

**Lucent Technologies**  
Bell Labs Innovations



**DEFINITY<sup>®</sup>**  
**Enterprise Communications Server**  
Release 7  
System Description

555-230-211  
Comcode 108343260  
Issue 4  
June 1999

Notice

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

Your Responsibility for Your System's Security

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

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

Standards Compliance

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

Australia AS3548 (AS/NZ3548)	FCC Part 15 and Part 68	ITU-T (Formerly CCITT)	CSA C222 Number 225
ANSI	EN55022	IEC 950	SO-9000
CISPR22	EN50081	IPNS	TS001
DEFINITY®	EN50082	National ISDN-1	National ISDN-2
DPNSS	ETSI	UL 1459	UL 19501
ECMA	IEC 825		

Electromagnetic Compatibility Standards

This product complies with and conforms to the following:

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

EN50082-1, European Generic Immunity Standard

FCC Part 15

Australia AS3548

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

Electrostatic Discharge (ESD) IEC 1000-4-2

Radiated radio frequency field IEC 1000-4-3

Electrical Fast Transient IEC 1000-4-4

Lightning effects IEC 1000-4-5

Conducted radio frequency IEC 1000-4-6

Mains frequency magnetic field IEC 1000-4-8

Low frequency mains disturbance

The DEFINITY ECS conforms to the following standards:

Electromagnetic compatibility General Immunity Standard, part 1; residential, commercial, light industry, EN50082-1, CENELEC, 1991

Issue 1 (1984) and Issue 2 (1992), Electrostatic discharge immunity requirements (EN55024, Part 2) IEC 1000-4-2

Radiated radio frequency field immunity requirements IEC 1000-4-3

Electrical fast transient/burst immunity requirements IEC 1000-4-4

Federal Communications Commission Statement

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

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

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

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

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

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

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

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

### Means of Connection

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

Manufacturer's Port Identifier	FIC Code	SOC/REN/A.S. Code	Network Jacks
Off/On premises station	OL13C	9.0F	RJ2GX, RJ21X, RJ11C
DID trunk	02RV2-T	0.0B	RJ2GX, RJ21X
CO trunk	02GS2	0.3A	RJ21X
CO trunk	02LS2	0.3A	RJ21X
Tie trunk	TL31M	9.0F	RJ2GX
Basic Rate Interface	02IS5	6.0F, 6.0Y	RJ49C
1.544 digital interface	04DU9-BN, 1KN, 1SN	6.0F	RJ48C, RJ48M
120A2 channel service unit	04DU9-DN	6.0Y	RJ48C

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

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

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

This equipment may be repaired or repaired by Lucent Technologies certified technicians.

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

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

### Canadian Department of Communications (DOC) Interference Information

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

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

### European Union Declaration of Conformity

Lucent Technologies Business Communications Systems declares that the DEFINITY equipment specified in this book bearing the "CE" (*Conformité Européenne*) mark conforms to the European Union Electromagnetic Compatibility Directives. The CE mark indicates conformance to the European Union Electromagnetic Compatibility Directive (89/336/EEC) Low Voltage Directive (73/23/EEC), Telecommunication Terminal Equipment (TTE) Directive (91/263/EEC). The CE mark indicates conformance to i-CTR3 Basic Rate Interface (BRI) and i-CTR4 Primary Rate Interface (PRI) as applicable, and with CTR12. The CE mark is applied to the following products:

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

### ETS standards referenced by iCTR3 and CTR4

	iCTR3	iCTR4	CTR3	CTR4
L1:	ETS300012	ETS300011	ETS300012	ETS300011
L2:	ETS300153	ETS300156	ETS300125	ETS300125
L3:	ETS300104	ETS300104	ETS300102	ETS300102
Safety:	ETS300047	ETS300046	ETS300047	ETS300046

## **LASER Product**

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

Maximum power output: -5 dBm

Wavelength: 1310 nm

Mode field diameter: 8.8 microns

## **CLASS 1 LASER PRODUCT IEC 825 1993**

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

Contact your Lucent Technologies representative for more laser product information.

### **Lucent Technologies Fraud Intervention**

If you *suspect that you are being victimized* by toll fraud and you need technical support or assistance, call BCS Technical Service Center Toll Fraud Intervention Hotline at 1 800 643-2353.

### **Ordering Information**

Document No. 555-230-211

Comcode 108343260

4, June 1999

**In the USA and Canada, contact the** Lucent Technologies BCS Publications Center, 1-800-457-1235 (fax 1-800-457-1764), 2855 N. Franklin Road, Indianapolis, IN 46219 U.S.A.

In other locations, contact your local Lucent representative.

If you wish to receive updated versions of this document automatically, you can place a standing order billed to an account you specify. For more information, please contact the Lucent Technologies BCS Publications Center.

### **Comments**

To comment on this book, return the card at the front of the book.

# Contents

<b>Contents</b>	<b>v</b>
<b>About This Book</b>	<b>ix</b>
■ <a href="#">Purpose</a>	<a href="#">ix</a>
■ <a href="#">Intended Audience</a>	<a href="#">ix</a>
■ <a href="#">Systems Supported</a>	<a href="#">ix</a>
<b>1 — Overview of DEFINITY ECS R7</b>	<b>1</b>
■ <a href="#">The ProductName</a>	<a href="#">1</a>
■ <a href="#">System Components</a>	<a href="#">3</a>
■ <a href="#">System Configurations</a>	<a href="#">5</a>
■ <a href="#">Architecture</a>	<a href="#">11</a>
■ <a href="#">Connecting with TCP/IP Networks</a>	<a href="#">11</a>
■ <a href="#">DEFINITY ECS Hardware</a>	<a href="#">12</a>
■ <a href="#">Duplication</a>	<a href="#">18</a>
■ <a href="#">International Requirements</a>	<a href="#">18</a>
■ <a href="#">Administration</a>	<a href="#">19</a>
■ <a href="#">Integrating Adjunct, Peripheral, and Third-Party Products</a>	<a href="#">19</a>
■ <a href="#">Comparing System Versions</a>	<a href="#">20</a>

<b>2 — Site Requirements</b>	<b>23</b>
■ <a href="#">Floor Area</a>	<a href="#">23</a>
■ <a href="#">Floor Load Requirements</a>	<a href="#">26</a>
■ <a href="#">Floor-Plan Guidelines</a>	<a href="#">27</a>
■ <a href="#">Environmental Considerations</a>	<a href="#">33</a>
■ <a href="#">Cabinet Power Requirements</a>	<a href="#">37</a>
■ <a href="#">Cabinet Cooling Fans</a>	<a href="#">58</a>
■ <a href="#">System Protection</a>	<a href="#">59</a>
<b>3 — Cabinets, Carriers, and Circuit Packs</b>	<b>63</b>
■ <a href="#">Cabinets</a>	<a href="#">64</a>
■ <a href="#">Carriers in MCCs</a>	<a href="#">67</a>
■ <a href="#">Single-Carrier Cabinets</a>	<a href="#">77</a>
■ <a href="#">Carriers in SCCs</a>	<a href="#">80</a>
■ <a href="#">Minimum Cabinet Configurations</a>	<a href="#">88</a>
■ <a href="#">Directly Connected Cabinet Configurations</a>	<a href="#">92</a>
■ <a href="#">Cabinet Configurations in CSS- and ATM-Connected Systems</a>	<a href="#">94</a>
■ <a href="#">Cabling to On- and Off-Premises Systems</a>	<a href="#">101</a>
■ <a href="#">Circuit Packs and Related Hardware</a>	<a href="#">101</a>
■ <a href="#">DEFINITY Adjuncts</a>	<a href="#">160</a>

<b>4 — Technical Specifications</b>	<b>169</b>
■ <a href="#">Representative Number of Lines/Trunks</a>	<a href="#">169</a>
■ <a href="#">Call Performance</a>	<a href="#">170</a>
■ <a href="#">Additional Hardware to Use Features</a>	<a href="#">171</a>
■ <a href="#">Allocation of Buttons</a>	<a href="#">207</a>
■ <a href="#">Cabling Distances</a>	<a href="#">212</a>
■ <a href="#">Initialization and Recovery</a>	<a href="#">217</a>
■ <a href="#">Call Progress Tones</a>	<a href="#">217</a>
<b>A — Wireless Business Solutions</b>	<b>225</b>
■ <a href="#">Overview</a>	<a href="#">225</a>
■ <a href="#">FreeWorks™ Wireless Telecommunications</a>	<a href="#">225</a>
<b>B — System Capacity Limits</b>	<b>231</b>
■ <a href="#">Overview</a>	<a href="#">231</a>
■ <a href="#">System Capacity Limits</a>	<a href="#">231</a>
<b>Index</b>	<b>261</b>



---

## About This Book

---

### **Purpose**

---

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

### **Intended Audience**

---

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

### **Systems Supported**

---

This book covers the system updates from R6 to R7. The primary interest of this book is the R7 system. Refer to the *DEFINITY Enterprise Communications Server Release 6 System Description Pocket Reference* and the *DEFINITY Communications System Generic 3 System Description and Specifications* for previous versions.

For additional information on CallVisor ASAI refer to the following documents:

*DEFINITY Enterprise Communications Server Release 7—Installation, Administration, and Maintenance of CallVisor ASAI Over the DEFINITY LAN Gateway*, 555-230-223.

*DEFINITY Enterprise Communications Server Release 5—CallVisor PC ASAI Installation and Reference Issue 2*, 555-230-227.

About This Book

*Systems Supported*

x

---

---

# 1—Overview of DEFINITY ECS R7

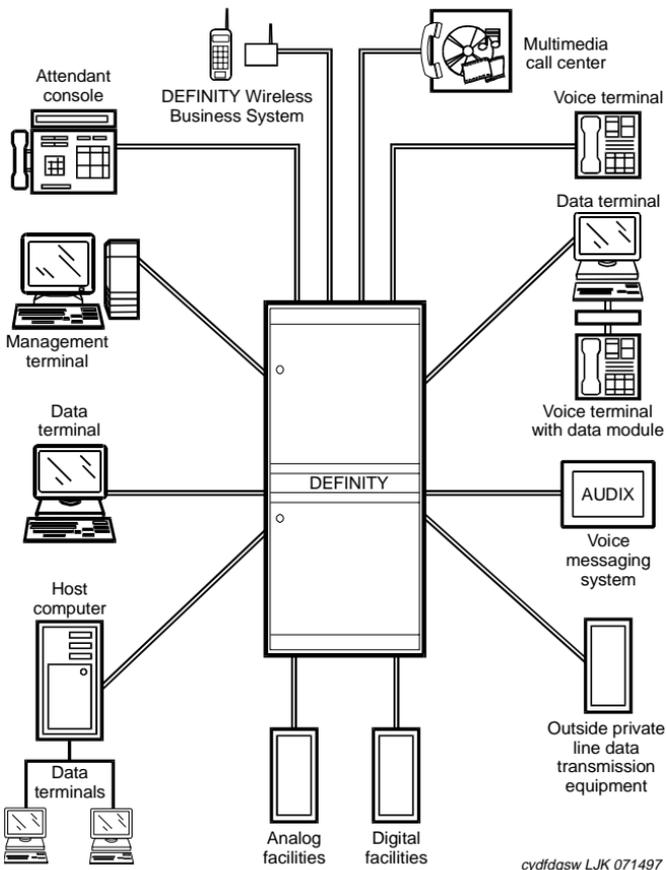
---

This document provides a general overview of the DEFINITY ECS R7.

## **The ProductName**

---

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



**Figure 1. The System as a Digital Switch**

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

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

## **System Components**

---

The basic system component is the port network (PN), consisting of port circuits connected to internal buses that allow the circuits to communicate with each other. See [Figure 1](#).

### **Processor Port Network**

---

The required processor port network (PPN) contains the switch processing element (SPE). The SPE is a computer that operates the system, processes calls, and controls the PN containing the port circuits.

### **Expansion Port Network**

---

An expansion port network (EPN) (optional) contains additional ports that increase the number of connections to trunks and lines.

### **Center Stage Switch**

---

A center stage switch (CSS) (optional for 3 PNs or less) in R7r is the central interface between the PPN and the EPNs. The CSS consists of 1, 2, or 3 switch nodes (SN). One SN can expand the system from 1 EPN to up to 15 EPNs. Two SNs can expand the system to up to 29 EPNs. Three SNs can expand the system to up to 43 EPNs.

#### **⇒ NOTE:**

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

### **ATM Switch**

---

The asynchronous transfer mode (ATM) switch is a replacement option for the CSS. Any standards-compliant asynchronous transfer mode (ATM) switch can serve as a DEFINITY ECS switch node.

---

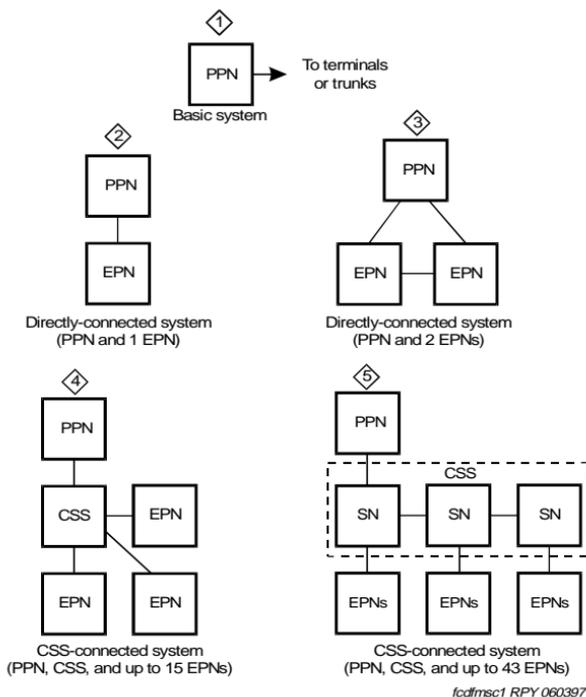
## **Main System Configuration**

---

Figure 2 shows the following 5 main system configurations:

Basic system consisting of a processor port network (PPN) only.

1. Directly-connected system with 2 PNs (1 PPN and 1 EPN) connected directly together.
2. Directly-connected system with 3 PNs (1 PPN and 2 EPNs) connected directly together.
3. Center stage switch (CSS)-connected system with up to 15 EPNs interconnected by 1 SN to the PPN.
4. CSS-connected system with up to 29 EPNs connected by 2 SNs to the PPN, and up to 43 EPNs connected by 3 SNs to the PPN.



