RAS server that you are connecting to. You should be able to get these settings from the network administrator of the remote PPP/RAS server. Once the dial-up connection is made, you can ping the IP trunk.

To place a call:

1 On the Windows Taskbar, clicking Start>Programs>NetMeeting to start NetMeeting. This path may vary depending on the configuration and operating system of your computer.

The NetMeeting main window appears.
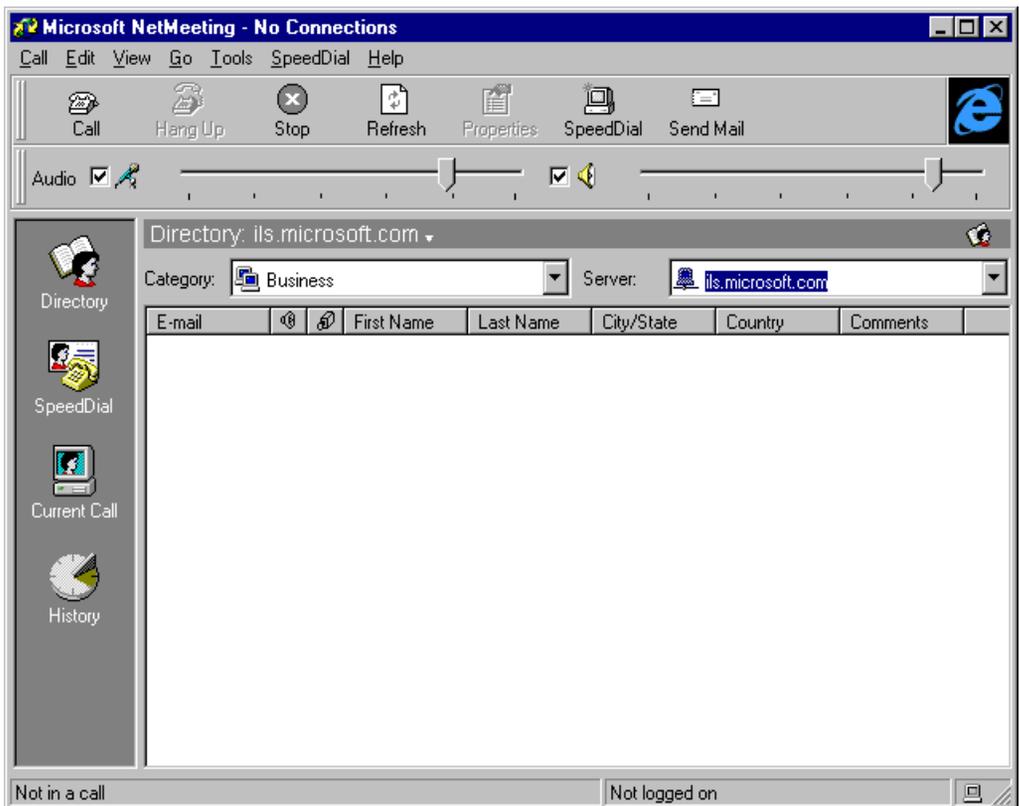
2 In the NetMeeting main window, click the Call icon located in the upper left-hand corner of the tool bar.

The New Call dialog box appears.
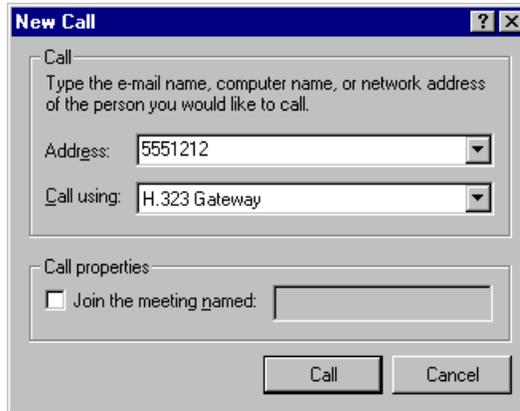
3 In the Address box, type the phone number you want to call.

Type the number exactly as you dial it from a regular phone. Do not use spaces or hyphens between numbers.

If your IP trunk application is configured to require an access code, verify the correct dialing sequence with the switch administrator.

4 In the Call using box, select H.323 Gateway from the pull-down menu.

5 Click the Call button to dial and initiate the call.

6 Use the microphone and headphones to talk to the person on the receiving end.

Placing a test telephone call

After starting the IP Trunk service, place a test telephone call to the remote switch.

Setting up alerts on IP trunks

Whenever something happens on IP trunks that might affect service quality, Windows NT™ displays an alert in a popup window. You can select the IP address for the alert messages and notify a computer other than the IP Trunk display screen. NT alerts allow you to monitor IP Trunk service on one or more switches.

Viewing error messages

The IP Trunk application logs Error Messages and will store the error messages and warnings in the Windows NT Event Viewer.

Note: Log settings for the NT Event Viewer should be set to *Overwrite Events as Needed* for both the System and the Application logs.

Troubleshooting IP Trunk

If IP calls are not going through, try these basic procedures before contacting an authorized Lucent Technologies Service Center for assistance.

• Check the IP Trunk service

• Check physical connections

• Check LAN functions

IP Trunk Worksheets

Worksheet 1: Two Site Solution: Both DEFINITY T1

SITE 1

Field Code	Field Name	Field Value
1A	International Access Code	
1B	Country Code	
1C	Long Distance Access Code	
1D	Area Code	
1E	Exchange	
1F	ARS Feature Access Code	
1G	IP Address	
1H	PBX-to-IP trunk Route Pattern Number	
1I	PBX-to-IP Trunk Group Number	
1J	PSTN Trunk Group Number (for PSTN fallback)	

SITE 2

Field Code	Field Name	Field Value
2A	International Access Code	
2B	Country Code	
2C	Long Distance Access Code	
2D	Area Code	
2E	Exchange	
2F	ARS Feature Access Code	
2G	IP Address	
2H	PBX-to-IP trunk Route Pattern Number	
2I	PBX-to-IP Trunk Group Number	
2J	PSTN Trunk Group Number (for PSTN fallback)	

Worksheet 2: Two Site Solution: DEFINITY T1 Administration
(No Off-Premise Dialing at Remote Site Only)

SITE 1

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Dialed String		1A2B2D2E	1C2D2E	2E
Total Mn		*	*	*
Total Mx		*	*	*
Rte Pat		1H	1H	1H

*Set this value to the total length of the number the user will dial, not including ARS feature access code (for example, 9).

Create route pattern number <1H> with:	
First route	*Second route*
Group No: 1I	Group No: 1J
No. Del Digits: blank	No. Del Digits: blank
Inserted Digits: blank	Inserted Digits: blank

SITE 2

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Dialed String		2A1B1D1E	2C1D1E	1E
Total Mn		*	*	*
Total Mx		*	*	*
Rte Pat		2H	2H	2H

*Set this value to the total length of the number the user will dial, not including ARS feature access code (for example, 9).

Create route pattern number <2H> with:	
First route	*Second route*
Group No: 2I	Group No: 2J
No. Del Digits: blank	No. Del Digits: blank
Inserted Digits: blank	Inserted Digits: blank

Worksheet 2 continued.

SITE 1

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Originating				
Search string		1A2B2D2E	1C2D2E	2E
Replace string		2E	2E	2E
IP Address		2G	2G	2G
Terminating				
Search string		1E	1E	1E
Replace string		None	None	None

SITE 2

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Originating				
Search string		2A1B1D1E	2C1D1E	1E
Replace string		1E	1E	1E
IP Address		1G	1G	1G
Terminating				
Search string		2E	2E	2E
Replace string		None	None	None

Worksheet 3: Two Site Solution: DEFINITY T1 Administration
(Off-Premise Dialing at Remote Site [same area code, any exchange])

SITE 1

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	Fill in with your actual values	Different Country	Same country, different area code	Same area code
Dialed String		1A2B2D	1C2D	NA**
Total Mn		*	*	
Total Mx		*	*	
Rte Pat		1H	1H	

*Set this value to the total length of the number the user will dial, not including the ARS feature access code (for example, 9).
**This type of routing is not allowed.