**Figure 2. Main System Configurations**

## System Configurations

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

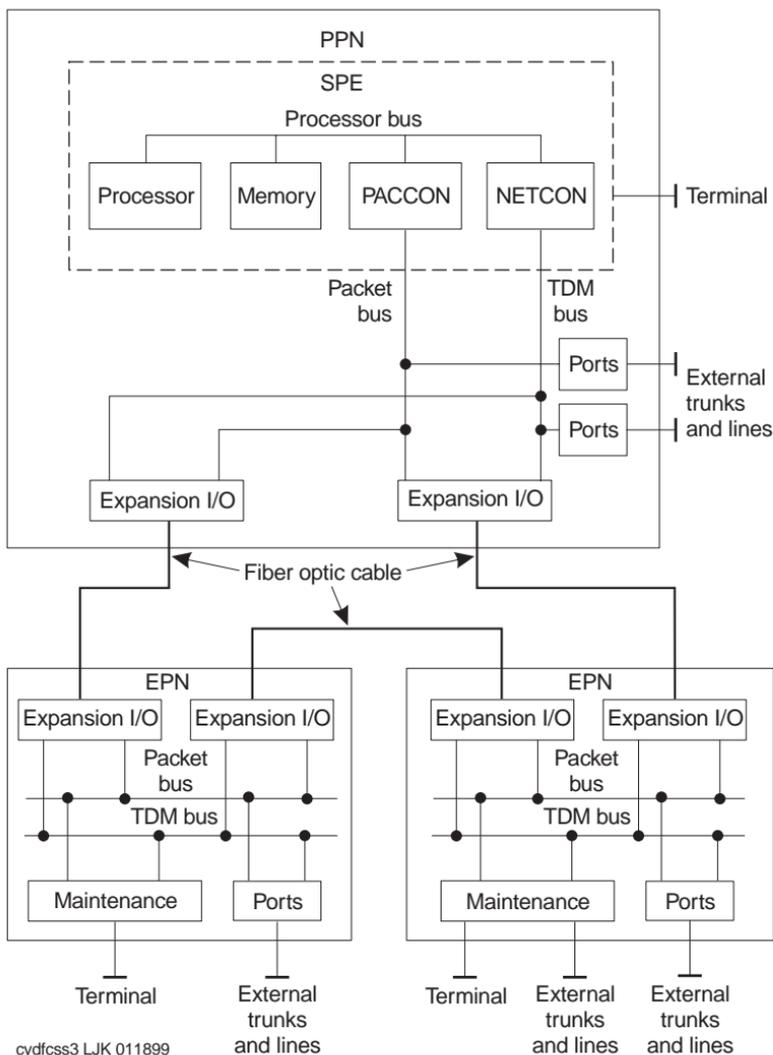


Figure 3. Components of a Directly-Connected System

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

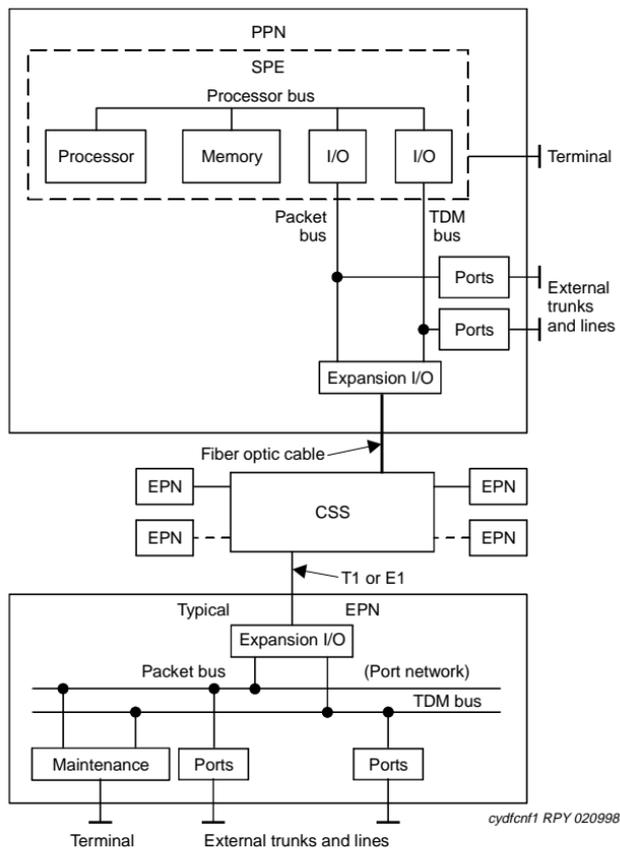


Figure 4. Components of a CSS-Connected System

---

## Switch Processing Element

---

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

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

- **Processor:** All R7 systems use a reduced instruction set computer (RISC) processor. The TN790 processor circuit pack is used in R7si systems. The TN798 is used in R7csi systems. The UN331B is used in R7r systems.
- **Memory:** R7csi and R7si systems use 16 Mbytes of flash read only Memory (ROM) and 16 Mbytes of dynamic random access memory (DRAM) resident on the processor circuit pack. R7r systems require 3 TN1650B memory circuit packs to provide a total of 96 Mbytes of DRAM.
- **Storage:** In all R7 systems except R7r, translations are stored in nonvolatile memory on a PCMCIA memory card. In R7r systems, the disk drive is a nonvolatile system bootstrap and translation storage device. A R7r system can use a tape drive as backup storage.
- **Input/output (I/O) circuits:** These act as interfaces between the SPE and the time division multiplexing bus and packet bus.
- **Maintenance interface:** connects the system to an administration terminal and monitors power failure, clock signals and temperature sensors.

---

## Port Network (PN)

---

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

- **Time division multiplexing (TDM) bus:** Has 483 time slots, 23 B channels and 1 D channel available per bus. Runs internally throughout each PN and terminates on each end. Consists of two 8-bit parallel buses: bus A and bus B. These buses carry switched digitized voice and data signals and control signals among all port circuits and between port circuits and the SPE. The port circuits place digitized voice and data signals on a TDM bus. Bus A and bus B are normally active simultaneously.
- **Packet bus:** Runs internally throughout each PN and terminates on each end. It is an 18-bit parallel bus that carries logical links and control messages from the SPE, through port circuits, to endpoints such as terminals and adjuncts.

The packet bus carries the following types of logical links between some specific port circuits in the system.

**Table 1. Packet Bus Logical Links**

Logical Link	R7csi	R7si	R7r
X.25 links (including DCS)	not available	TDM only	packet only
Switch node interfaces	not available	not available	packet only
Remote management terminal	TDM only	TDM only	packet only

- *Port circuits:* form analog/digital interfaces between the PN and external trunks and devices providing links between these devices and the TDM bus and packet bus. Incoming analog signals are converted to pulse-code modulated (PCM) digital signals and placed on the TDM bus by port circuits. Port circuits convert outgoing signals from PCM to analog for external analog devices. All port circuits connect to the TDM bus. Only specific ports connect to the packet bus.
- *Interface circuits:* Located in the PPN and in each EPN. These are types of port circuits that terminate fiber optic cables connecting TDM buses and the packet bus from the PPN cabinet to the TDM buses and packet bus of each EPN cabinet. The fiber-optic cable also connects the CSS to the PPN and the EPNs. These interface and cabling terminations provide a transmission path between the port circuits in different PNs.  
  
An expansion interface (EI) circuit pack also terminates each end of a cable connecting the PPN to an EPN. Each end of a cable connecting an EPN to another EPN, and the PN end of a cable connected between a PN carrier and a SN carrier.  
  
A switch node Interface (SNI) circuit pack terminates the SN carrier end of a cable connected between an SN carrier and a PN.
- *DS1 interface circuits:* Convert from fiber interface to DS1 interface between PNs for DS1 remoting.
- *Service circuits:* Connect to an external terminal to monitor, maintain, and troubleshoot the system. Also provide tone production and detection as well as call classification, modem pooling, recorded announcements, and speech synthesis.

---

## CSS

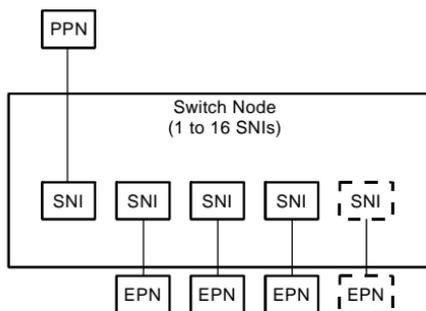
---

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

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

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

---



cent\_ppn\_0 RBP 070296

---

**Figure 5. CSS with Switch Nodes (SNs)**

In a high reliability system (with duplicated processor), 2 SNI circuit packs connect to the PPN, allowing up to 15 PNs to connect to 1 SN, up to 20 PNs to connect to 2 SNs, and up to 25 PNs to connect to 3 SNs, depending on the exact configuration chosen.

---

## ATM Switch Nodes

---

Any standards-compliant asynchronous transfer mode (ATM) switch can serve as a DEFINITY ECS switch node. In this configuration, TN2238 multi-mode or TN2338 single-mode ATM circuit packs are installed on the port networks and connected to the ATM switch with the multi- or single-mode fiber specified for the ATM switch.

---

## **Architecture**

---

The system consists of 2 main components:

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

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

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

---

## **Connecting with TCP/IP Networks**

---

---

### **LAN Gateway**

---

With the optional J58890MA-1 LAN Gateway circuit-pack assembly installed, DEFINITY ECS works with PC/LAN-based communications applications that support the CallVisor Adjunct-Switch Application Interface (ASAI).

---

### **PassageWay Integrated Voice/Data-Workstation Applications**

---

PassageWay applications make the features of the DEFINITY ECS telephone system available from the Windows desktop. With PassageWay and the DEFINITY LAN gateway implemented, a call-center application could, for instance, let agents access all job-related resources—the order-processing database, company World Wide Web site, phone system, voicemail system, and fax machine—from a single interface on the PC.

---

## IP Trunking

---

DEFINITY ECS now supports Internet Protocol (IP) trunks using the [TN802](#) circuit pack.

IP trunking is a good choice for basic, corporate voice and fax communications, where cost is a major concern. IP-trunk calls travel over the intranet or Internet, rather than the public telephone network. So, for the commonest types of internal, corporate communications, IP trunks offer considerable savings.

IP trunking is usually not a good choice for applications where calls have to be routed to multiple destinations (as in most conferencing applications) or to a voice messaging system. IP-trunk calls are compressed to save network bandwidth. Repeated compression and decompression results in a loss of data at each stage and degrades the final quality of the signal. This is not a problem in normal, corporate voice or fax calls. They go through two or three compression cycles at most. But multipoint conference calls and most voice messaging systems add too many compression cycles for acceptable quality.

---

## DEFINITY ECS Hardware

---

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

---

### Cabinets

---

The system cabinets house all components, including the power supply. A cabinet contains at least 1 carrier in an enclosed shelf with vertical slots to hold circuit packs. The circuit packs fit into connectors that attach to the rear of the slots. There are 3 cabinet types:

#### Compact modular cabinets (R7csi)

The compact modular cabinet (CMC) is only used as a PPN and is standard reliability only (no duplication). It mounts on a wall (preferred) or sits on the floor (with a floor panel). See [Figure 6, "Compact Modular Cabinet, Floor Mount \(Top\) and Wall Mount \(Bottom\)" on page 14](#). The carrier contains universal port slots. The processor circuit pack resides in slot 1 and the tone-clock circuit pack resides in slot 2 of the A cabinet. The AUX connector on the side of the carrier provides power for 1 attendant console and 1 emergency transfer panel.

## Single-carrier cabinets

Up to 4 single-carrier cabinets can be stacked to form a single PN. DEFINITY ECS R7si supports up to 3 cabinet stacks. See [Figure 7, "Typical Single-Carrier Cabinet"](#) on page 15.

Single-carrier cabinets come in any of 4 configurations:

- A basic control cabinet that contains a TN790 processor, tone clock, and a power converter
- An expansion control cabinet that contains additional port circuit packs, interfaces to the PPN, a maintenance interface and a power converter
- A duplicated control cabinet that contains the same equipment as the basic control cabinet
- A port cabinet that contains port circuit packs and a power converter

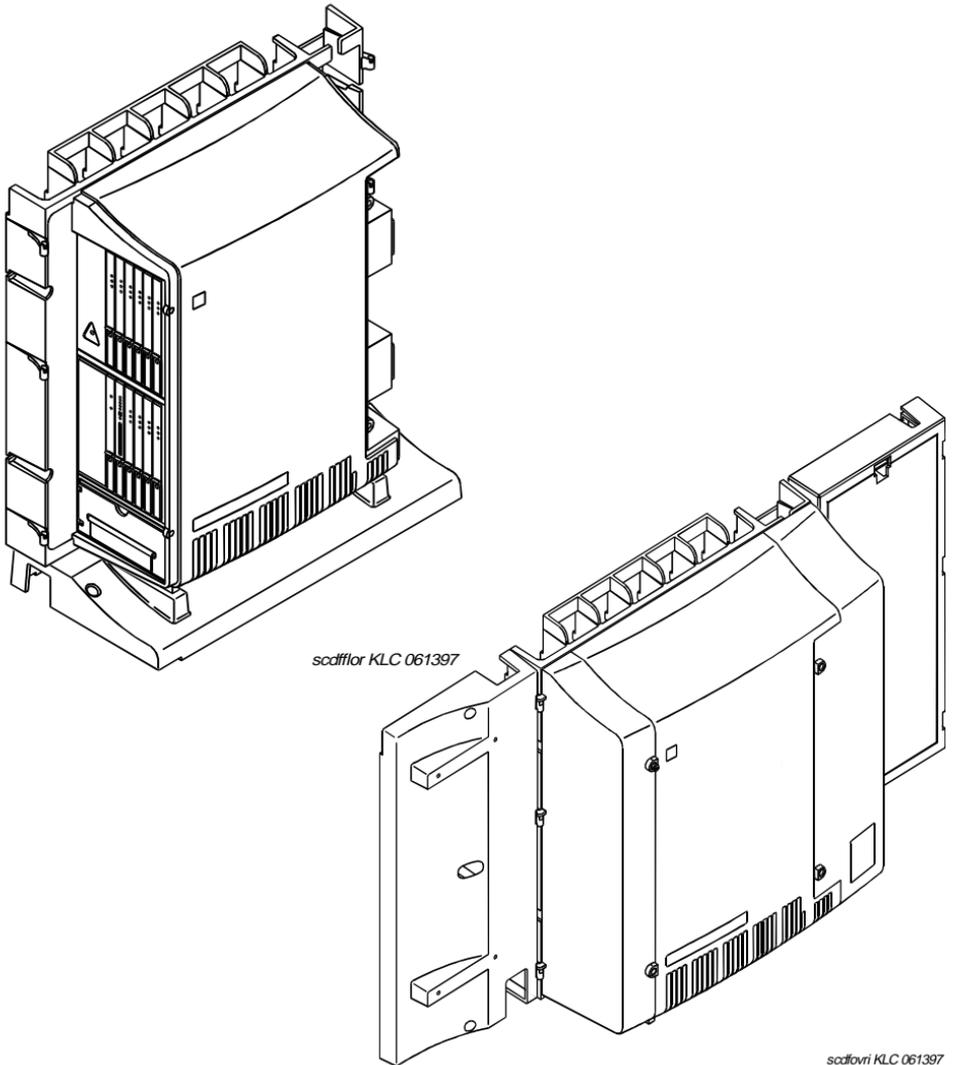
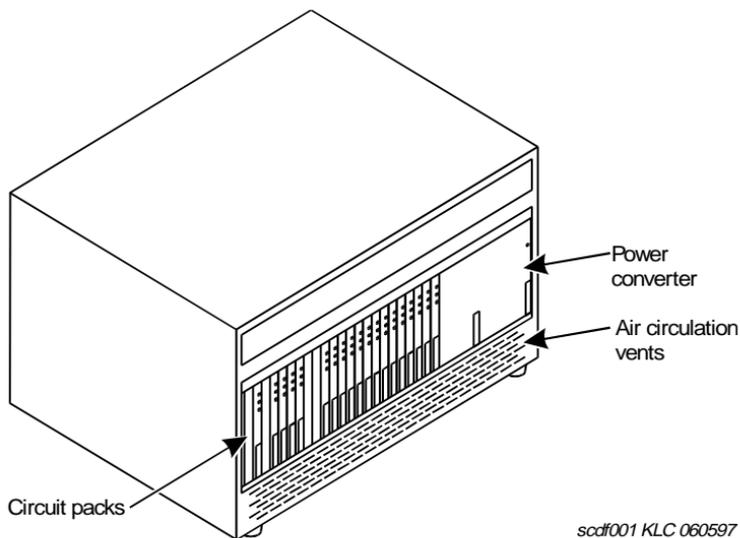


Figure 6. Compact Modular Cabinet, Floor Mount (Top) and Wall Mount (Bottom)

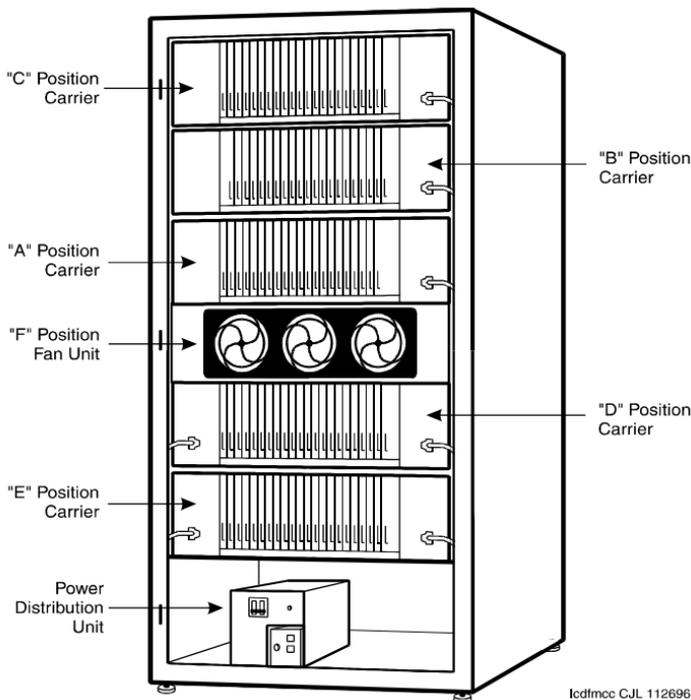


**Figure 7. Typical Single-Carrier Cabinet**

### Multicarrier cabinets

A multicarrier cabinet is a 70 in. (178 cm) cabinet that has up to 5 carriers (see [Figure 8, "Typical Multicarrier Cabinet" on page 16](#)). The 3 types of multicarrier cabinets are as follows:

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



**Figure 8. Typical Multicarrier Cabinet**

## Carriers

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

- Control carrier (PPN cabinet only)
- Optional duplicated control carrier (PPN cabinet only)
- Optional port carrier (PPN and/or EPN cabinets)
- Optional expansion control carrier (EPN cabinets only)
- Optional switch-node carrier (PPN and/or EPN cabinets)

## **Supported Terminals**

---

- 300-series attendant consoles (302A, 302B, 302C)
- 500-, 2500-, 6200-, 7100-, 8100-, 9100-series analog voice terminals
- 602/603/606 Callmaster sets. The 603 and 606 terminals display the full 8-bit OPTREX character set of graphical characters, including Eurofonts, and the Japanese katakana character alphabet.
- The 6400-series 2-wire DCP voice terminals connect to a digital line circuit pack and allow the use of both I-Channels for voice. The number of displayed characters is 27 for calls involving a single ID. If more than one party's ID displays, the ID truncates to 15 characters.