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	Fill in with your actual values	Different Country	Same country, different area code	Same area code
Originating				
Search string		1A2B2D	1C2D	NA**
Replace string		1A2B2D	1C2D	
IP Address		2G	2G	
Terminating				
Search string		2A1B1D	2C1D	NA**
Replace string		1F	1F	

SITE 2

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	Fill in with your actual values	Different Country	Same country, different area code	Same area code
Dialed String		2A1B1D	2C1D	NA**
Total Mn		*	*	
Total Mx		*	*	
Rte Pat		2H	2H	

*Set this value to the total length of the number the user will dial, not including the ARS feature access code (for example, 9).
**This type of routing is not allowed.

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	Fill in with your actual values	Different Country	Same country, different area code	Same area code
Originating				
Search string		2A1B1D	2C1D	NA**
Replace string		2A1B1D	2C1D	
IP Address		1G	1G	
Terminating				
Search string		1A2B2D	1C2D	NA**
Replace string		2F	2F	

Worksheet 4: Two Site Solution: DEFINITY T1 Administration
(Off-Premise Dialing at Remote Site [same area code, only exchange X...**])

SITE 1

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Dialed String		1A2B2DX	1C2DX	X
Total Mn		*	*	*
Total Mx		*	*	*
Rte Pat		1H	1H	1H

*Set this value to the total length of the number the user will dial, not including the ARS feature access code (for example, 9).

**Substitute all X's in these tables for each exchange X, which may be 2, 3, or 4 digits. You need one entry (both PBX and ITS) for each exchange X.

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Originating				
Search string		1A2B2DX	1C2DX	X
Replace string		1A2B2DX	1C2DX	X
IP Address		2G	2G	2G
Terminating				
Search string		2A1B1DX	2C1DX	X
Replace string		1FX	1FX	1FX

SITE 2

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Dialed String		2A1B1DX	2C1DX	X
Total Mn		*	*	*
Total Mx		*	*	*
Rte Pat		2H	2H	2H

*Set this value to the total length of the number the user will dial, not including the ARS feature access code (for example, 9).

**Substitute all X's in these tables for each exchange X, which may be 2, 3, or 4 digits. You need one entry (both PBX and ITS) for each exchange X.

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Originating				
Search string		2A1B1DX	2C1DX	X
Replace string		2A1B1DX	2C1DX	X
IP Address		1G	1G	1G
Terminating				
Search string		1A2B2DX	1C2DX	X
Replace string		2FX	2FX	2FX

Worksheet 5: Two Site Solution: DEFINITY T1 Administration
(Off-Premise Dialing at Remote Site [same country, any area code])

SITE 1

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Dialed String		1A2B	1C	1C
Total Mn		*	*	*
Total Mx		*	*	*
Rte Pat		1H	1H	1H

*Set this value to the total length of the number the user will dial, not including the ARS feature access code (for example, 9).

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Originating				
Search string		1A2B	1C	1C
Replace string		1A2B	1C	1C
IP Address		2G	2G	2G
Terminating				
Search string		2A1B	2C	2C
Replace string		1F1C	1F1C	1F1C

SITE 2

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Dialed String		2A1B	2C	2C
Total Mn		*	*	*
Total Mx		*	*	*
Rte Pat		2H	2H	2H

*Set this value to the total length of the number the user will dial, not including the ARS feature access code (for example, 9).

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Originating				
Search string		2A1B	2C	2C
Replace string		2A1B	2C	2C
IP Address		1G	1G	1G
Terminating				
Search string		1A2B	1C	1C
Replace string		2F2C	2F2C	2F2C

Worksheet 6: Two Site Solution: DEFINITY T1 Administration
(Off-Premise Dialing at Remote Site [same country, only area code X...**])

SITE 1

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Dialed String		1A2BX	1CX	1CX
Total Mn		*	*	*
Total Mx		*	*	*
Rte Pat		1H	1H	1H

*Set this value to the total length of the number the user will dial, not including the ARS feature access code (for example, 9).

**Substitute all X's in these tables for each area code X, which may be 2, 3, or 4 digits. You need one entry (both PBX and ITS) for each area code X.

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Originating				
Search string		1A2BX	1CX	1CX
Replace string		1A2BX	1CX	1CX
IP Address		2G	2G	2G
Terminating				
Search string		2A1BX	2CX	2CX
Replace string		1F1CX	1F1CX	1F1CX

SITE 2

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Dialed String		2A1BX	2CX	2CX
Total Mn		*	*	*
Total Mx		*	*	*
Rte Pat		2H	2H	2H

*Set this value to the total length of the number the user will dial, not including the ARS feature access code (for example, 9).

**Substitute all X's in these tables for each area code X, which may be 2, 3, or 4 digits. You need one entry (both PBX and ITS) for each area code X.

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Originating				
Search string		2A1BX	2CX	2CX
Replace string		2A1BX	2CX	2CX
IP Address		1G	1G	1G
Terminating				
Search string		1A2BX	1CX	1CX
Replace string		2F2CX	2F2CX	2F2CX

Worksheet 7: Two Site Solution: DEFINITY T1 Administration
(Off-Premise Dialing at Remote Site [any different country])

SITE 1

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Dialed String		1A	1A	1A
Total Mn		*	*	*
Total Mx		*	*	*
Rte Pat		1H	1H	1H

*Set this value to the total length of the number the user will dial, not including the ARS feature access code (for example, 9).

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Originating				
Search string		1A	1A	1A
Replace string		1A	1A	1A
IP Address		2G	2G	2G
Terminating				
Search string		2A	2A	2A
Replace string		1F1A	1F1A	1F1A

SITE 2

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Dialed String		2A	2A	2A
Total Mn		*	*	*
Total Mx		*	*	*
Rte Pat		2H	2H	2H

*Set this value to the total length of the number the user will dial, not including the ARS feature access code (for example, 9).

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Originating				
Search string		2A	2A	2A
Replace string		2A	2A	2A
IP Address		1G	1G	1G
Terminating				
Search string		1A	1A	1A
Replace string		2F2A	2F2A	2F2A

Worksheet 8: Two Site Solution: DEFINITY T1 Administration
(Off-Premise Dialing at Remote Site [only different country code X...**])

SITE 1

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Dialed String		1AX	1AX	1AX
Total Mn		*	*	*
Total Mx		*	*	*
Rte Pat		1H	1H	1H

*Set this value to the total length of the number the user will dial, not including the ARS feature access code (for example, 9).

**Substitute all X's in these tables for each different country code X, which may be 2, 3, or 4 digits. You need one entry (both PBX and ITS) for each country X.

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Originating				
Search string		1AX	1AX	1AX
Replace string		1AX	1AX	1AX
IP Address		2G	2G	2G
Terminating				
Search string		2AX	2AX	2AX
Replace string		1F1AX	1F1AX	1F1AX

SITE 2

PBX Admin		If Sites 1 and 2 are in:		
Add ARS analysis entry with:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Dialed String		2AX	2AX	2AX
Total Mn		*	*	*
Total Mx		*	*	*
Rte Pat		2H	2H	2H

*Set this value to the total length of the number the user will dial, not including the ARS feature access code (for example, 9).

**Substitute all X's in these tables for each different country code X, which may be 2, 3, or 4 digits. You need one entry (both PBX and ITS) for each country X.

MMCX Admin		If Sites 1 and 2 are in:		
Create entries:	**Fill in with your actual values**	**Different Country**	**Same country, different area code**	**Same area code**
Originating				
Search string		2AX	2AX	2AX
Replace string		2AX	2AX	2AX
IP Address		1G	1G	1G
Terminating				
Search string		1AX	1CX	1CX
Replace string		2F2AX	2F2AX	2F2AX

G References

This Appendix lists the complete set of current DEFINITY ECS user documentation and selected related documents.

This appendix contains a list of user documents for the DEFINITY Enterprise Communications Server (ECS) Release 8.2. Most of these documents are backward compatible with DEFINITY ECS Release 7 systems.

To order these or other DEFINITY documents, contact the Lucent Technologies Publications Center at the address and phone number on the back of the title page of this document. A complete catalog of Business Communications Systems (BCS) documents is available on the World Wide Web: http://www.lucent.com/enterprise/documentation

Basic DEFINITY ECS documents

These documents are issued for all new and upgrade DEFINITY ECS Release 8.2 systems.

Administration   The primary audience for these documents consists of customer administrators.

DEFINITY ECS Release 8.2 — Administrator's Guide, 555-233-506, Issue 1

A task-based document that provides step-by-step procedures for administering the switch. This book contains information previously found in *DEFINITY ECS Administration and Feature Description*, 555-230-522, and *DEFINITY ECS Release 8 — Administrator's Guide*, 555-233-502, as well as new information for this release.

DEFINITY ECS Release 8.2 — Administration for Network Connectivity, 555-233-504, Issue 1

Describes how to administer connections between DEFINITY ECS switches (csi, si, and r models) for DCS messaging. The main focus is on TCP/IP connectivity introduced with DEFINITY Releases 7 and 8, including voice over IP (VOIP).

DEFINITY ECS Release 8.2 — Change Description, 555-233-411, Issue 1

Provides a high-level overview of what is new in DEFINITY ECS R8.2. Describes the hardware and software enhancements and lists the problem corrections for this release. It also includes any last-minute changes that come in after the remaining books have gone to production.

DEFINITY ECS Release 8.2 — System Description, 555-233-200, Issue 1

Provides hardware descriptions, system parameters, listing of hardware required to use features, system configurations, and environmental requirements.

DEFINITY System's Little Instruction Book for basic administration, 555-233-756, Issue 1

Provides step-by-step procedures for performing basic switch administration tasks. Includes managing phones, managing features, routing outgoing calls, and enhancing system security.

DEFINITY System's Little Instruction Book for advanced administration, 555-233-757, Issue 1

Provides step-by-step procedures for managing trunks, managing hunt groups, setting up night service, writing vectors, recording announcements, using reports, and understanding call centers.

DEFINITY System's Little Instruction Book for basic diagnostics, 555-233-758, Issue 1

Provides step-by-step procedures for baselining your system, solving common problems, reading alarms and errors, using features to troubleshoot your system, and contacting Lucent.

DEFINITY ECS Release 8.2 — Reports, 555-233-505, Issue 1

Provides detailed descriptions of the measurement, status, security, and recent change history reports available in the system and is intended for administrators who validate traffic reports and evaluation system performance. Includes corrective actions for potential problems. Previously known as *DEFINITY ECS System Monitoring and Reporting*.

BCS Products Security Handbook, 555-025-600, Issue 7

Provides information about the risks of telecommunications fraud and measures for addressing those risks and preventing unauthorized use of BCS products. This document is intended for telecommunications managers, console operators, and security organizations within companies.

DEFINITY Terminals and Adjuncts Reference, 555-015-201, Issue 10

Provides drawings and full descriptions for all phones, phone adjuncts, and data terminals that can be used with System 75, System 85, DEFINITY Communications System, and DEFINITY ECS. This document is intended for customers and Lucent Technologies account teams for selecting the correct equipment.

Guide Builder™ Software for DEFINITY® Telephones, 555-230-755, Issue 5

Provides the ability to produce laser-printed documentation for specific telephones. A comprehensive user's guide and on-line help support the software. This information applies to Release 8.2 as well as earlier DEFINITY systems. All customers receive this software.

Installation and maintenance	**DEFINITY ECS Release 8.2 — Installation and Test for Single-Carrier Cabinets, 555-233-120, Issue 1**

DEFINITY ECS Release 8.2 — Installation and Test for Single-Carrier Cabinets, 555-233-120, Issue 1

Provides procedures and information for hardware installation and initial testing of single-carrier cabinets. This document is availabe in languages other than English and can be ordered from the BCS Publications Catalog web site.

DEFINITY ECS Release 8.2 — Installation and Test for Multi-Carrier Cabinets, 555-233-114, Issue 1

Provides procedures and information for hardware installation and initial testing of multi-carrier cabinets.

DEFINITY ECS Release 8.2 — Installation for Adjuncts and Peripherals, 555-233-116, Issue 1

Provides procedures and information for hardware installation and initial testing of ECS adjunct and peripheral systems and equipment.

DEFINITY ECS Release 8.2 — Installation and Test for Compact Modular Cabinets, 555-233-118, Issue 1

Provides procedures and information for hardware installation and initial testing of compact modular cabinets.

DEFINITY ECS Release 8.2 — ATM Installation, Upgrades, and Administration, 555-233-124, Issue 1

Provides step-by-step instructions for how to install, upgrade, and administer ATM switches.

DEFINITY ECS Release 8.2 — Installation and Maintenance for Survivable Remote EPN, 555-233-121, Issue 1

Describes how to install, cable, test, and perform maintenance on a Survivable Remote Expansion Port Network (SREPN). Provides power, ground, and fiber connections.

DEFINITY ECS Release 8.2 — Upgrades and Additions for R8.2r, 555-233-115, Issue 1

Provides procedures for an installation technician to upgrade an existing DEFINITY Communications System or DEFINITY ECS to DEFINITY ECS Release 8.2.

Includes upgrade considerations, lists of required hardware, and step-by-step upgrade procedures. Also includes procedures to add control carriers, switch node carriers, port carriers, circuit packs, auxiliary cabinets, and other equipment.

DEFINITY ECS Release 8.2 — Upgrades and Additions for R8.2si, 555-233-122, Issue 1

Provides procedures for an installation technician to upgrade an existing DEFINITY Communications System or DEFINITY ECS to DEFINITY ECS Release 8.2.

Includes upgrade considerations, lists of required hardware, and step-by-step upgrade procedures. Also includes procedures to add control carriers, switch node carriers, port carriers, circuit packs, auxiliary cabinets, and other equipment.

DEFINITY ECS Release 8.2 — Maintenance for R8.2r, 555-233-117, Issue 1

Provides detailed descriptions of the procedures for monitoring, testing, troubleshooting, and maintaining the R8.2r ECS. Included are maintenance architecture, craft commands, step-by-step trouble-clearing procedures, the procedures for using all tests, and explanations of the system's error codes.

DEFINITY ECS Release 8.2 — Maintenance for R8.2si, 555-233-123, Issue 1

Provides detailed descriptions of the procedures for monitoring, testing, troubleshooting, and maintaining the R8.2si ECS. Included are maintenance architecture, craft commands, step-by-step trouble-clearing procedures, the procedures for using all tests, and explanations of the system's error codes.

DEFINITY ECS Release 8.2 — Maintenance for R8.2csi, 555-233-119, Issue 1

Provides detailed descriptions of the procedures for monitoring, testing, troubleshooting, and maintaining the R8.2csi (Compact Modular Cabinet) ECS. Included are maintenance architecture, craft commands, step-by-step trouble-clearing procedures, the procedures for using all tests, and explanations of the system's error codes.