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

- 7300-series hybrid
- 7400-series DCP voice terminal
- The 8400-series DCP voice terminal connects to a digital line circuit pack and uses one I-channel for voice (the 8411 uses both I-channels). The number of displayed characters for calls involving a single ID is 27. If more than one party's ID displays, the ID truncates to 15 characters.

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

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



### **NOTE:**

Many other terminals are available. Contact your Lucent Technologies representative for more information.

## **Duplication**

---

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

- Standard reliability
- High reliability
- Critical reliability

As duplication increases, the maximum number of port carriers and port circuit packs per cabinet decreases.

## **International Requirements**

---

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

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

---

## **Administration**

---

A management terminal connects to the system for administrative purposes. Enter commands at the terminal to display administration screens (forms). The forms list data and allow you to add, change, and remove system and voice-terminal features. For system administration information, consult the *DEFINITY Enterprise Communications Server Release 7 Administrator's Guide*.

## **Integrating Adjunct, Peripheral, and Third-Party Products**

---

The ProductName can work with a wide range of external equipment, applications, and peripherals. It provides extensive support for third-party equipment and applications, such as external ringing equipment and music-on-hold systems. The CallVisor Adjunct-Switch Application Interface even gives independent application developers access to DEFINITY ECS features and routing information from within their own applications.

## Comparing System Versions

To compare the differences between the system version and the cabinet version, see Table 2 and Table 3.

**Table 2. System Versions**

System	PPN	Maximum EPNs	Direct-, ATM-, or CSS- Connected
Release 7csi	1	0	Does not apply
Release 7si	1	2	Direct (fiber only)
Release 7r	1	43	Direct, CSS or ATM

**Table 3. Carriers**

Cabinet	R7csi	R7si	R7r
Basic control	PPN	PPN	PPN
Duplicated control	Does not apply	PPN	PPN
Port	PPN	PPN and EPN	PPN and EPN
Expansion control	Does not apply	EPN	EPN

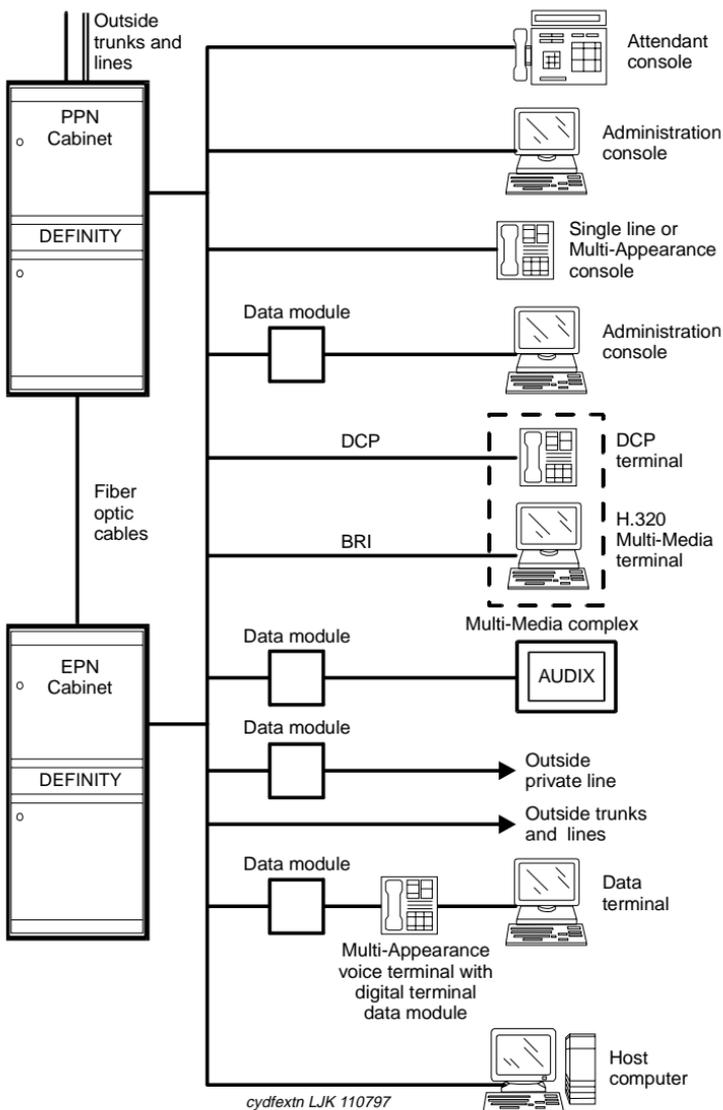


Figure 9. Typical DEFINITY ECS Connections and Terminals



## 2—Site Requirements

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

### Floor Area

For maintenance access, floor plans typically allocate space around the front, ends, and rear of the cabinets. Floor area requirements vary between cabinets. Dimensions and clearances for all cabinet configurations are listed in the table below.

**Table 4. Cabinet Dimensions and Clearances**

Cabinet Type	Height	Width	Depth	Clearance
Compact modular 1-cabinet	25.5 in. (64.8 cm)	24.5 in. (62.2 cm)	12 in. (30.5cm)	Left, Right, and Front 12 in. (30.5 cm)
2-cabinets	51 in. (129.6 cm)	24.5 in. (62.2 cm)	12 in. (30.5 cm)	
3-cabinets	76.5 in. (194.4 cm)	24.5 in. (62.2 cm)	12 in. (30.5 cm)	
Compact single-carrier cabinet	14 in. (35.6 cm)	13 in. (33 cm)	26 in. (66 cm)	Left, Right, and Front 12 in. (30.5 cm), plus 38 in. (97 cm) between rear of cabinet and wall

*Continued on next page*

Table 4. Cabinet Dimensions and Clearances — *Continued*

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

*Continued on next page*

**Table 4. Cabinet Dimensions and Clearances — Continued**

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

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

## Floor Load Requirements

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

**Table 5. Cabinet Weights and Floor Loadings**

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

---

## Floor-Plan Guidelines

---

DEFINITY ECS floor plans vary with the size and shape of the equipment room and the extent of future growth. Future growth includes a new or upgraded system, adjuncts and peripherals, and the MDF. See [“Main Distribution Frame” on page 32](#).

For floor standing cabinets, reserve the area behind a cabinet for the MDF and the cable slack manager. For wall mounted cabinets, reserve the area beside the cabinets for the MDF. [Figure 10](#) through [Figure 15](#) show typical floor plans. All dimensions are shown in inches. Refer to [Table 12](#) for power requirements.

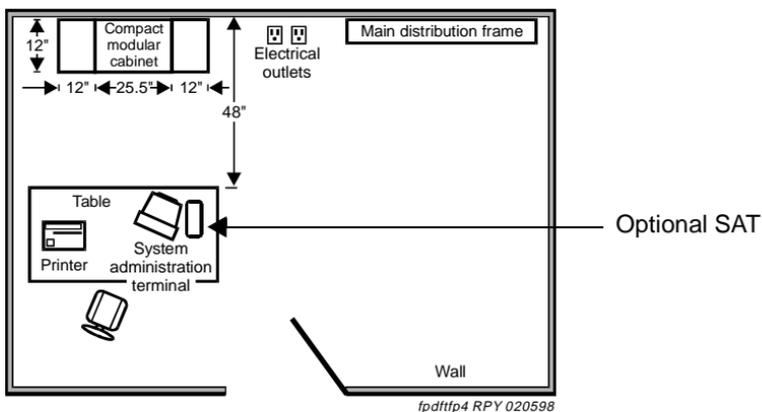
### Compact Modular Cabinet Configuration Guidelines

---

The main distribution frame (MDF) (cross-connect) is either to the rear or right of the cabinet. To allow service access, the table for the management terminal and optional printer is away from the equipment area. See [Figure 10](#) and [“Table Area” on page 32](#) for requirements. In an installation where no MDF is present, an MDF can be installed in the CMC right panel.

The following steps are pre-installation guidelines:

1. Locate the power outlets outside the MDF area. The outlets must not be controlled by a wall switch or be shared with other equipment.
2. Locate the trunk/auxiliary field inside the MDF, if desired.
3. Ground the system. See [“Approved Grounds” on page 52](#).
4. Each cabinet requires either: NEMA 5-15R receptacle (or equivalent) for United States installations or local IEC 320 cord set (or equivalent) for non-United States installations.



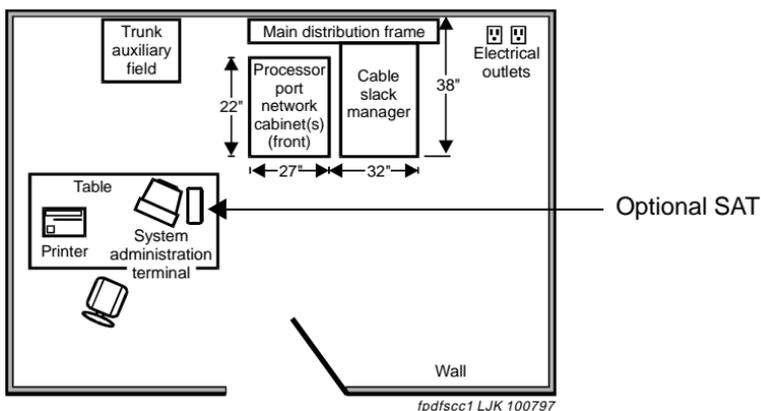
**Figure 10. Typical Compact Modular Cabinet Floor Plan**

### Single-Carrier Cabinet Configuration Guidelines

The MDF can be directly behind the cable slack manager. To allow service access, the table for the management terminal and optional printer is away from the equipment area. See [Figure 11](#) and "Table Area" on page 32 for requirements.

The following steps are pre-installation guidelines:

1. Locate the power outlets outside the MDF area. The outlets must not be controlled by a wall switch or be shared with other equipment.
2. Locate the trunk/auxiliary field inside the MDF, if desired.
3. Ground the system. See ["Approved Grounds"](#) on page 52.
4. For fiber connections between PN's, use a 20-foot (6.1 m) multimode fiber optic cable.
5. Install earthquake protection (if required). See ["Earthquake Protection"](#) on page 61.
6. Each cabinet requires either: NEMA 5-15R, NEMA 5-20R receptacle (or equivalent) for United States installations or local cord set (or equivalent) for non-United States installations.



**Figure 11. Typical Single-Carrier Cabinet Floor Plan**

## Multicarrier Cabinet Configuration Guidelines

The MDF is directly behind the cable slack manager. To allow service access, the table for the management terminal and optional printer is away from the equipment area. See [Figure 12](#) and [“Table Area” on page 32](#) for requirements. The following steps are pre-installation guidelines:

1. Locate the power outlets outside the MDF area. The outlets must not be controlled by a wall switch or be shared with other equipment.
2. For the PPN cabinets, use either a NEMA 5-50R receptacle (or equivalent) or a NEMA L14-30R receptacle (or equivalent) power outlet or: 220 VAC, 50-60 Hz power outlet for the Global AC Cabinet.
3. For the Auxiliary Cabinet, use a NEMA 5-20R receptacle (or equivalent).
4. Allow at least 3 feet (91.4cm) of space in front of the cabinet to permit the door to open.
5. Ground the system. See [“Approved Grounds” on page 52](#).
6. Install earthquake protection (if required). See [“Earthquake Protection” on page 61](#).
7. Locate the trunk/auxiliary field inside the MDF, if desired.
8. Fiber connections between PNs use a 20-foot (6.1 m) multimode fiber optic cable.

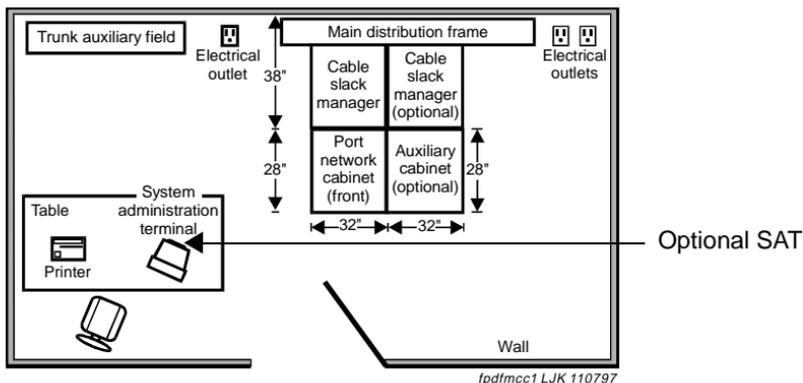


Figure 12. Typical Multicarrier Cabinet Floorplan

### Additional Floor Plans

The following floor plans illustrate recommendations for other possible installations. See [Figure 13](#), [Figure 14](#), and [Figure 15](#).

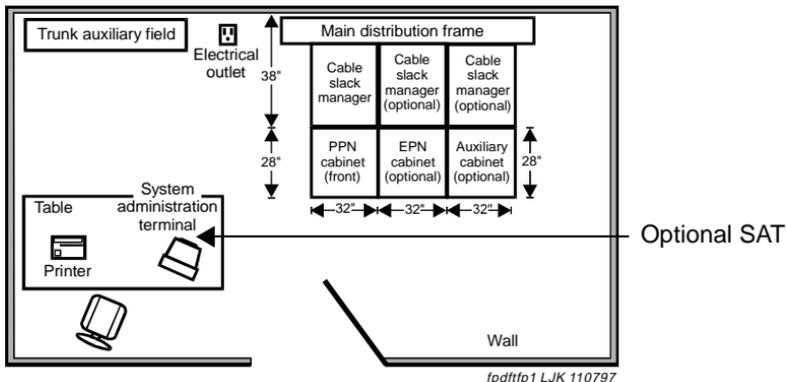


Figure 13. Typical Floor Plan with EPN and Auxiliary Cabinet

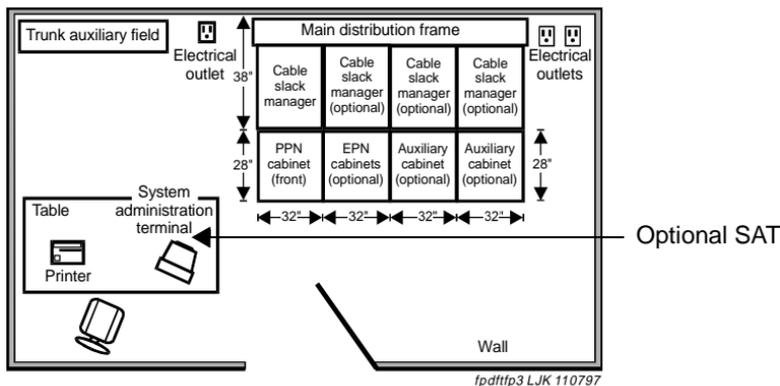


Figure 14. Typical Floor Plan with an additional EPN and Auxiliary Cabinets

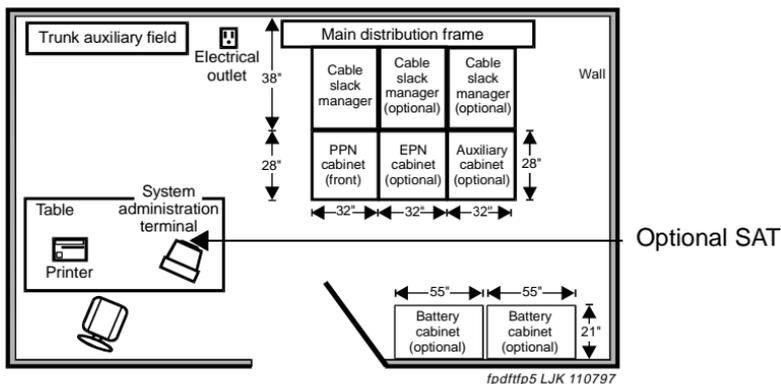
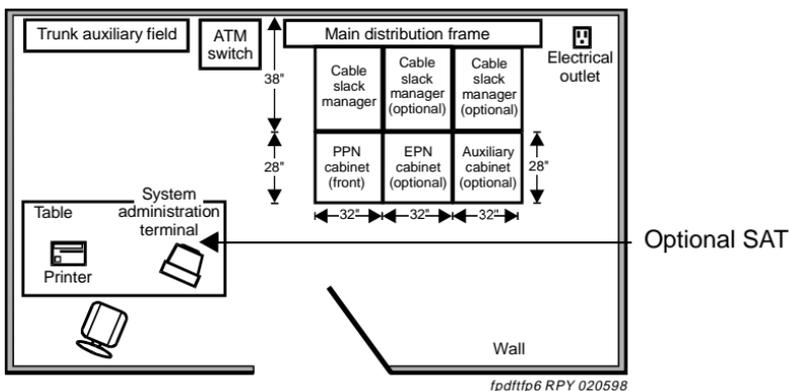


Figure 15. Typical Floor Plan with Battery Cabinets



**Figure 16. Typical Floor Plan with ATM Switch**

### Table Area

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

### Main Distribution Frame

The Main Distribution Frame (MDF) equipment is located a specified distance from the DEFINITY cabinets and must meet specific requirements. An optional MDF can be installed in the CMC right hand panel.