Call center documents

These documents are issued for DEFINITY ECS Call Center applications. The intended audience is DEFINITY ECS administrators.

DEFINITY

DEFINITY ECS Release 8 — Guide to ACD Call Centers, 555-233-503, Issue 2

This module contains information about the call center-specific features of the DEFINITY ECS.

DEFINITY ECS Release 8 — Call Vectoring/EAS Guide, 555-230-521, Issue 4

Provides information on how to write, use, and troubleshoot vectors, which are command sequences that process telephone calls in an Automatic Call Distribution (ACD) environment.

It is provided in two parts: tutorial and reference. The tutorial provides step-by-step procedures for writing and implementing basic vectors. The reference includes detailed descriptions of the call vectoring features, vector management, vector administration, adjunct routing, troubleshooting, and interactions with management information systems (including the Call Management System).

DEFINITY ECS Release 7— Basic Call Management System (BCMS) Operations, 555-230-706, Issue 2

Provides detailed instructions on how to generate reports and manage the system. It is intended for telecommunications managers who wish to use Basic Call Management System (BCMS) reports and for system managers responsible for maintaining the system.

CentreVu CMS   The following documents provide information about administration and use of the CentreVu Call Management System (CMS).

Lucent Call Center's Little Instruction Book for Basic Administration, 585-210-935, Issue 1

Lucent Call Center's Little Instruction Book for Advanced Administration, 585-210-936, Issue 1

CentreVu Call Management System Release 3 Version 8 — Administration, 585-210-910, Issue 1

CentreVu Call Management System — Database Items, 585-210-939, Issue 1

CentreVu Call Management System Release 3 Version 8 — External Call History Interface, 585-210-912, Issue 1

CentreVu Call Management System Release 3 Version 8 — Upgrades and Migrations, 585-210-913, Issue 1

CentreVu Call Management System Release 3 Version 8 — Software Installation and Setup, 585-210-941, Issue 1

CentreVu Call Management System Release 3 Version 8 — Maintenance and Troubleshooting, 585-210-919, Issue 1

CentreVu Advocate Release 8— User Guide, 585-210-927, Issue 1

CentreVu Supervisor Version 8— Installation and Getting Started, 585-210-928, Issue 1

CentreVu Supervisor Version 8— Reports, 585-210-929, Issue 1

CentreVu Report Designer Version 8— User Guide, 585-210-930, Issue 1

CentreVu Call Management System — Forecast, 585-215-825, Issue 1

CentreVu Call Management System — Custom Reports, 585-215-822, Issue 2

Application-specific documents

These documents support specific DEFINITY applications.

ACD   **DEFINITY Communications Systems G3 — Automatic Call Distribution (ACD) Agent Instructions, 555-230-722, Issue 5**

Provides information for use by agents after they have completed ACD training. Includes descriptions of ACD features and the procedures for using them.

DEFINITY Communications Systems G3 — Automatic Call Distribution (ACD) Supervisor Instructions, 555-230-724, Issue 4

Provides information for use by supervisors after they have completed ACD training. Includes descriptions of ACD features and the procedures for using them.

Console operations   The primary audience for these documents consists of attendant console users.

DEFINITY ECS Release 7 — Console Operations, 555-230-700, Issue 4

Provides operating instructions for the attendant console. Included are descriptions of the console control keys and functions, call-handling procedures, basic system troubleshooting information, and routine maintenance procedures.

DEFINITY ECS Release 7 — Console Operations Quick Reference, 555-230-890, Issue 3

Provides operating instructions for the attendant console. Included are descriptions of the console control keys and functions, call-handling procedures, basic system troubleshooting information, and routine maintenance procedures. This document is availabe in languages other than English and can be ordered from the BCS Publications Catalog web site.

Hospitality   **DEFINITY ECS and Guestworks Release 8.2 — Hospitality Operations, 555-233-755, Issue 1**

Provides step-by-step procedures for using the features available for the lodging and health industries to improve their property management and to provide assistance to their employees and clients. Includes detailed descriptions of reports.

Non-U.S. audiences   **DEFINITY ECS — Application Notes for Type Approval**

Describes specific hardware and administration required to operate the DEFINITY ECS in countries outside the United States. Available on the DEFINITY ECS Release 8.2 Library CD only.

Glossary

A

AAR

See Automatic Alternate Routing (AAR).

Abbreviated Dialing (AD)

A feature that allows callers to place calls by dialing just one or two digits.

AD

See Abbreviated Dialing (AD)

ADU

See Asynchronous data unit (ADU).

adjunct

A processor that does one or more tasks for another processor and that is optional in the configuration of the other processor. Intuity AUDIX and CentreVu CMS are considered adjuncts to the DEFINITY ECS.

Administration Without Hardware (AWOH)

A feature that allows administration of ports without associated terminals or other hardware.

ANSI

American National Standards Institute. A United States professional/technical association supporting a variety of standards.

APLT

Advanced Private-Line Termination.

ARP

Address Resolution Protocol.

ARS

See Automatic Route Selection (ARS).

ASCII

American Standard Code for Information Interchange. The standard code for representing characters in digital form. Each character is represented by an 8-bit code (including parity bit).

asynchronous data transmission

A method of transmitting data in which each character is preceded by a start bit and followed by a stop bit, thus permitting data characters to be transmitted at irregular intervals. This type transmission is advantageous when transmission is not regular (characters typed at a keyboard). Also called asynchronous transmission.

Asynchronous data unit (ADU)

A device that allows direct connection between RS-232C equipment and a digital switch.

Asynchronous Transfer Mode (ATM)

A connection-oriented, digital service optimized for fiber-optic lines at speeds up to 622.08 mbps. ATM networks set up a virtual circuit (virtual connection) between the transmitter and the receiver before sending any data. Data is then sent in a continuous stream of fixed-length, 58-byte cells, each of which contains a 48-byte payload and a 5-byte header. The header contains the virtual circuit number that identifies the pre-negotiated path through the network.

ATM

See Asynchronous Transfer Mode (ATM)

Audio Information Exchange (AUDIX)

A fully integrated voice-mail system. Can be used with a variety of communications systems to provide call-history data, such as subscriber identification and reason for redirection.

Automatic Alternate Routing (AAR)

A feature that routes calls to other than the first-choice route when facilities are unavailable.

Automatic Route Selection (ARS)

A system for automatically routing telephone calls by the least costly route. A feature of the Lucent DEFINITY Enterprise Communications Server.

auxiliary trunk

A trunk used to connect auxiliary equipment, such as radio-paging equipment, to a communications system.

AWOH

See Administration Without Hardware (AWOH).

B

B8ZS

See Bipolar 8 Zero Substitution (B8ZS).

Basic Rate Interface (BRI)

A standard ISDN frame format that specifies the protocol used between two or more communications systems. As used in North America, BRI provides 23 64-kbps B-channels (voice or data) and one 64-kbps D-channel (signaling). The D-channel is the 24th channel of the interface and contains multiplexed signaling information for the other 23 channels.

bandwidth

The amount of data that a given channel can transmit in a given period of time, measured in bits per second (not bytes per second) on digital networks or in Hertz (cycles per second) on analog networks. For analog transmission, the band width can be measured as the difference, expressed in hertz, between the highest and lowest frequencies transmitted.

baud

A unit of transmission rate equal to the number of signal events per second. See also bit rate.

BCC

See bearer capability class (BCC)

bearer capability class (BCC)

Code that identifies the type of a call (for example, voice and different types of data). Determination of BCC is based on the caller's characteristics for non-ISDN endpoints and on the Bearer Capability and Low-Layer Compatibility Information Elements of an ISDN endpoint. Current BCCs are 0 (voice-grade data and voice), 1 (DMI mode 1, 56 kbps data transmission), 2 (DMI mode 2, synchronous/asynchronous data transmission up to 19.2 kbps) 3 (DMI mode 3, 64 kbps circuit/packet data transmission), 4 (DMI mode 0, 64 kbps synchronous data), 5 (temporary signaling connection, and 6 (wideband call, 128–1984 kbps synchronous data).

BER

Bit error rate.

Bipolar 8 Zero Substitution (B8ZS)

B8ZS line coding substitutes a mix of 1s and 0s for every group of eight consecutive 0s in a stream of AMI-encoded data (see line coding). The encoded string contains consecutive ones with the same polarity. These intentional, bipolar violations of the AMI coding scheme let the receiving end identify, decode, and restore the long zero strings in the original message. B8ZS line coding does not corrupt digital data, so it is commonly used with T-1 lines.

bit (binary digit)

One unit of information in binary notation, having two possible values: 0 or 1.

bit rate

The speed at which bits are transmitted, usually expressed in bits per second. Also called *data rate*.

bps

Bits per second.

BOS

Bit-oriented signaling.

BRI

See Basic Rate Interface (BRI)

bridge

A device that connects two or more packet-switched networks and directs packets sent from one to the other. See router.

bus bridge

A connection between the TDM bus and the packet bus built into the C-LAN circuit pack for use with DEFINITY ECS R7csi. Bus bridge connectivity is not used with any other DEFINITY switch model.

BX.25

A version of the CCITT X.25 protocol for data communications. BX.25 adds a fourth level to the standard X.25 interface. This uppermost level combines levels 4, 5, and 6 of the ISO reference model.

byte

A sequence of (usually eight) bits processed together.

C

Call Detail Recording (CDR)

A feature that uses software and hardware to record call data. (Same as station message detail recording — SMDR).

Call Detail Recording utility (CDRU)

Software that collects, stores, optionally filters, and outputs call-detail records.

Call Management System (CMS)

An application, running on an adjunct processor, that collects information from an ACD unit. CMS enables customers to monitor and manage telemarketing centers by generating reports on the status of agents, splits, trunks, trunk groups, vectors, and VDNs, and enables customers to partially administer the ACD feature for a communications system.

call redirection

See restricted facilities.

CALLed Party Number IE

The ISDN information element containing the digits sent to the called party.

capture rate

The number of frames contained in a one-second video sample, used as a measure of video quality.

CA-TSC

Call-Associated Temporary Signaling Connection.

CCIS

Common-Channel Interoffice Signaling

CCITT

Comitte Consultatif International Telephonique et Telegraphique. Now called *International Telecommunications Union* (ITU).

CCMS

Control-Channel Message Set.

CDR

See Call Detail Recording (CDR). (Same as SMDR and CMDR).

CDRU

Call Detail Record Unit.

CDRP

Call Detail Record Poller.

CEPT1

European Conference of Postal and Telecommunications Rate 1.

channel

A communication path linking two points for transmitting voice and data. Also:

1. A circuit-switched call.
2. In wideband, all of the time slots (contiguous or noncontiguous) necessary to support a call.   Example: an H0-channel uses six 64-kbps time slots.
3. A DS0 on a T1 or E1 facility not specifically associated with a logical circuit-switched call; analogous to a single trunk.

circuit

1. An arrangement of electrical elements through which electric current flows.
2. A channel or transmission path between two or more points.

circuit pack

A card on which electrical circuits are printed, and IC chips and electrical components are installed. A circuit pack is installed in a switch carrier.

Class of Restriction (COR)

A feature that allows up to 64 classes of call-origination and call-termination restrictions for voice terminals, voice-terminal groups, data modules, and trunk groups.

Class of Service (COS)

A feature that uses a number to specify if voice-terminal users can activate the Automatic Callback, Call Forwarding All Calls, Data Privacy, or Priority Calling features.

circuit-switched network

A network that sets up and maintains a connection for the exclusive use of two or more communicating parties for the duration of their call.   The familiar, voice telephone network is circuit-switched. See packet switching.

clear-channel facility

A digital circuit that requires no in-channel framing or control bits. The whole bandwidth is thus available for data transmission.

client

An application that runs on one processor while drawing on data or other resources that are on a server located elsewhere. **MMCX client:** a workstation capable of making MMCX calls. Such a workstation is a client of one or more MMCX servers. See dial-plan table.

CMDR

Centralized Message Detail Recording. (Same as CDR and SMDR).

CMS

Call Management System.

COR

See Class of Restriction (COR).

COS

See Class of Service (COS).

CP

Circuit pack.

CSN

See circuit-switched network.

CSU

Channel service unit.

cyclic redundancy checking (CRC)

A method for detecting read, transmit, and write errors in data. At the transmission end, the system treats a block of data as a single binary number, divides it by some specified binary number, and appends the remainder (called the CRC character) to the data. At the receiving end, the system recalculates the remainder and compares the result to the CRC character. If the two agree, there are no errors.

D

data channel

A communications path between two points used to transmit digital signals.

data-communications equipment (DCE)

The equipment (usually a modem, data module, or packet assembler/disassembler) on the network side of a communications link that makes the binary serial data from the source or transmitter compatible with the communications channel.

datagram

In packet switching, a packet that carries information sufficient for routing from the originating data terminal equipment (DTE) without the necessity of establishing a connection between the DTEs and the network. Connectionless, unreliable.

data link

The configuration of physical facilities enabling end terminals to communicate directly with each other.

data path

The end-to-end connection used for a data communications link. A data path is the combination of all elements of an interprocessor communication in a DCS.

data port

A point of access to a computer that uses trunks or lines for transmitting or receiving data.

data service unit (DSU)

A device that transmits digital data on transmission facilities.

data terminal equipment (DTE)

Equipment consisting of the endpoints in a connection over a data circuit. In a connection between a data terminal and host, the terminal, the host, and their associated modems or data modules make up the DTE.

DCE

Data-communications equipment.

D-channel backup

Type of backup used with Non-Facility Associated Signaling (NFAS). A primary D-channel provides signaling for an NFAS D-channel group (two or more PRI facilities). A second D-channel, on a separate PRI facility of the NFAS D-channel group, is designated as backup for the D-channel. Failure of the primary D-channel causes automatic transfer of call-control signaling to the backup D-channel. The backup becomes the primary D-channel. When the failed channel returns to service, it becomes the backup D-channel.

DCIU

Data communications interface unit.

DCP

Digital Communications Protocol.

DCS

Distributed Communications System.

dial-plan table

A data structure that defines how a switch or server (such as MMCX) interprets dialed digits and routes calls. The dial-plan table performs two tasks. First, it identifies a dial plan rule that applies to the kind of input it has received. Then it applies the rule and translates the dialed input into a corresponding extension or public-network telephone number. (MMCX interserver calls are handled differently; see interserver routing table.)