For new installations, Lucent Technologies personnel may install the MDF. For more details about the MDF and other site requirements, refer to the following documents:

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



**NOTE:**

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

## Environmental Considerations

This section details the environmental considerations for the multicarrier and single-carrier cabinets. For information about the DEFINITY Wireless Business System, refer to Appendix A.

### Heat Dissipation

Typical heat dissipation compact single-carrier, single-carrier, multicarrier are shown in [Table 6](#).

**Table 6. Typical Heat Dissipation for Various Cabinet Configurations**

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

### Altitude and Air Pressure

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

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

## Temperature and Humidity

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

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

**Table 7. Temperature and Relative Humidity**

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

*Continued on next page*

**Table 7. Temperature and Relative Humidity — Continued**

Room Temperature (Degrees Fahrenheit)	Room Temperature (Degrees Celsius)	Relative Humidity (%)
116	46.7	10 to 36
118	47.8	10 to 34
120	48.9	10 to 32

## Air Purity

The compact modular cabinet, single-carrier and multicarrier cabinets contain an air filter to reduce particulates flowing through the equipment. Do not install the cabinet where the air may be contaminated by excessive dust, lint, carbon particles, paper fiber contaminants, or metallic contaminants. Corrosive gases above the levels in [Table 8](#) must be avoided.

**Table 8. Allowable Concentrations for Atmospheric Contaminants**

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

## Lighting

Lighting must be bright enough to allow personnel to perform their tasks. The recommended light intensity is 50 to 70 footcandles (538 to 753 lumens/m<sup>2</sup>) to meet the Occupational Safety and Health Act (OSHA) standards.

## Radio Frequency Noise

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

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

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

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

## Acoustic Noise Generated by Cabinets

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

**Table 9. Noise Generated by Cabinets**

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

*Continued on next page*

**Table 9. Noise Generated by Cabinets**

Cabinet Type	Operating Condition	Additional Noise Generated	At Distance
	2 cabinets	2 dBA (50 dBA total)	5 ft. (1.5 m)
	3 cabinets	4 dBA (52 dBA total)	5 ft. (1.5 m)
	4 cabinets	5 dBA (53 dBA total)	5 ft. (1.5 m)

## Cabinet Power Requirements

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

### AC Power

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

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

- Single-phase, 4-wire, 120/240 VAC supplying 240 VAC. See [Figure 17](#). This source has 3 hot wires plus 1 ground wire.
- Three-phase, 4-wire, 120/208 VAC supplying 208 VAC. See [Figure 18](#). This source has 2 hot wires and 1 ground wire.

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

- International 4-wire, Y, 220/380 VAC. See [Figure 19](#). This source has 3 hot wires, 1 neutral wire, and 1 ground wire.
- International Delta, 3-wire, 220 or 240 VAC. See [Figure 20](#). This source has 3 wires.

**NOTE:**

The type of power for a multicarrier cabinet is shown on the cabinet's rear door, a single-carrier cabinet is shown on the cabinet's rear cover, and a compact modular cabinet is shown on the right door.

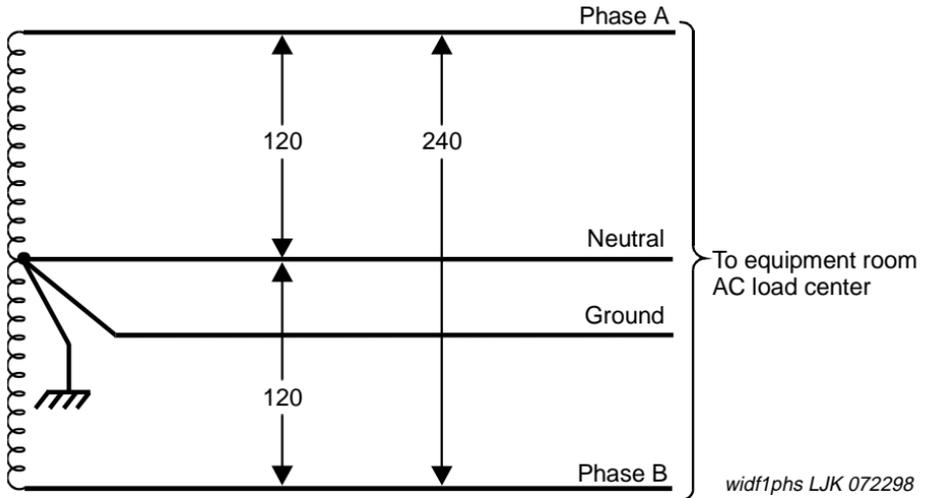


Figure 17. Single-Phase, 120/240 VAC, 60 Hz Source

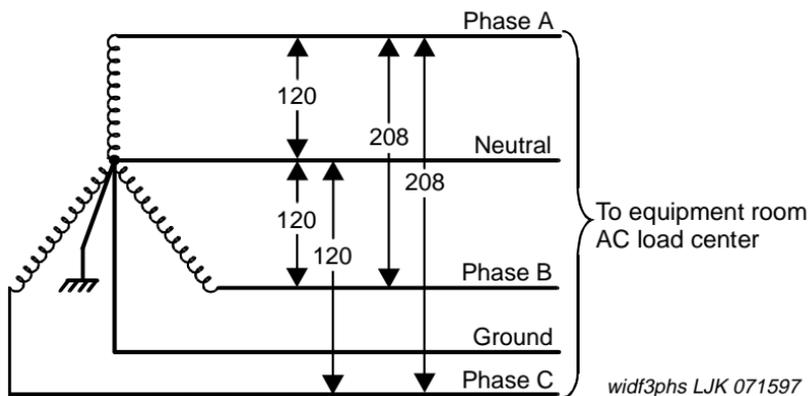


Figure 18. Single-Phase, 4-Wire, 120/208 VAC, 60 Hz Source

### 50 Hz Power Sources in R7 Systems

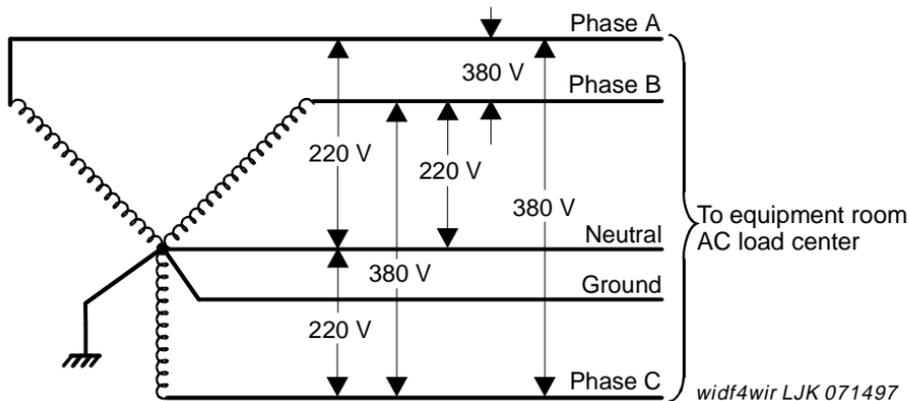
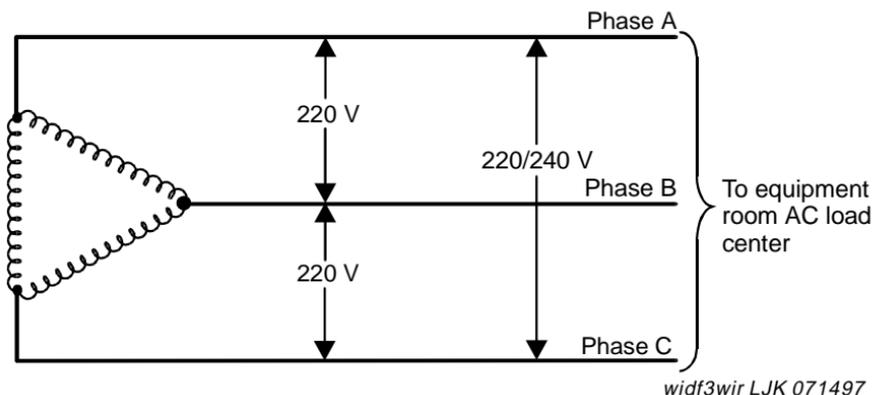


Figure 19. International 4-Wire, 220/380 VAC, 50-Hz Source



**Figure 20. International Delta, 3-Wire, 220 or 240 VAC, 50-Hz Source**

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

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

**Table 10. Cabinet AC Power Sources**

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

## DC Power

DC-powered cabinets containing a J58890CF power distribution unit require a -42.5 to -56 VDC source at up to 75 A. Refer to [“Multicarrier Cabinet Power System” on page 43](#).

Refer to [“Single-Carrier Cabinet Power Systems” on page 55](#) for DC-power information.

For DEFINITY Wireless Business System power requirements, refer to Appendix A.

## AC and DC Load Center Circuit Breakers

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

**Table 11. Circuit Breakers for AC-Powered Cabinets**

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

**Table 12. Circuit Breakers for DC-Powered Cabinets**

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

## Multicarrier Cabinet Power System

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

[Table 13](#) lists the input and output voltages of power unit circuit packs in the carriers of multicarrier cabinets.

**Table 13. Power Units in Multicarrier Cabinets**

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

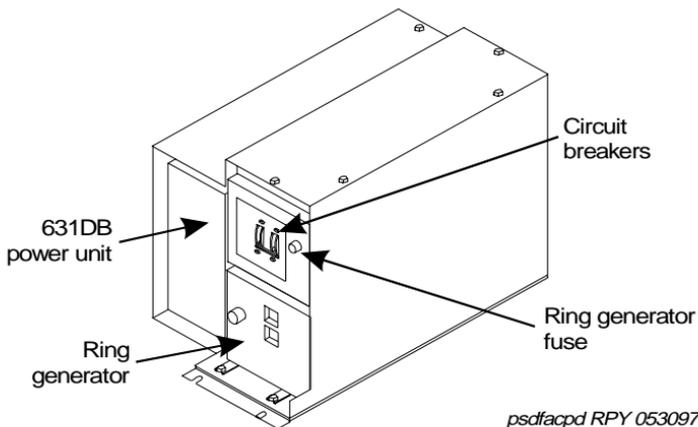
## AC and DC Power Distribution

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

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

### AC Power Distribution

[Figure 21](#) shows an AC Power Distribution Unit and Battery Charger (J58890CE-2 List 15 or later). This unit sits at the bottom of some multicarrier cabinets.

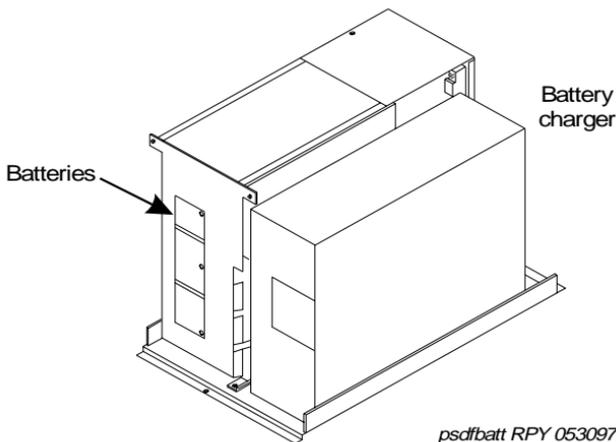


**Figure 21. AC Power Distribution Unit (J58890CE-2) (Front)**

The AC-power distribution unit contains the following additional components not shown in the figure:

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

The optional battery charger (List 11) sits at the bottom of some multicarrier cabinets. See [Figure 22](#).



psdfbatt RPY 053097

**Figure 22. Battery Charger (Optional Part of J58890CE-2) (Front)**

The battery charger is used only without an uninterruptible power supply (UPS). The charger contains:

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

### Circuit Breaker

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

### 48-VDC Batteries

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

### Battery Charger

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

## DC Power Relay

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

## Electromagnetic Interference (EMI) Filters

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

## Ring Generator

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

## Fuses

20-Amp fuses protect the power on each cable going from the AC- power distribution unit to power converters in the carriers.

Figure 23 shows AC power distribution in some multicarrier cabinets. The DC-power distribution cables are on both sides of the cabinet. These cables supply power to each of the carriers. The optional battery charger is at the right side of the power distribution unit.

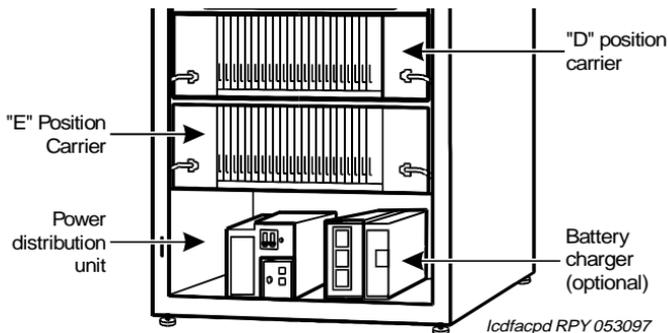


Figure 23. AC Power Distribution in Multicarrier Cabinets

## Power Backup

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

## Uninterruptible Power Supply

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

## AC Power Distribution Unit (J58890CH-1)

Figure 24 shows a typical ac power distribution unit used in some multicarrier cabinets. The unit sits at the bottom of the cabinet.

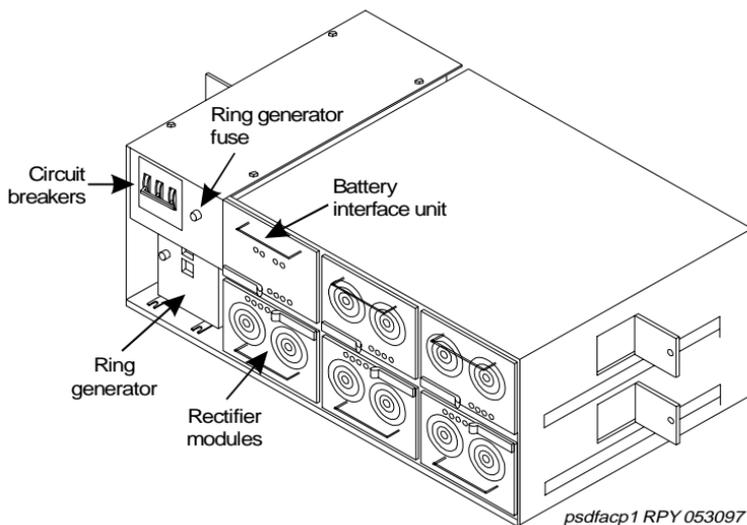


Figure 24. AC Power Distribution Unit (J58890CH-1) (Front)

## Power Backup

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

### Small Batteries

The small battery is an 8 AH (Amp-hour) battery fused for short circuit protection and is charged by the J58890CH-1. The batteries also contain a thermal sensor that changes the charging voltage depending on battery temperature. See [Figure 25](#).