DID

Direct Inward Dialing.

digital communications protocol (DCP)

A proprietary protocol used to transmit both digitized voice and digitized data over the same communications link. A DCP link is made up of two 64-kbps information (I-) channels and one 8-kbps signaling (S-) channel. The DCP protocol supports 2 information-bearing channels, and thus two telephones/data modules.

digital signal level 0 (DS0)

A single 64-kbps voice channel. A DS0 is a single 64-kbps channel in a T1 or E1 facility and consists of eight bits in a T1 or E1 frame every 125 microseconds.

digital signal level 1 (DS1)

A single 1.544-Mbps (United States) or 2.048-Mbps (outside the United States) digital signal carried on a T1 transmission facility. A DS1 converter complex consists of a pair, one at each end, of DS1 converter circuit packs and the associated T1/E1 facilities.

digital terminal data module (DTDM)

An integrated or adjunct data module that shares with a digital telephone the same physical port for connection to a communications system. The function of a DTDM is similar to that of a PDM and MPDM in that it converts RS-232C signals to DCP signals.

distributed application

A computer application that runs on one or more clients and uses shared resources, such as databases. These resources reside on a common server. Distributed design lets multiple users run programs using common, centrally maintained files.

domain

An addressable location on a network, such as a group of computers, single computer, or subdirectory. See Domain Name Server (DNS).

Domain Name Server (DNS)

An Internet computer that maintains a database of domain names.

Provides a mapping of alphanumeric names to IP addresses; for example, xxx.xxx.xxx.xxx --> www.lucent.com.

DNS

See Domain Name Server (DNS).

DSU

Data service unit.

DTDM

Digital-terminal data module.

DTE

Data-terminal equipment.

E

E-1

A digital transmission link with a capacity of 2.048 Mbps (2,048,000 bits per second). The European equivalent of the T-1. It can support 30 multiplexed 64-Kbps voice and data channels plus separate 64-Kbps channels for signalling and framing (synchronization). Also spelled **E1**.

EIA

See Electronics Industries Association (EIA).

EIA-232

A physical interface specified by the EIA. EIA-232 transmits and receives asynchronous data at speeds of up to 19.2 kbps over cable distances of up to 50 feet. EIA-232 replaces RS-232 protocol in some DEFINITY applications.

electronic tandem network (ETN)

A tandem tie-trunk network that has automatic call-routing capabilities based on the number dialed and the most preferred route available. Each switch in the network is assigned a unique private network office code (RNX), and each voice terminal is assigned a unique extension.

Electronics Industries Association (EIA)

A trade association of the electronics industry that establishes electrical and functional standards.

Ethernet

A local area network (LAN) that works over short distances on twisted-pairs or coaxial cables at speeds up to 10 mbps or 100 mbps. One of the two LAN protocols MMCX supports. See ATM, LAN emulation (LANE).

Ethernet Source Address

A 48-bit physical address of the NIC; also called the MAC address.

ETN

Electronic tandem network

F

facility

A telecommunications transmission pathway and associated equipment.

facility-associated signaling (FAS)

Signaling for which a D-channel carries signaling only for those channels on the same physical interface.

FAS

Facility-associated signaling

framing

The data-formatting conventions that allow a receiver to synchronize with the transmitting end of a circuit. For example, T-1 frames contain an 8-bit sample from each of the 24 channels on the interface (192 bits total) plus a framing bit (for a total of 193 bits). Each framing bit marks the end of a timed sample the input at the transmission end.

FRL

Facilities Restriction Level.

FX

Foreign exchange.

G

Gateway

(1) protocol converter (2) a node between network segments.

H

H.320

The most common standard for videoconferencing over ISDN BRI circuits. H.320-compatible systems can communicate with each other even when they rely on dissimilar hardware and software.

H.323

A specification that sets standards for multimedia communications between LANs and telephony networks, such as ISDN.

HDB3

See High Density Bipolar 3-Bit Substitution (HDB3).

High Density Bipolar 3-Bit Substitution (HDB3)

HDB3 line coding is similar to Bipolar 8 Zero Substitution (B8ZS) in some ways. It replaces every 4 consecutive zero in a stream of AMI-encoded data (see line coding) with either of two sequences. If there has been an even number of 1s since the last substitution, it substitutes the pattern **1 0 0 BipolarViolation**, where **BipolarViolation** is a 3-volt pulse (a **1**) of the same polarity as the preceding 3-volt pulse. If there has been an odd number of 1s since the last substitution, HDB3 coding substitutes the pattern **0 0 0 BipolarViolation** for the 4-zero string. This system does not corrupt binary data, and is commonly used with E-1 lines.

host

A server.

host name

See server name.

I

IANA

Internet Assigned Number Authority.

INADS

Initialization and Administration System

Information element (IE)

The data fields in ISDN messages.

in-service state

The condition or state of an MMCX server that is ready to handle calls.

International Standards Organization (ISO)

A body that defines and/or adopts protocols widely used in the computer and telecommunications industries.

International Telecommunications Union (ITU)

Formerly known as International Telegraph and Telephone Consultative Committee (CCITT), ITU is an international organization that sets universal standards for data communications, including ISDN. ITU members are from telecommunications companies and organizations around the world.

Internet

The decentralized network of networks that grew from ARPAnet and supported by TCP/IP.

interserver routing table

A database that keeps track of the interserver routing tables on a multiserver MMCX network. When a server sets up a Point-to-Point Protocol connection with a remote server, the local server looks up the dialed-digit sequences in the interserver routing table. (Calls that involve only one MMCX server are routed using the dial-plan table.)

I/O base address

The place in memory where a given computer peripheral places and picks up messages that travel over a computer's system bus.

IP

Internet Protocol.

IP (Internet Protocol) address

A 32-bit number that uniquely identifies endpoints on the Internet, commonly specified in the form $n1.n2.n3.n4$ where each n_n is a decimal number between **0** and **255**. Part of the IP address represents the address of a local network's gateway to the Internet and part represents the host-machine address within that local network. The available bits are apportioned to the network address or local address using a system of classes. The Class A addresses used by the largest organizations on the Internet reserve the first 8 bits for the network portion of the address and remaining 24 for the host machine. Class B addresses, the most common class, assign 16 bits to the network and 16 to the host machine. The Class C addresses used by small networks reserve the first 24 bits for the network and the remaining 8 bits for the host.

IP user

An H.323 endpoint on an MMCX network. Such users do not have log ins, so the MMCX server identifies them using an extension number and an IP address.

ISDN

Integrated Services Digital Network, a digital, voice and data service. You get ISDN in either of two forms. Primary Rate Interface (PRI) service has a capacity of 1.544 mbps, divided into 23 or 29 B-channels (23 on a North American T-1 connection, 29 on a European E-1) and 1 D-channel, each with a capacity of 64 kbps. Basic Rate Interface (BRI) service has a capacity of 144 kbps, divided into 2 B-channels at 64 kbps each and 1 D-channel at 16 kbps.

ISDN trunk

A trunk administered for use with ISDN-PRI. Also called ISDN facility.

L   **LAN**

See local area network.

LAN emulation (LANE)

A technique that lets ATM networks communicate with Ethernet LAN cards. ATM service is not widely available at the desktop and ATM interface cards are expensive, so ATM networks usually emulate LANs when communicating with user terminals. Typically, a **LAN-emulation configuration server (LECS)** keeps track of the relationships between ATM-network addresses and IP addresses on the LAN. Each ATM card is then treated as a client of a **LAN-emulation server**, which connects the ATM cards to the LAN cards on the user terminals.

LAP-D

See link-access procedure on the D-channel (LAPD).

LECS (LAN-emulation configuration server)

See LAN emulation (LANE).

LES (LAN-emulation server)

See LAN emulation (LANE).

line coding

Line coding is the data format that lets either end of a communications channel correctly interpret messages from the other. Line coding systems specify the voltage levels and patterns that represent binary digits (1s and 0s), based on the requirements of the transmission network. The AT&T network has two: it demands that the net voltage on the line equal 0 volts DC and it demands a minimum Open System Interconnect (OSI) Model. The T-carrier system meets the first requirement by using a bipolar line-coding scheme called Alternate Mark Inversion (AMI). It meets the second with one of several supplementary coding schemes, including ZCS, Bipolar 8 Zero Substitution (B8ZS), and High Density Bipolar 3-Bit Substitution (HDB3).

line compensation

An allowance for pulse distortions in the cable that connects the MMCX server to the first channel service unit (CSU) on the PRI span. It is proportional to the length of the cable. T1 circuit packs adjust the outgoing signal so that it arrives at the far end without distortion.

link

A transmitter-receiver channel that connects two systems.

link-access procedure on the D-channel (LAPD)

A link-layer protocol on the ISDN-BRI and ISDN-PRI data-link layer (level 2). LAPD provides data transfer between two devices, and error and flow control on multiple logical links. LAPD is used for signaling and low-speed packet data (X.25 and mode 3) on the signaling (D-) channel and for mode-3 data communications on a bearer (B-) channel.

local area network

A short-range data communication network providing high-speed carrier service with low error rates. Generally, a LAN is limited in range to a maximum of 6.2 miles. Ethernet and Token-Ring are common LAN architectures. See wide area network, Ethernet.

looparound testing

Checking an interface by sending a signal through the output, across a medium (the loop), and back through the input. Internal looparound tests run against the internal circuitry of the card. External looparound tests check the connectors at the edge of the card using a fiber or wire loop. PRI, Ethernet, and ATM cards are tested this way.

M

MAC

Media Access Control; a sublayer of the OSI Data Link layer, provides an interface with the network adapter.

main-satellite-tributary

A private network configuration that can either stand alone or access an ETN. A main switch provides interconnection, via tie trunks, with one or more subtending switches, called satellites; all attendant positions for the main/satellite configuration; and access to and from the public network. To a user outside the complex, a main/satellite configuration appears as one switch, with one listed directory number (LDN). A tributary switch is connected to the main switch via tie trunks, but has its own attendant positions and LDN.

Management Information Base (MIB)

A virtual database used by the Simple Network Management Protocol (SNMP).

MAPD

Multiapplication platform for DEFINITY.

MA-UUI

Message-Associated User-to-User Signaling.

M-Bus

Memory bus.

MDR

Message detail record.

MIB

See Management Information Base (MIB).

MMCH

Multimedia call handling.

MSA

Message Server Adjunct.

multicasting

A transmission method that promotes efficient bandwidth utilization on a multimedia data network when several parties are transmitting and receiving simultaneously. Normally, each party sends a separate video stream to each of the other parties and receives a separate video stream from each in return (this is called unicasting). Multicasting substitutes a single broadcast transmission (addressed to all parties) for the separate transmissions addressed to each. Each party then continues to receive multiple data streams while sending only one. For best results, multicast messages should be restricted to one or more subnet.

N

National Television Standards Committee (NTSC) standard

The standard format and transmission method for television signals in North America, Central America, and Japan. The NTSC is a division of the Electronic Industries Association (EIA). MMCX video transmissions conform with NTSC requirements.

national number

The full dialed number minus the country code. The national number is composed of office code plus subscriber code. In North America, this means area code plus seven digits. For example, 303-538-1234 is a national number.

NCA/TSC

Noncall-associated/temporary-signaling connection.

NCOSS

Network Control Operations Support Center.

NCSO

National Customer Support Organization.

NEC

National Engineering Center.

NEMA

National Electrical Manufacturer's Association.

NETCON

Network-control circuit pack.

Network

A collection of computer-like devices ("nodes") that are connected by, and can communicate across, a common transmission medium.

Network Adapter

The interface between a node and the network; has a unique physical address.

Network Interface Card (NIC)

A circuit board that can be fitted to a personal computer (PC) to allow the PC to communicate with other machines on a network. MMCX works with Ethernet cards and with asynchronous transfer mode (ATM) cards running Ethernet emulation. Also called a network adapter.

NFAS

See Nonfacility-associated signaling (NFAS).

NIC

See Network Interface Card (NIC).

Node

1. A point on a network that provides an interface to a communications device.

2. A switch or adjunct in a Lucent DCS network.

Nonfacility-associated signaling (NFAS)

A method that allows multiple T1 and/or E1 facilities to share a single D-channel to form an ISDN-PRI. If D-channel backup is not used, one facility is configured with a D-channel, and the other facilities that share the D-channel are configured without D-channels. If D-channel backup is used, two facilities are configured to have D-channels (one D-channel on each facility), and the other facilities that share the D-channels are configured without D-channels.

NTSC

See National Television Standards Committee (NTSC) standard.

O

Open System Interconnect (OSI) Model

An International Standards Organization (ISO) interoperability specification. OSI defines standard services that compliant communications networks and equipment must provide, rather than specific implementations. It divides network operations into 7 steps, called layers, and arranges them hierarchically, in a protocol stack. The rules (protocols) in each layer of the stack specify a service that other parts of a communications system can always get, as long as they make their requests in a standard way. This approach leaves designers free to implement the internal details of the service in whatever way seems best to them. The OSI layers are **1 Physical** (transmission medium), **2 Datalink** (link-level signaling and error control), **3 Network** (computer-to-computer signaling, routing, etc.), **4 Transport** (delivery, end-to-end error control, and flow control), **5 Session** (dialog management), **6 Presentation** (data-format compatibility), and **7 Application** (file-transfer services, virtual terminals, etc.).

OSI

See Open System Interconnect (OSI) Model.

out-of-service state (OOS)

The condition or state of an MMCX server that is operating but not ready to accept or place calls.

P

PACCON

Packet controller.

packet

A group of bits (including a message element, which is the data, and a control information element (IE), which is the header) used in packet switching and transmitted as a discrete unit. In each packet, the message element and control IE are arranged in a specified format.

packet bus

A wide-bandwidth bus that transmits packets.

packet switching

A data-transmission technique whereby user information is segmented and routed in discrete data envelopes called packets, each with its own appended control information, for routing, sequencing, and error checking. The packets can travel to their destinations by varying routes. For data transmissions, a packet switched network can make more efficient use of available bandwidth than a circuit-switched network, because it does not dedicate a channel for the duration of a call. Instead, packets are queued and sent on a standby basis, as channel capacity becomes available. The Internet is a good example of a packet-switching network.

PBX

Private Branch Exchange: a customer-owned telephone switch that connects a company's internal telephone network with the local telephone service provider's central office.   Lucent's DEFINITY PBX is a good example.

PDM

See processor data module (PDM).

PGATE

Packet gateway.

Point-to-Point Protocol

A TCP/IP implementation tailored for use over telephone lines. It supports router-to-router and host-to-network connections over both synchronous and asynchronous circuits. PPP replaces SLIP, the older Serial Line Interface Protocol.

Port

(1) Interface between an application and the TCP/IP network. A port is a predefined internal address (port number) that serves as a pathway from the application to the Transport layer (or from T to A). (2) circuit-pack port.

PPP

See Point-to-Point Protocol.

PRI

Primary Rate Interface. See ISDN.

Primary Rate Interface

See ISDN.

private network

A network used exclusively for the telecommunications needs of a particular customer.

private network office code (RNX)

The first three digits of a 7-digit private network number.

processor data module (PDM)

A device that provides an RS-232C DCE interface for connecting to data terminals, applications processors (APs), and host computers, and provides a DCP interface for connection to a communications system.

protocol

A set of conventions or rules governing the format and timing of message exchanges to control data movement and correction of errors.

PSDN

Packet-switch public data network.

PSTN

See Public Switched Telephone Network (PSTN).

PSN

Packet-switched network.

Public Switched Telephone Network (PSTN)

The worldwide voice telephone system.

Q

QPPCN

Quality Protection Plan Change Notice.

QSIG

A set of open standards for Enterprise Networking. QSIG is a protocol defining message exchanges (signalling) at the "Q" reference point between two PBXs.