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

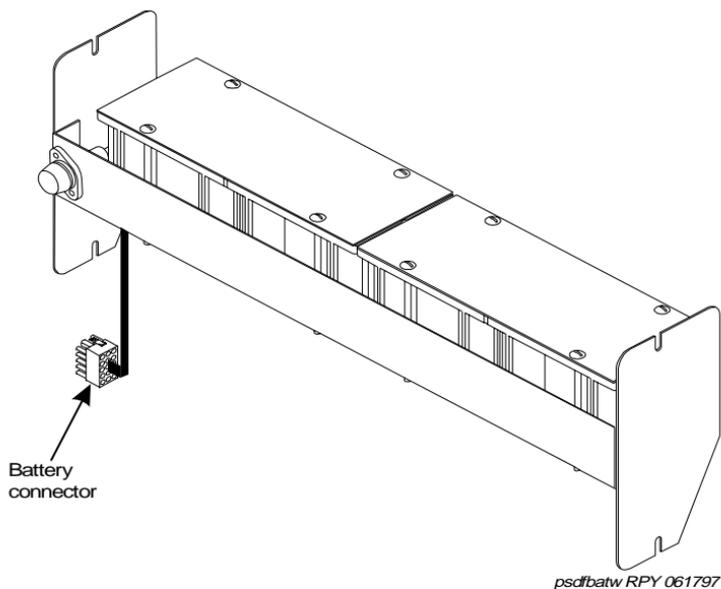


Figure 25. Small Battery Assembly

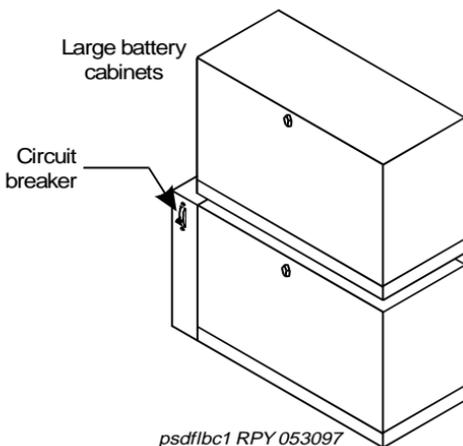
## Large Batteries

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

The batteries also contain a thermal sensor that changes the charging voltage, depending on the battery temperature. The batteries provide extended holdover. Battery holdover and recharge times for a typical 2500-Watt load are shown in [Table 14](#). A typical large battery cabinet, (200 A) is shown [Figure 26](#).

**Table 14. Battery Holdover and Recharge Times**

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



**Figure 26. Typical Large Battery Cabinets**

## DC Power Distribution

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

### DC Power Distribution Unit (J58890CF-2)

Figure 27 shows a power distribution unit in some DC-powered multicarrier cabinets. The unit sits at the bottom of the cabinet and contains the ring generator, 20-amp circuit breakers, terminal blocks, and system fan power.

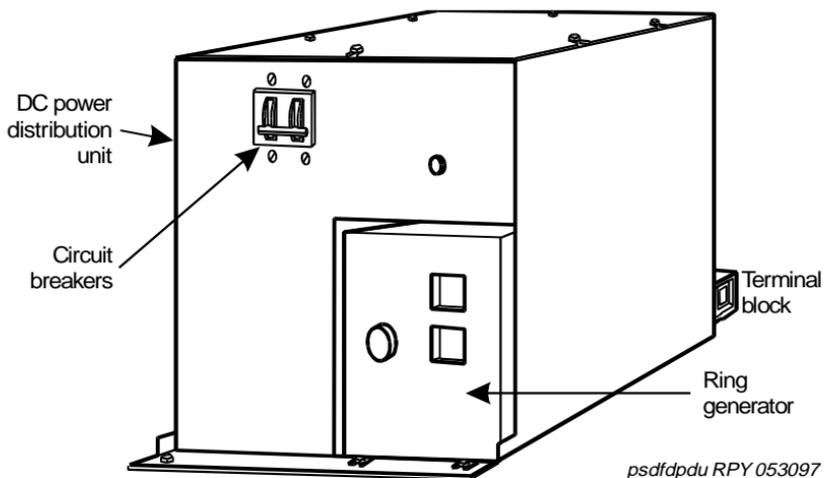


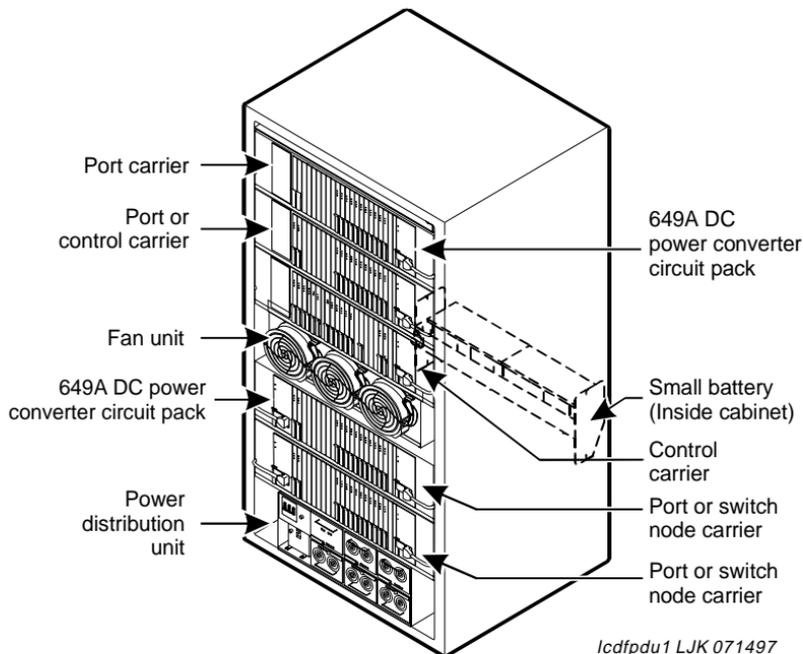
Figure 27. DC Power Distribution Unit (J58890CF-2) (Front)

## Ground Isolation

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

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

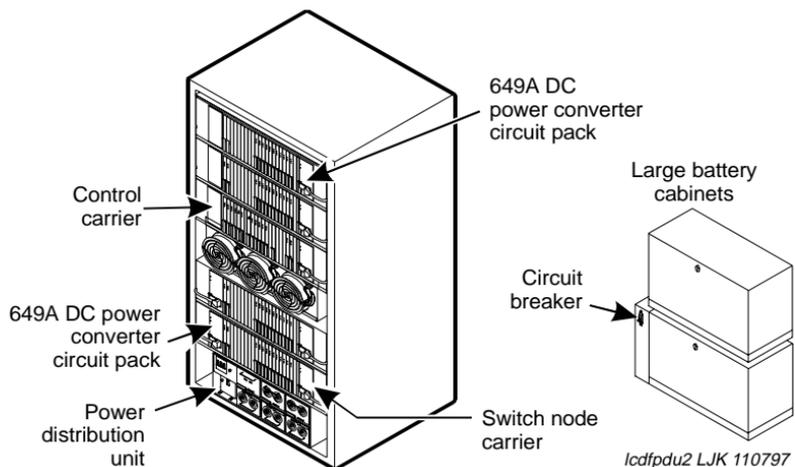
Figure 28 shows the power distribution in some multicarrier cabinets with short term battery holdover (small battery). In R7r systems, the power distribution cables are on the right hand side of the cabinet only. This is because the 649A DC power converter circuit pack replaces 2 power converters at either end of each carrier. Switch node (SN) carriers require two 649As and 2 cables.



lcdfpdu1 LJK 071497

Figure 28. Power Distribution in Multicarrier Cabinets

Figure 29 shows the DC-power distribution in some multicarrier cabinets with extended battery backup (large batteries). In R7r systems, the power distribution cables are on the right side of the cabinet only. This is because the 649A DC power converter circuit pack replaces 2 power converters at either end of each carrier. Switch node (SN) carriers require two 649As and two cables.



**Figure 29. DC Power Distribution in Multicarrier Cabinets**

### DC Power Converter (649A)

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

### AC and DC Grounding

#### Approved Grounds

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

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

## Protective Grounds

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

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

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

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

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

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

**Ground Ring** — A buried ground that encircles a building or structure at a depth of at least 2.5 feet (0.8 meter) below the earth's surface. The ground ring must be at least 20 feet (6 meters) of 2AWG (3.5 mm<sup>2</sup>), bare, copper wire.

## Approved Floor Grounds



### WARNING:

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

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

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



### NOTE:

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

## Coupled Bonding Conductor

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

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

---

## **Single-Carrier Cabinet Power Systems**

---

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

### **AC Power Supply (1217A)**

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

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

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

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

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

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

## **DC Power Supply (676C)**

In a DC-powered single-carrier cabinet, a single, plug-in multi-output DC power supply is in the power supply slots.

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

## **DC Power Distribution Unit (J58890CG)**

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

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

## **Enhanced DC Rectifier Cabinet (J58890R)**

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

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

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



### **NOTE:**

A J58890CG DC power distribution unit is required if the distance between the DC cabinet and the cabinet stack is greater than 30 feet (9 m).

## Compact Modular Cabinet AC Power Supply (650A)

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

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

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

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

## Compact Modular Cabinet Uninterruptible Power Supply

The UPS provides surge protection for all connected cabinets.

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

---

## **Cabinet Cooling Fans**

---

### **Compact Modular Cabinet Fan Unit**

---

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

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

### **Multicarrier Cabinet Fans**

---

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

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

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

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

---

## **Single-Carrier Cabinet Fan Unit**

---

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

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

---

## **System Protection**

---

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

- Overvoltage
- Sneak current
- Lightning
- Earthquake

---

## **Overvoltage Protection**

---

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

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

---

## **Sneak Current Protection**

---

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

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

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

---

## **Lightning Protection**

---

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

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

The CBC can be a 10 AWG (5.3 mm<sup>2</sup>/2.6 mm) ground wire, a continuous cable sheath surrounding wires within a cable, or 6 unused pairs of wire within a cable, twisted and soldered together. The CBC connects from the cabinet single-point ground bar in an AC-powered cabinet or the ground discharge bar in a DC-powered cabinet to the terminal bar at the MDF.

When there is an auxiliary cabinet, a 6 AWG (13.3 mm<sup>2</sup>/4.1 mm) wire connects the system cabinet single-point ground block to the Auxiliary cabinet ground block. The ground wire routes as closely as possible to the cables that connect the system cabinet to the Auxiliary cabinet.

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

---

## **Earthquake Protection**

---

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



---

## 3 — Cabinets, Carriers, and Circuit

### Packs

---

This section describes the cabinets, carriers, and circuit packs, their functions, physical specifications, and interconnections in DEFINITY ECS R7. It also describes minimum cabinet and carrier configurations relative to interconnection and system-duplication options.

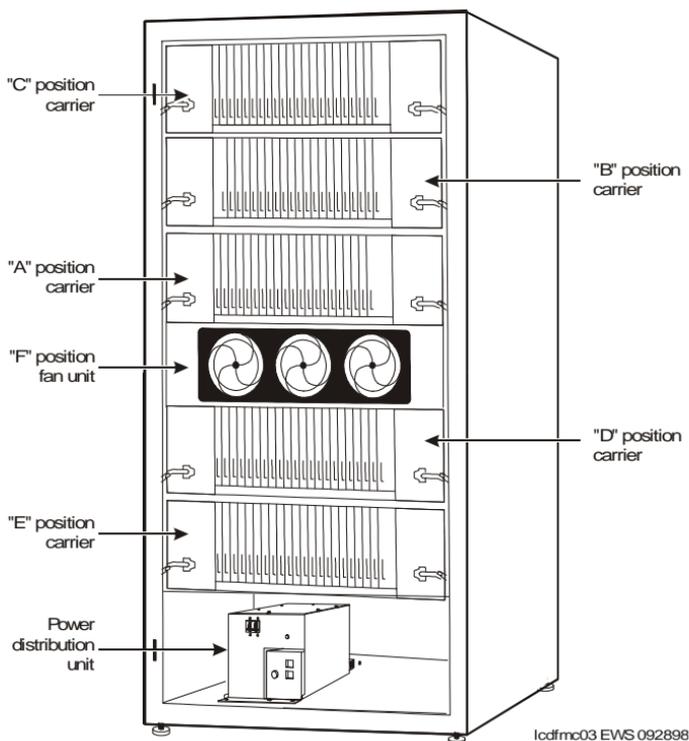
 **NOTE:**

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

## Cabinets

This section describes the auxiliary, processor port network (PPN), expansion port network (EPN), and AC-power cabinets.

A multicarrier cabinet (MCC) can be used as a PPN cabinet and/or an EPN cabinet. Doors on the front and rear of the MCC protect the internal equipment and allow easy access to the circuit packs. Each cabinet contains casters. Leveling feet keep the cabinet from rolling. Each corner of a cabinet can bolt to the floor, if required. See [Figure 30](#).



**Figure 30. Typical MCC Layout**

---

## AUX Connector Capacity

---

The AUX (auxiliary) connector is on the rear of the control carrier. Up to 3 attendant consoles can be powered by the AUX connector in the A position in R7 cabinets. Only 1 attendant console connects to R7vs and R7csi cabinets.

Up to 7 emergency transfer panels can be powered by the AUX connector in the A position in R7 cabinets. Only 1 emergency transfer panel connects to R7csi cabinets.

---

## Auxiliary Cabinet (J58886N)

---

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

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

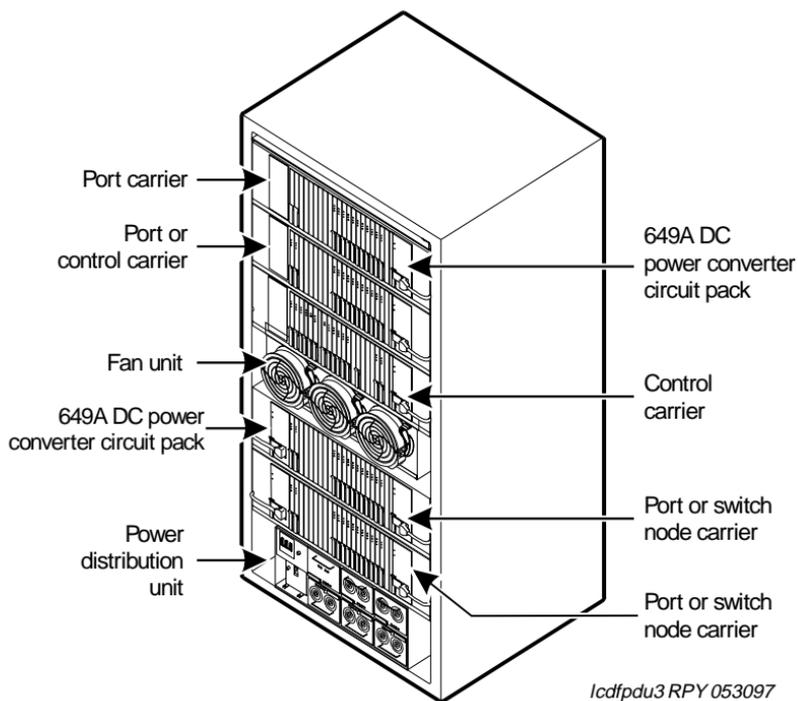
---

## Processor Port Network Cabinet (J58890A)

---

A processor port network (PPN) cabinet (see [Figure 31](#)) contains the following carriers:

- Port carrier (J58890BB) — 1 to 4
- Control carrier (J58890AH) in R7si — 1 in all configurations
- Duplicated control carrier (J58890AJ) R7si — 1 in high or critical reliability configurations
- Processor carrier (J58890AP) in R7r — 1 in all systems, 2 in high reliability and critical reliability systems
- Switch node (SN), 4-carrier (J58890SA), in R7r with an ATM or center stage switch (CSS) — 1 in standard and high reliability systems or 2 in critical reliability systems



**Figure 31. Typical Multicarrier PPN Cabinet (J58890A)**

### **Expansion Port Network Cabinet (J58890A)**

An expansion port network (EPN) cabinet (Figure 32) contains the following carriers:

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

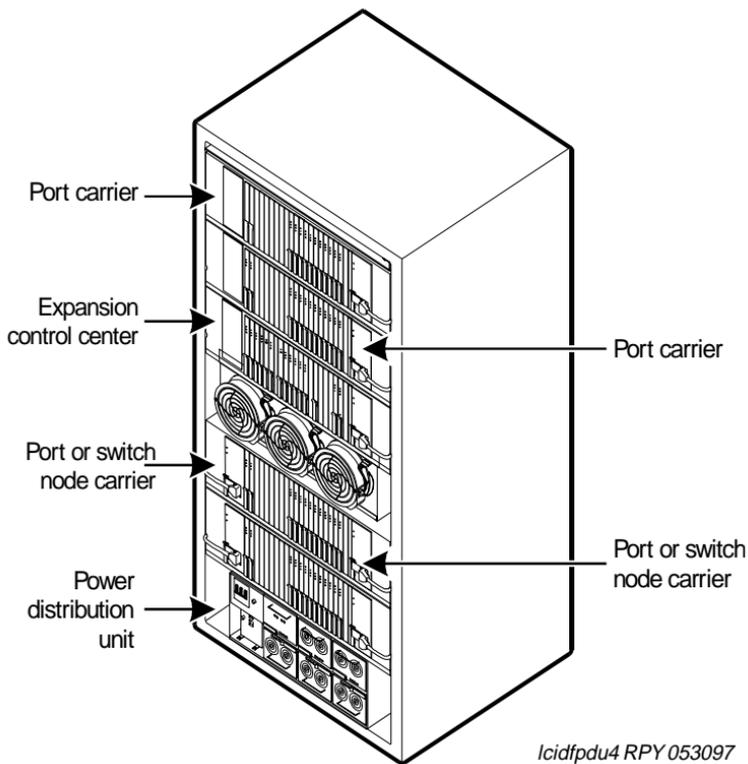


Figure 32. Typical Multicarrier EPN Cabinet (J58890A)

## Carriers in MCCs

The following types of carriers can install in MCCs:

- **Control Carrier (J58890AH)** located only in the R7si PPN cabinet. Contains SPE circuit packs to perform call processing, maintenance, and administration. These carriers also contain port circuit pack slots.

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

## Carrier Circuit-Pack Slots

---

There are 3 types of circuit pack slots in the carriers: control, port, and service.

### NOTE:

The purple colored circuit packs and slots are being replaced by gray colored circuit packs and slots.

- Port: colored purple or gray and can accept any purple or gray-labeled circuit pack
- Control: colored white and can accept only a circuit pack assigned to that slot
- Service: during the transition gray and purple circuit packs are interchangeable

Each port slot attaches to a 50-pin (25-pair) connector on the carrier's rear panel. A cable attaches to each connector and routes to the MDF. Each slot containing a fiber optic interface circuit pack (EI or SNI) attaches to a 25-pair connector on the carrier's rear panel. A fiber optic transceiver attaches directly to this connector without connecting to the MDF.

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

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

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

**⇒ NOTE:**

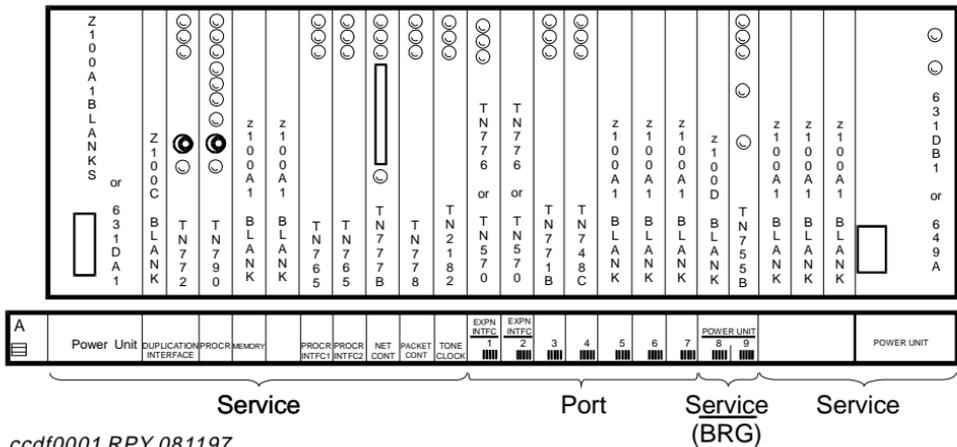
Throughout this section, the power units and circuit packs shown in the front views of the carriers are representative examples only. Actual, installed hardware may vary from that shown.

**⇒ NOTE:**

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

### J58890AH Control Carrier

A representative J58890AH control carrier is shown below.



ccdf0001 RPY 081197

Figure 33. Control Carrier (J58890AH) (Front)

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

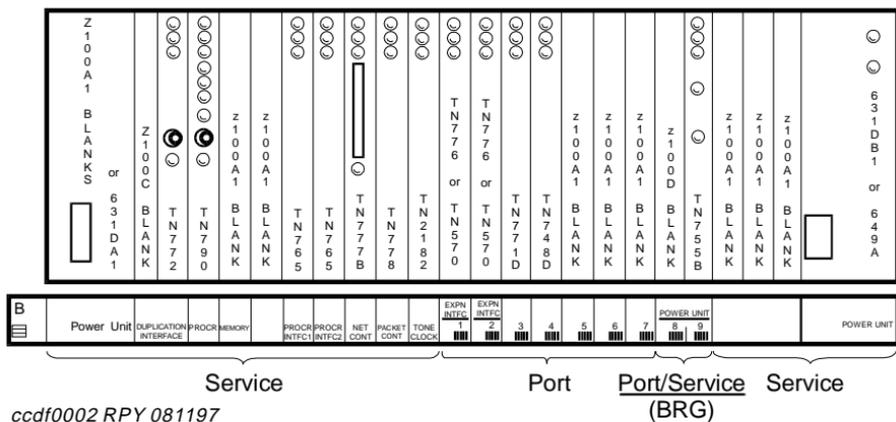
**Table 15. Control-Carrier Connectors**

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

## J58890AJ Duplicated Control Carrier

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

AC or DC power units located at each end of the duplicated control carrier, supply power to the carrier. See [Figure 34](#) for a representative example. See [Table 16](#) for the duplicated control carrier rear connector descriptions.



**Figure 34. Duplicated Control Carrier (J58890AJ) (Front)**

**Table 16. J58890AJ Duplicated Control Carrier Connectors**

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



**Table 17. J58890AP Processor Carrier Connectors**

Connector	Function
Terminal, standby	Used only in duplicated processors to connect a management terminal to the standby processor carrier
P1	Provides position indicator of the carrier and access to alarm and control circuits
P2	Provides control signals to the carrier

## J58890BB Port Carrier

A port carrier contains the following circuit packs:

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

See [Figure 36](#) for a representative example. See [Table 20](#) for the port carrier rear connector descriptions.

**Table 18. J58890BB Port Carrier Connectors**

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

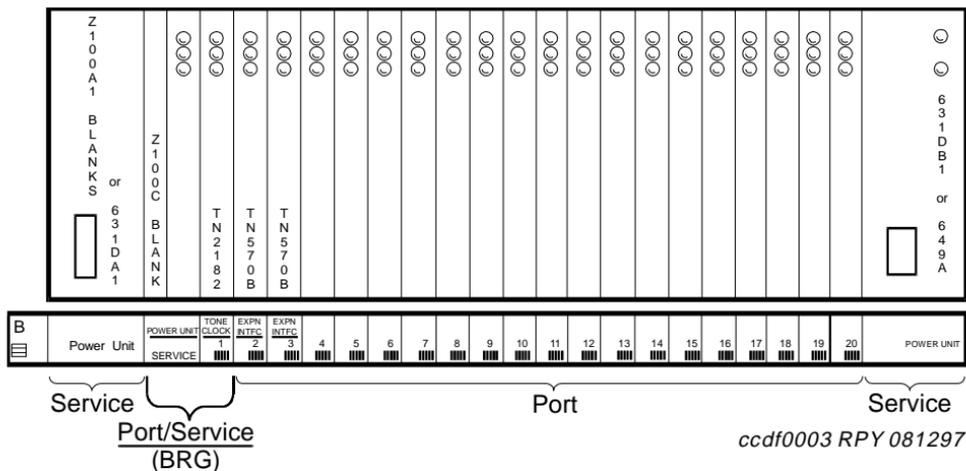


Figure 36. J58890BB Port Carrier (Front)

### J58890AF Expansion Control Carrier

The expansion control carrier contains an EI circuit pack in port slots 1 and 2. It is used in a fiber optic cabling path to another cabinet or the CSS in the same cabinet. These slots may contain optional port circuit packs. See [Figure 37](#) for a representative example.

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

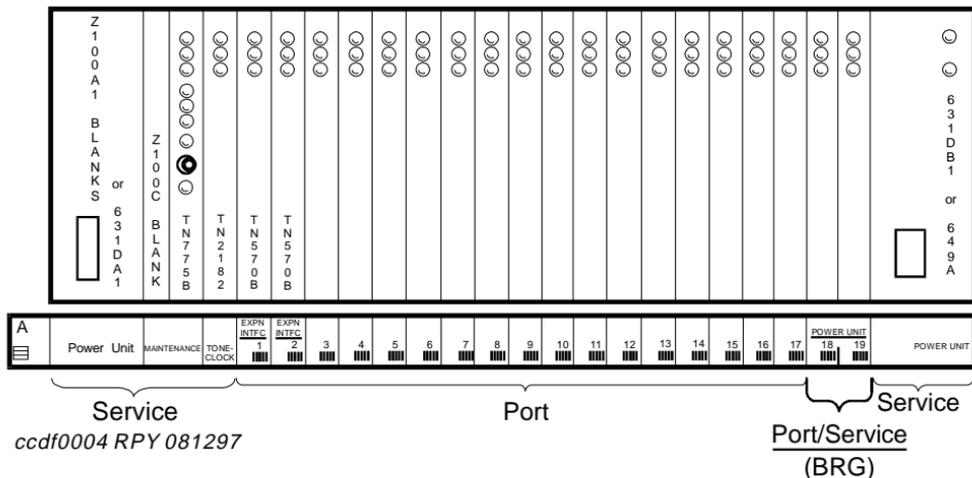


Figure 37. Expansion Control Carrier (J58890AF) (Front)

Table 19. Expansion Control Carrier (J58890AF) Connectors

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

### J58890SA Switch-Node Carrier

The switch node carrier (SN) (J58890SA) is used in R7r only. See [Figure 38](#) for a representative example. The SN can contain one or two switch node clocks, up to 16 SNI circuit packs, 1 or 2 DS1 converter circuit packs, one EI circuit pack, and 2 AC or DC power units.

The AC or DC power units are located at each end of the SN. The SN always contains 3 memory circuit packs and 1 packet interface circuit pack and can be used when connecting 3 or more EPNs. See [Table 20](#) for the SN rear connector descriptions.

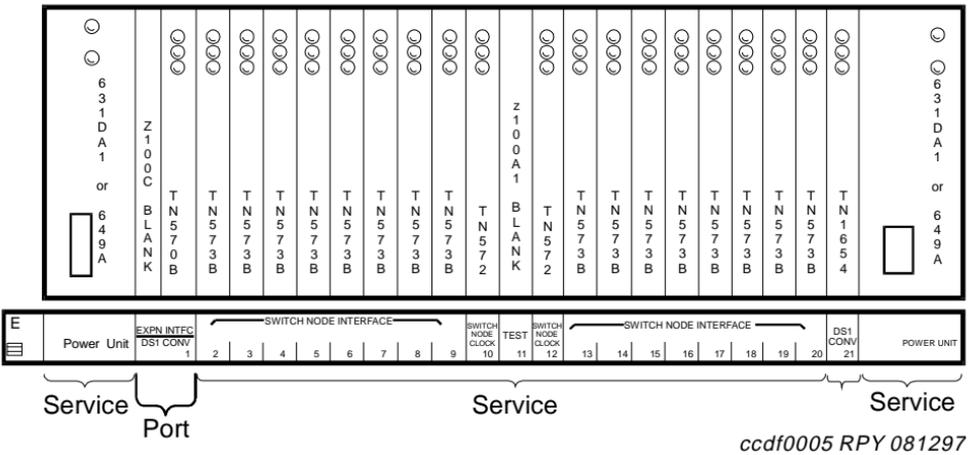


Figure 38. Switch Node Carrier (J58890SA) (Front)

**Table 20. Switch Node Carrier (J58890SA) Connectors**

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

## Single-Carrier Cabinets

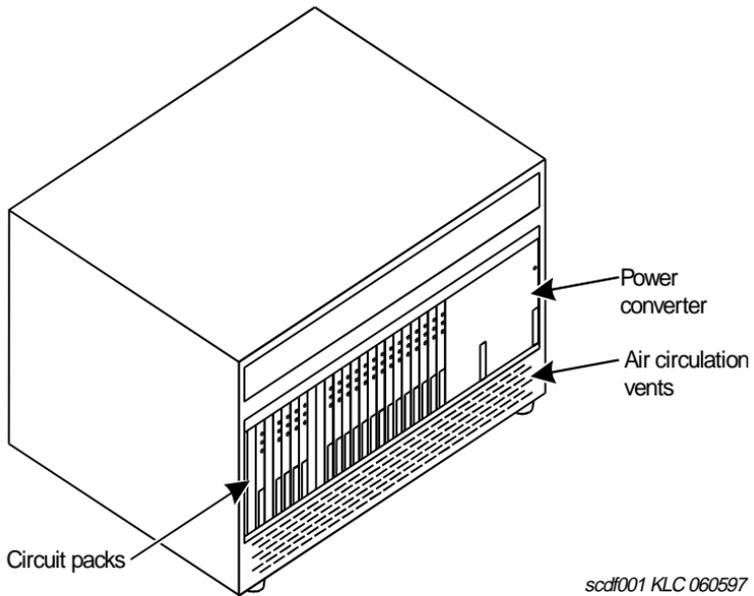
This section describes the following types of single-carrier cabinet (SCC):

- [Basic Control Cabinet \(J58890L\)](#)
- [Duplicated Control Cabinet \(J58890M\)](#)
- [Expansion Control Cabinet \(J58890N\)](#)
- [Port Cabinet \(J58890H\)](#)
- [Compact Modular Cabinet \(J58890T\)](#)
- DC power distribution cabinet

[Figure 39](#) shows a typical SCC. Each SCC has vertical slots that hold circuit packs. A blank faceplate covers each unused slot.

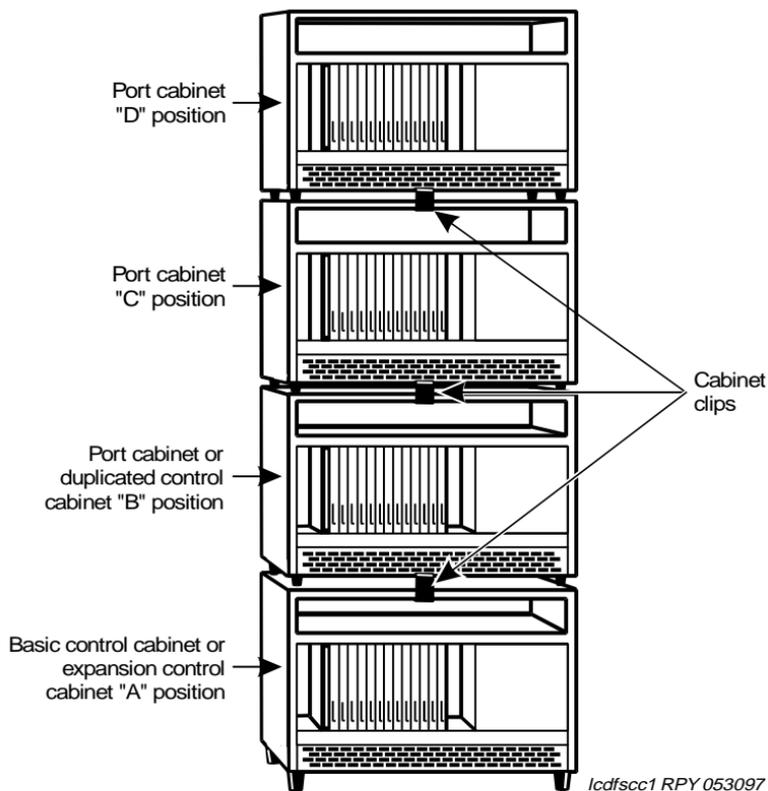
**NOTE:**

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



**Figure 39. Typical SCC**

A maximum of 4 SCCs can stack on top of each other. The cabinet positions are labeled A through D. The position of the basic control cabinet or expansion control cabinet is always labeled A. Additional port cabinet positions are labeled B, C, and D, sequentially. The duplicated control cabinet is labeled B. See [Figure 40](#).