R

RBS

Robbed-bit signaling.

RFC

Request for comment.

restricted facilities

PRI spans that use ZCS line coding, the opposite of unrestricted facilities.

RNX

Route-number index (private network office code)

router

An interface between different networks. Routers support network management, including load balancing, route optimization, prioritizing of calls, and troubleshooting. They are thus more capable than bridges.

routing plan

Routing plans direct outgoing voice-interworking and interserver calls to the first available PRI trunk group in a list. This arrangement lets you allow for trunk groups that are busy, out of service, or out of bandwidth. Each routing plan is identified by a routing-plan number in the range **1-32**.

RPN

Routing-plan number.

RTP

Real-time protocol.

S

Socket

An address formed by concatenating the IP address and the port number.

server

1. Any system that maintains and administers files that are used by independent, client applications. 2. the MMCX server, the computer that sets up, maintains, and administers MMCX network communications. See dial-plan table.

server name

The name that identifies the MMCX server on your local area network. You enter the server name in the boot-time administration menu. See server number.

server number

The ISDN international number that uniquely identifies your MMCX server on the PBX and/or the public telephone network. See server name, interserver routing table.

signaling

The control information that a network uses to set up and maintain connections. On-hook and off-hook are, for instance, the familiar voice-telephone signals that tell the central office that you have picked up the telephone handset or hung up at the end of a call.

In-channel signalling reserves part of the available data -communication bandwidth for control information (see restricted facilities). Out-of-channel signalling schemes use a separate channel for signals, so that data transmissions can use all of the bandwidth available to them (see clear-channel facility).

Simple Network Management Protocol (SNMP)

An International Standards Organization (ISO) protocol that sets standards for communications between network components and network management stations. SNMP handles network resources using the information contained in a management information base (MIB), a virtual database resident on the various parts of the network. SNMP supports security, configuration, performance, fault management, and accounting management. SNMP is part of the ISO Open System Interconnect (OSI) Model specification.

SMDR

Station Message Detail Recording. (Same as call detail recording — CDR).

SNMP

See Simple Network Management Protocol (SNMP).

SPE

Switch Processing Element

subnet

A network within a larger network. Subdividing a network into subnets improves the efficiency of routing and makes the best use of the limited number of addresses available with any given addressing scheme. Subnetworks are defined by using part of the host-machine portion of the IP (Internet Protocol) address as an additional layer of network information. Routers can then distinguish between a networking part that is significant for internet/intranet routing and a host-machine part, which is significant only within the local subnet.

subnet mask

A bit pattern that lets a network administrator define subnets using the host-machine portion of the IP (Internet Protocol) address. The subnet mask has binary ones in positions corresponding to the network and subnet parts of the address and zeros in the remaining, host-address positions. During IP-address resolution, zero fields in the mask hide corresponding host-address fields in the address, causing the router to ignore them. The router resolves only the networking part of the address, leaving the host part for the local subnet to resolve. This increases speed and makes multicasting more efficient. Subnet masks are usually written in the decimal notation used for IP addresses.

T

T-1

A 4-wire (2 twisted pair), digital communications link with a capacity of 1.544 Mbps (1,544,000 bits per second). A T-1 provides 24 separate 64-Kbps channels. These can support up to 23 concurrent voice and data channels plus a separate channel for signalling and framing (synchronization). T-1 is the standard for data communications in North America and Japan. Also spelled **T1**. See E-1.

T-carrier

A hierarchy of digital voice- and data-transmission systems used in North America and based on multiples of the capacity of the T-1 line.

tandem switch

A switch within an electronic tandem network (ETN) that provides the logic to determine the best route for a network call, possibly modifies the digits outpulsed, and allows or denies certain calls to certain users.

tandem-through

The switched connection of an incoming trunk to an outgoing trunk without human intervention.

tandem tie-trunk network (TTTN)

A private network that interconnects several customer switching systems.

TCP

Transmission Control Protocol — Transport layer; Connection oriented, reliable.

TCP/IP

Transmission Control Protocol/Internet Protocol. A standard that lets different computer hardware and different operating systems (such as PCs, Apple computers, UNIX workstations, and mainframes) communicate with each other over a network. TCP/IP is the most complete, most widely accepted network protocol currently available.

TDM

See time-division multiplexing.

tie trunk

A telecommunications channel that directly connects two private switching systems.

time-division multiplexing

A way of interleaving digitized voice, video, and/or data so that several calls can be sent concurrently over the same spread of frequencies. TDM systems distribute the available bandwidth across a series of time slots and divide each input stream into a set of samples. They then assign successive time slots to the first sample in each input stream. They repeat the process until all time slots have been assigned or all inputs sent. At the far end, the receiver demultiplexes the transmission and reconstructs the original sequence of samples. Time-division multiplexing is typically used on circuit-switched networks.

time slot

64 kbps of digital information structured as eight bits every 125 microseconds. In the switch, a time slot refers to either a DS0 on a T1 or E1 facility or a 64-kbps unit on the TDM bus or fiber connection between port networks.

trunk

A communication line linking two switches (public-network, PBX, or MMCX-server).

trunk group

A collection of trunks that all terminate at the same public switch, PBX, or MMCX server.

U

UDP

1. User Datagram Protocol — Transport layer; Connectionless, unreliable, fast.

2. Uniform Dial Plan.

UNP

Uniform numbering plan

unrestricted data

Data that has to travel over an unrestricted facilities, because it can be corrupted by Zero Code Suppression (ZCS) line coding. Digital data is unrestricted data.

unrestricted facilities

PRI spans that use non-ZCS line coding, such as B8ZS or HDB3, end-to-end. See Zero Code Suppression (ZCS).

V

VCI

The ATM virtual channel identifier. ATM is a connection-oriented service that sets up a virtual circuit between the transmitter and the receiver. The two endpoints negotiate an agreed route through the network before sending any data. VCI and VPI together constitute the virtual circuit number that identifies this route.

virtual channel identifier

See VCI.

virtual circuit (virtual connection)

The pre-arranged route through the ATM network that all cells in an ATM transmission follow.

virtual circuit number

The route identifier contained in an ATM cell header. A VCI and a VPI together constitute the virtual circuit number.

virtual path identifier

See VPI.

VPI

The ATM virtual path identifier. ATM is a connection-oriented service that sets up a virtual circuit between the transmitter and the receiver. The two endpoints negotiate an agreed route through the network before sending any data. VCI and VPI together constitute the virtual circuit number that identifies this route. The VPI is analogous in some ways to an ISDN trunk group.

W

WAN

See wide area network.

well-known address

The default network address for a given type of network component, as specified by a communications protocol or standards body. For example, the ATM Forum defines well-known addresses for LAN-emulation servers and LAN-emulation configuration servers.

well-known port

port numbers that are assigned to specific applications by IANA. For example, 21 for FTP, 23 for Telnet, 110 for pop3.

wide area network

A data network that connects local area networks (LANs) using common-carrier telephone lines, bridges, and routers.

wideband

A circuit-switched call at a data rate greater than 64 kbps. A circuit-switched call on a single T1 or E1 facility with a bandwidth between 128 and 1536 (T1) or 1984 (E1) kbps in multiples of 64 kbps. H0, H11, H12, and N x DS0 calls are wideband.

Z

ZCS

See Zero Code Suppression (ZCS).

Zero Code Suppression (ZCS)

ZCS line coding substitutes a 1 for the second least-significant bit of every all-zero byte in AMI-encoded data (see line coding). ZCS encoding has no effect on voice communications, but it corrupts digital data (see restricted facilities). In MMCX communications, ZCS corrupts the ISDN D-channel.

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