**Figure 40. Typical SCC Stack**

Each stack of SCCs requires 1 basic- or expansion-control cabinet at the bottom of the stack. Three is the maximum number of port cabinets per stack.

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

## **Carrier Circuit Pack Slots**

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

 **NOTE:**

The purple colored circuit packs and slots are being replaced by gray colored circuit packs and slots.

- Port slots are purple or gray and accept any purple or gray circuit pack.
- Control slots are white and accept assigned circuit packs only.
- Service slots are gray and accept purple or gray circuit packs.

 **NOTE:**

Service: during the transition gray and purple circuit packs are interchangeable.

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

Blank faceplates cover empty carrier slots, as follows:

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

 **NOTE:**

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

## Carriers in SCCs

---

### J58890L Basic Control Cabinet

---

The basic control cabinet is in the PPN only. It contains ports, a control complex to perform call processing, and an interface to an optional duplicated control cabinet. It also interfaces to the optional STRATUM 3 Clock. See [Figure 41](#) for a representative example.

The basic control cabinet has dedicated white circuit pack slots that house specific control circuit packs. Also see [Table 21](#). Dual-colored slots may contain any port circuit

pack or the designated white circuit packs (such as an expansion interface or power unit). AC or DC power units supply power to the carrier.

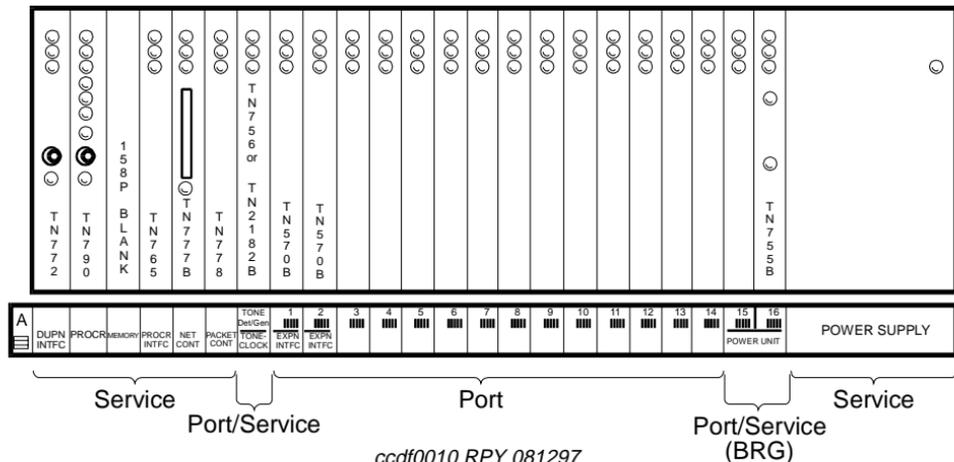


Figure 41. Basic Control Cabinet (J58890L) (Front)

Table 21. Basic Control Cabinet (J58890L) Connectors

Connector	Function
1 to 16 (A1 to A16)	25-pair connectors connect port circuit packs to the MDF or a fiber transceiver.
AUX (auxiliary)	Provides interfaces for customer alarms, attendant console power, emergency power-transfer panels, and an internal modem (for remote maintenance)
PI (processor interface)	Provides a BX.25 protocol interface for communication between the circuit pack and external DCE equipment. This connection is only used with the standard reliability option.

Continued on next page

**Table 21. Basic Control Cabinet (J58890L) Connectors**

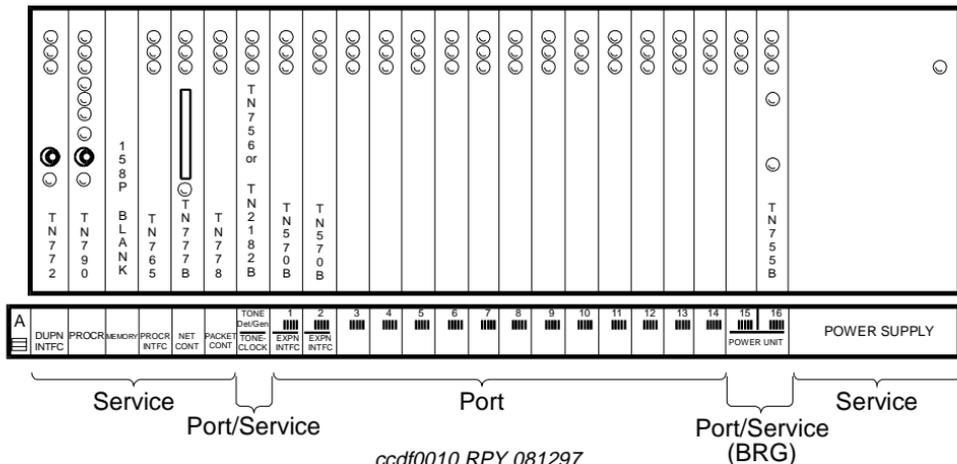
Connector	Function
DCE	Connects the processor to CDR equipment, a system printer, or an external modem (for remote maintenance)
TERM (terminal)	Connects an administration terminal to the processor circuit pack in standard reliability systems. Can be used to access the standby SPE. The TERM connector always connects to the processor in its own carrier.
DOT (duplication option terminal)	Used in high reliability and critical reliability systems to connect an administration terminal to the active processor via the duplication interface slot. The DOT connector can be used to connect to the processor in another carrier.

## J58890M Duplicated Control Cabinet

The duplicated control cabinet is optional and is only in the PPN in R7si. See [Figure 42](#) for a representative example. This cabinet contains ports, a duplicated control complex, and an interface to a designated expansion control cabinet.

The duplicated control cabinet has dedicated white circuit pack slots for designated control circuit packs. The port circuit pack slots can contain any port circuit packs.

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



**Figure 42. Duplicated Control Cabinet (J58890M) (Front)**

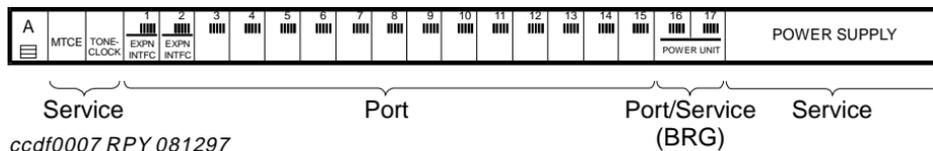
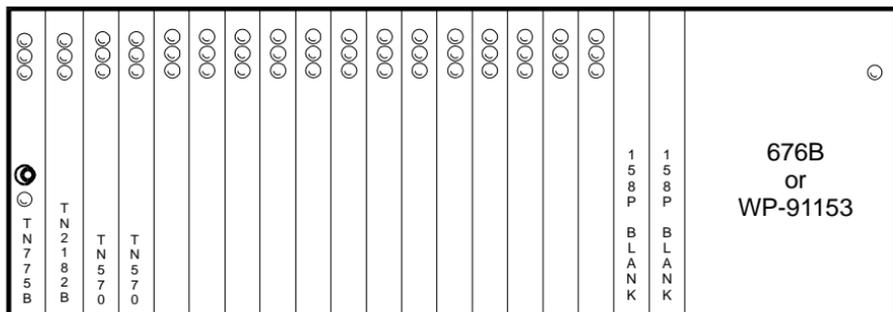
**Table 22. Duplicated Control Cabinet (J58890M) Connectors**

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

## J58890N Expansion Control Cabinet

The expansion control cabinet contains ports, a tone-clock, an interface to a port cabinet, and an optional maintenance interface. It is only in an EPN. See [Figure 43](#) for a representative example.

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



**Figure 43. Expansion Control Cabinet (J58890N) (Front)**

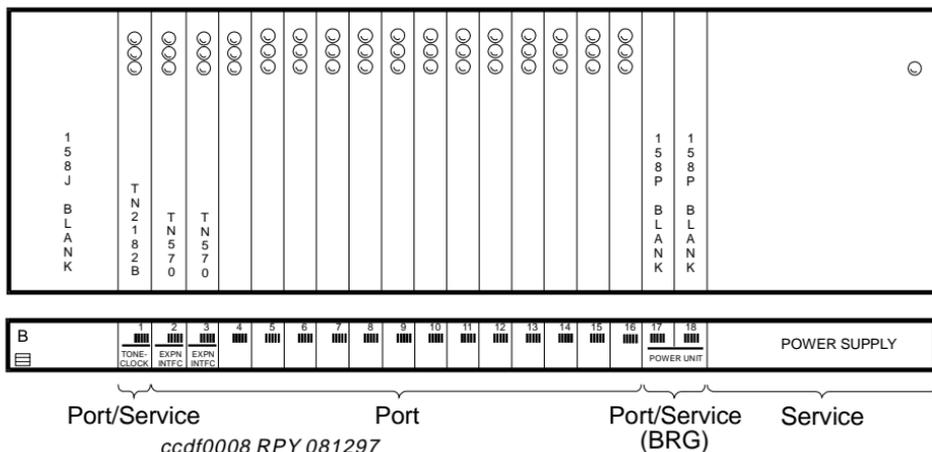
**Table 23. Expansion Control Cabinet (J58890N) Connectors**

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

## J58890H Port Cabinet

The port cabinet is located in the PPN and in EPNs. It contains ports and an interface to an expansion control cabinet. The port cabinet has optional port circuit packs in port slots 1 to 18. In a critical-reliability system, these can include a tone-clock circuit pack in slot 1 and expansion interface circuit packs in slots 2 and 3. A neon power unit can be installed in slots 17 and 18. See [Figure 44](#) for a representative example.

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



**Figure 44. Port Cabinet (J58890H) (Front)**

**Table 24. Port Cabinet (J58890H) Connectors**

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

## J58890T Compact Modular Cabinet

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

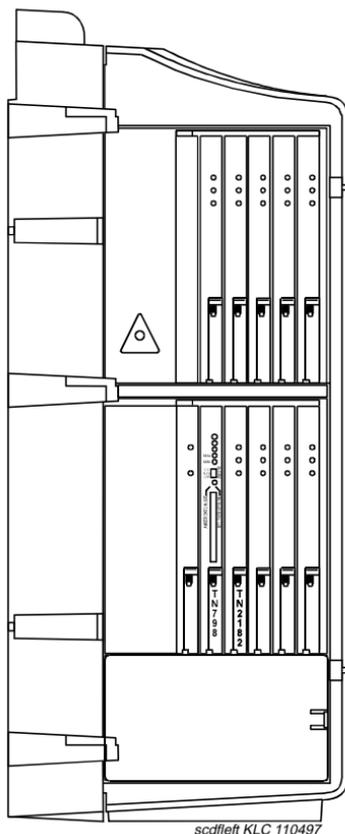
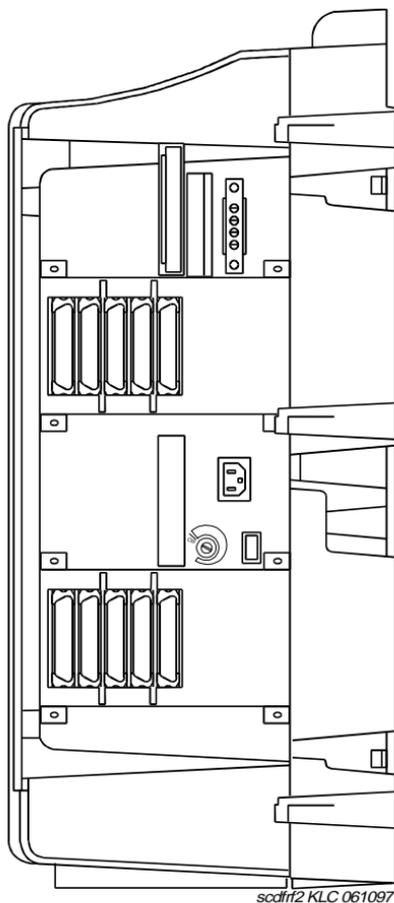


Figure 45. J58890T Compact Modular Cabinet (Left Side)

The connectors on the right side of the cabinet are shown in [Figure 46](#). 1 to 10 25-pair connectors interface between port circuit packs and the MDF or a cable access panel.



**Figure 46. CMC (J58890T) (Right Side)**

Up to three Compact Modular Cabinets can be combined in a single installation. Port and service circuit packs fill all ten slots in the second and third cabinets. The first cabinet (A)

installs in the middle position, the second cabinet (B) installs on the top, and the third cabinet (C) installs on the bottom. See [Figure 47](#).

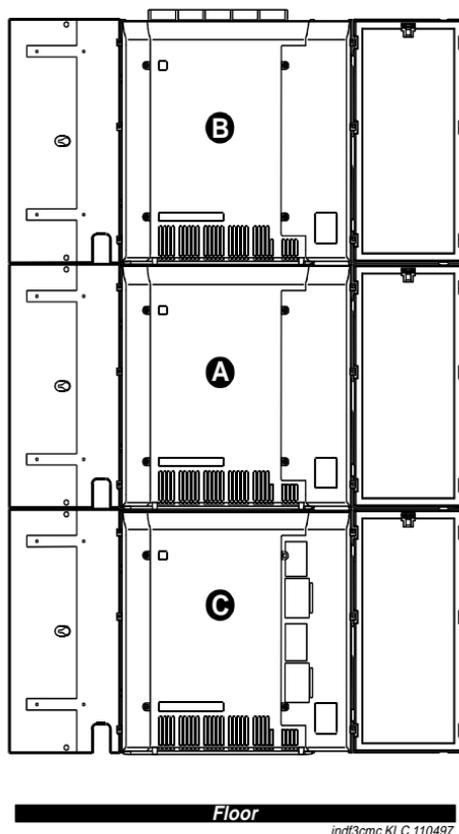


Figure 47. Typical [Compact Modular Cabinet](#) Installation (Front)

## Minimum Cabinet Configurations

Minimum cabinet configurations in MCCs and in stacks of single-carrier cabinets serve as the foundations on which to build cabinets in directly-connected systems and center stage switch (CSS)-connected systems.

**⇒ NOTE:**

The compact modular cabinet cannot be duplicated; but the CMC may be connected to other CMC cabinets.

Also described are the carrier and cabinet locations of the following minimum required circuit packs:

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

The following criteria describes a minimum cabinet configuration:

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

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

**Table 25. Minimum Requirements for PPN Cabinet**

Duplication Option	Connection Option	Control Carriers	Switch Node Carriers	Tone Clocks
Standard reliability	direct	1	0	1
	CSS (R7r Only)	1	0 or 1 <sup>1</sup>	1
High reliability	direct	2	0	2
	CSS (R7r Only)	2	0 or 1 <sup>1</sup>	2
Critical reliability	direct	2	0	2
	CSS (R7r Only)	2	0 or 2 <sup>1</sup>	2

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

**Table 26. Minimum Requirements for an EPN Cabinet**

Duplication Option	Connection Option	Expansion Control Carriers	Switch Node Carriers	Tone-Clocks	Expansion Interfaces In EPN
Standard reliability	direct	1	0	1	Equals number of PNs
	CSS (R7r only)	1	0 or 1 <sup>1</sup>	1	1
High Reliability	direct	1	0	1	Equals number of PNs
	(R7r only)	1	0 or 1 <sup>1</sup>	1	1
Critical reliability	direct	1	0	2	Twice number of PNs
	CSS (R7r only)	1	0 or 2 <sup>1</sup>	2	2

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

**Table 27. Minimum Requirements for a Two-PN Multicarrier Cabinet EPN (R7r)**

Duplication Option	Connection Option	Control Carriers	Switch Node Carriers	Tone-Clocks	Expansion Interfaces
Standard reliability	direct	1	0	2	4
	CSS	1	0	2	2

**Table 27. Minimum Requirements for a Two-PN Multicarrier Cabinet EPN (R7r)**

Duplication Option	Connection Option	Control Carriers	Switch Node Carriers	Tone-Clocks	Expansion Interfaces
High reliability	direct	1	0	2	4
	CSS	1	0	2	2
Critical reliability	direct	1	0	4	8
	CSS	1	0	4	4

### **Standard Reliability Systems**

The standard reliability configuration is available in all systems, has no duplicated hardware, and includes:

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

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

### **High Reliability Systems**

High reliability is available in R7si and R7r. These systems require:

- Duplicate control carriers in the PPN cabinet
- Duplicate tone-clock circuit packs in the PPN cabinet
- One tone-clock circuit pack per EPN
- Port networks interconnected by single fiber pairs
  - The PPN requires duplicate connectivity to the switch node
  - The switch node requires duplicates switch node clocks. The switch node carrier is provided in the PPN cabinet for a CSS-connected R7r.

### **Critical Reliability Systems**

Critical reliability is available in R7si and R7r. These systems require:

- Duplicate control Carriers in the PPN cabinet and EPN cabinet
- Duplicate tone-clock circuit packs in the PPN cabinet and EPN cabinets
- Port networks interconnected by duplicated cables
- Duplicate switch node carriers in the CSS (R7r only)

**NOTE:**

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

## Directly Connected Cabinet Configurations

A directly connected system connects cabinets directly to each other fiberoptic pairs. There is no intervening switch or hub. Directly connected system can contain up to 3 port networks, including 1 PPN and 2 EPNs (in R7si, a port network can consist of a single-carrier cabinet, a stack of single-carrier cabinets, or a single Multi-Carrier Cabinet).

### Standard Reliability Systems

Table 28 lists the required EI circuit pack slots, tone-clock circuit pack slots, maintenance circuit pack slots, and remaining port circuit pack slots in a standard reliability directly-connected system.

**Table 28. Standard Reliability Directly-Connected System**

Port Networks	Expansion Interfaces	Tone-Clocks	Remaining Port Slots	Service Slots (R7r and R7si)
1 PPN only	0	1	89 (R7si) 80 (R7r)	4 (depends on traffic)
2 (1 PPN and 1 EPN)	2	2	186 (R7si) 176 (R7r)	8 (depends on traffic)
3 (1 PPN and 2 EPNs)	6	3	281 (R7si) 271 (R7r)	12 (depends on traffic)

## High Reliability Systems

High reliability is available on R7si and R7r only. [Table 29](#) lists the required EI circuit pack, tone-clock circuit pack slots, maintenance circuit pack slots, and remaining port circuit pack slots in a high reliability, directly-connected system. In the first cabinet, the EI circuit pack is not required in a single PN (PPN only) system because no connection to another cabinet is required.

**Table 29. High Reliability Directly-Connected System**

Port Networks	Expansion Interfaces	Tone-Clocks	Remaining Port Slots	Service Slots
1 PPN only	0	2	78 (R7si) 60 (R7r)	3 (depends on traffic)
2 (1 PPN and 1 EPN)	2	3	175 (R7si) 156 (R7r)	7 (depends on traffic)
3 (1 PPN and 2 EPNs)	6	4	270 (R7si) 251 (R7r)	11 (depends on traffic)

## Critical Reliability Systems (R7si and R7r)

High reliability is available on R7si and R7r only. [Table 30](#) lists the required EI circuit pack slots, tone-clock circuit pack slots, and remaining port circuit pack slots in critical reliability, directly connected systems. The port carrier in cabinet 1 is optional in systems with only 1 PN, but is required in systems with 2 or 3 PNs.

No EI circuit packs are required for systems with only a PPN because no connection is required to another cabinet. The EI circuit packs shown in cabinet 1 are shown in their R7r positions. These are installed in the control carriers in cabinet 1.

**Table 30. Critical Reliability Direct-Connected System**

Port Networks	Expansion Interfaces	Tone-Clocks	Remaining Port Slots	Service Slots
1 PPN only	0	2	78/59 (R7r)	3
1 PPN and 1 EPN	4	4	172/152 (R7r)	7
1 PPN and 2 EPNs	12	6	262 (R7si) 241 (R7r)	11

## Cabinet Configurations in CSS- and ATM-Connected Systems

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

### Standard Reliability Systems

Table 31 lists configurations for a low-traffic, standard-reliability CSS- or ATM-connected system with up to 3 switch node carriers (SNCs) and up to 44 PNs. Standard reliability systems with 1 SNC can contain up to 2 DS1 converter circuit packs in the SNC. Standard reliability systems can only contain 1 maintenance circuit pack.

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

**Table 31. Standard Reliability ATM- or CSS-Connected Systems**

Port Networks	Switch Node Carriers	Port Slots	Service Slots	Expansion Interfaces	Tone-Clocks	Unused Port Slots	Remaining Port Slots
3	1	218	9	3	3	4	214
4	1	317	13	4	4	5	312
5	1	416	17	5	5	6	410
6	1	515	21	6	6	7	508
7	1	614	25	7	7	8	606
8	1	713	29	8	8	9	704
9	1	812	33	9	9	10	802
10	1	911	37	10	10	11	900
11	1	1010	41	11	11	12	998
12	1	1109	45	12	12	13	1096
13	1	1208	49	13	13	14	1194

*Continued on next page*

Table 31. Standard Reliability ATM- or CSS-Connected Systems

Port Networks	Switch Node Carriers	Port Slots	Service Slots	Expansion Interfaces	Tone-Clocks	Unused Port Slots	Remaining Port Slots
14	1	1307	53	14	14	15	1292
15	1	1406	57	15	15	16	1390
16	1	1505	61	16	16	17	1488
17	2	1604	65	17	17	18	1586
18	2	1703	69	18	18	19	1684
19	2	1802	73	19	19	20	1782
20	2	1901	77	20	20	21	1880
21	2	2000	81	21	21	22	1978
22	2	2099	85	22	22	23	2076
23	2	2198	89	23	23	24	2174
24	2	2297	93	24	24	25	2272
25	2	2396	97	25	25	26	2370
26	2	2495	101	26	26	27	2468
27	2	2594	105	27	27	28	2566
28	2	2693	109	28	28	29	2664
29	2	2792	113	29	29	30	2762
30	2	2891	117	30	30	31	2860
31	3	2990	121	31	31	32	2958
32	3	3089	125	32	32	33	3056
33	3	3188	129	33	33	34	3154
34	3	3287	133	34	34	35	3252
35	3	3386	137	35	35	36	3350
36	3	3485	141	36	36	37	3448
37	3	3584	145	37	37	38	3546

*Continued on next page*

**Table 31. Standard Reliability ATM- or CSS-Connected Systems**

Port Networks	Switch		Service Slots	Expansion Interfaces	Tone-Clocks	Unused	
	Node Carriers	Port Slots				Port Slots	Remaining Port Slots
38	3	3683	149	38	38	39	3644
39	3	3782	153	39	39	40	3742
40	3	3881	157	40	40	41	3840
41	3	3980	161	41	41	42	3938
42	3	4079	165	42	42	43	4036
43	3	4178	169	43	43	44	4134
44	3	4277	173	44	44	45	4232

### High Reliability Systems

Table 32 lists configurations for a low-traffic, high-reliability, CSS-connected system with up to up to 43 PNs with 1 PPN. High-reliability systems with 1 switch-node carrier can contain up to 2 DS1 converter circuit packs in the SNC. High reliability systems can only contain 1 maintenance circuit pack.

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

**Table 32. High Reliability ATM- or CSS-Connected Systems**

Port Networks	Switch		Service Slots	Expansion Interfaces	Tone-Clocks	Unused	
	Node Carriers	Port Slots				Port Slots	Remaining Port Slots
3	1	198	10	4	4	5	193
4	1	297	14	5	5	6	291
5	1	396	18	6	6	7	389
6	1	495	22	7	7	8	487
7	1	594	26	8	8	9	585

*Continued on next page*

Table 32. High Reliability ATM- or CSS-Connected Systems — *Continued*

Port Networks	Switch Node Carriers	Port Slots	Service Slots	Expansion Interfaces	Tone-Clocks	Unused Port Slots	Remaining Port Slots
8	1	693	30	9	9	10	683
9	1	792	34	10	10	11	781
10	1	891	38	11	11	12	879
11	1	990	42	12	12	13	977
12	1	1089	46	13	13	14	1075
13	1	1188	50	14	14	15	1173
14	1	1287	54	15	15	16	1271
15	1	1386	58	16	16	17	1369
16	2	1485	62	17	17	18	1467
17	2	1584	66	18	18	19	1565
18	2	1683	70	19	19	20	1663
19	2	1782	74	20	20	21	1761
20	2	1881	78	21	21	22	1859
21	2	1980	82	22	22	23	1957
22	2	2079	86	23	23	24	2055
23	2	2178	90	24	24	25	2153
24	2	2277	94	25	25	26	2251
25	2	2376	98	26	26	27	2349
26	2	2475	102	27	27	28	2447
27	2	2574	106	28	28	29	2545
28	2	2673	110	29	29	30	2643
29	3	2772	114	30	30	31	2741
30	3	2871	118	31	31	32	2839
31	3	2970	122	32	32	33	2937

*Continued on next page*

Table 32. High Reliability ATM- or CSS-Connected Systems — *Continued*

Port Networks	Switch Node Carriers	Port Slots	Service Slots	Expansion Interfaces	Tone-Clocks	Unused Port Slots	Remaining Port Slots
32	3	3069	126	33	33	34	3035
33	3	3168	130	34	34	35	3133
34	3	3267	134	35	35	36	3231
35	3	3366	138	36	36	37	3329
36	3	3465	142	37	37	38	3427
37	3	3564	146	38	38	39	3525
38	3	3663	150	39	39	40	3623
39	3	3762	154	40	40	41	3721
40	3	3861	158	41	41	42	3819
41	3	3960	162	42	42	43	3917
42	3	4059	164	43	43	44	4015
43	3	4158	168	44	44	45	4113

### Critical Reliability Systems

Table 33 lists configurations for a low traffic, critical reliability CSS-connected system with up to 44 port networks (PNs). Critical reliability systems have a duplicated switch-node carrier (SNC). Up to 4 DS1 converter circuit packs can be installed, up to 2 per SNC. Critical reliability systems can contain up to 42 maintenance circuit packs.

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

## Cabinets, Carriers, and Circuit Packs

## Cabinet Configurations in CSS- and ATM-Connected Systems

99

Table 33. Critical Reliability CSS-Connected Systems

Port Networks	Switch Node Carriers	Port Slots	Service Slots	Expansion Interfaces	Tone-Clocks	Unused Port Slots	Remaining Port Slots
3	1	138	9	6	6	9	209
4	1	237	13	8	8	13	304
5	1	336	17	10	10	17	399
6	1	435	21	12	12	21	494
7	1	534	25	14	14	25	589
8	1	633	29	16	16	29	684
9	1	732	33	18	18	33	779
10	1	831	37	20	20	37	874
11	1	930	41	22	22	41	969
12	1	1029	45	24	24	45	1064
13	1	1128	49	26	26	49	1159
14	1	1227	53	28	28	53	1254
15	1	1326	57	30	30	57	1349
16	1	1425	61	32	32	61	1444
17	2	1524	65	34	34	65	1539
18	2	1623	69	36	36	69	1634
19	2	1722	73	38	38	73	1729
20	2	1821	77	40	40	77	1824
21	2	1920	81	42	42	81	1919
22	2	2019	85	44	44	85	2014
23	2	2118	89	46	46	89	2109
24	2	2217	93	48	48	93	2204
25	2	2316	97	50	50	97	2299
26	2	2415	101	52	52	101	2394

*Continued on next page*

**Table 33. Critical Reliability CSS-Connected Systems**

<b>Port Networks</b>	<b>Switch Node Carriers</b>	<b>Port Slots</b>	<b>Service Slots</b>	<b>Expansion Interfaces</b>	<b>Tone-Clocks</b>	<b>Unused Port Slots</b>	<b>Remaining Port Slots</b>
27	2	2514	105	54	54	105	2489
28	2	2613	109	56	56	109	2504
29	2	2712	113	58	58	113	2599
30	2	2811	117	60	60	117	2694
31	3	2910	121	62	62	121	2789
32	3	3009	125	64	64	125	2884
33	3	3108	129	66	66	129	2979
34	3	3207	133	68	68	133	3074
35	3	3306	137	70	70	137	3169
36	3	3405	141	72	72	141	3264
37	3	3504	145	74	74	145	3359
38	3	3603	149	76	76	149	3454
39	3	3702	153	78	78	153	3549
40	3	3801	157	80	80	157	3544
41	3	3900	161	82	82	161	3739
42	3	3999	165	84	84	165	3834
43	3	4098	165	86	86	169	3929
44	3	4197	169	88	88	173	4024

## Cabling to On- and Off-Premises Systems

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

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

Main distribution frames (MDFs) are termination points for equipment cabling and distribution cabling. Connections are made between those termination points to establish communications paths throughout the system. Two major types of distribution frames are:

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

## Circuit Packs and Related Hardware

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

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

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

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

- Yellow indicates a busy condition

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



### CAUTION:

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

## Color coding

---

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

## Types of Circuit Packs

---



### NOTE:

The purple colored circuit packs and slots are being replaced by gray colored circuit packs and slots.

- Port: colored purple or gray and can accept any purple or gray-labeled circuit pack
- Control: colored white and can accept only a circuit pack assigned to that slot
- Service: colored gray and can accept any purple or gray-labeled circuit pack.



### NOTE:

Service: during the transition gray and purple circuit packs are interchangeable

Four types of circuit packs are installed in carriers:

1. *Port circuit packs* provide links between analog and digital lines, trunks, networks, external communications equipment, and the TDM bus and packet bus. These circuit packs install in any gray port slot.
2. *Control circuit packs* include processor, memory, network control, disk control, tape control, protocol interfaces, duplication, and maintenance. These circuit packs install in dedicated white slots in the control carrier and do not operate in any other slots.

3. *Service circuit packs* produce and detect tones, synthesize speech, classify calls, record announcements, and allow system access for administration and troubleshooting. These circuit packs install in any port slot.
4. *Power Converter circuit packs* supply DC voltages to port, control, and service circuit packs. Install in dedicated white slots only.

## Port Circuit Packs

The components common to all port circuit packs are:

- Bus buffers
- Sanity and control interface (SAKI)
- Microprocessor with external random access memory (RAM)
- Network processing elements (NPEs) or switch conferencing for time division multiplexing in concentration highway (SCOTCH NPE)

### Bus Buffers

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

### SAKI

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

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

## Microprocessor with External RAM

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

## Network Processing Elements (NPEs)

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

## International Consolidation (I-CON)

TN791, TN2793, TN2214 and TN2215 are new circuit packs for export outside of the United States and Canada. The circuit packs are functionally identical to the TN746B, TN793, and TN2224 circuit packs.

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

**Table 34. I-CON Circuit Packs**

US and Canada Offer A	International Offer A or B, US and Canada Offer B only	Description
TN746B	TN791	16 port analog line
TN793	TN2793	24 port analog line
TN2224B	TN2214B	24 port digital line
	TN2215	16 port analog line (Australia, China, and Western Europe only)
TN464F/G (US and Canada Offer A Only)	TN2464	DS1

Table 35 lists the circuit packs by apparatus code.

Table 46 lists the available adjuncts. After the table, information briefly describes the adjunct functions.

## **Circuit Packs in DEFINITY**

Table 35 lists the circuit packs by apparatus code. After the table, circuit pack functions are detailed.

Table 38 lists the available adjuncts. After the table, adjunct descriptions are detailed.

**Table 35. Circuit Packs and Circuit Modules**

<b>Apparatus Code</b>	<b>Name</b>	<b>Type</b>
631DA1	AC Power Unit	Power
631DB1	AC Power Unit	Power
644A1	DC Power Unit	Power
645B1	DC Power Unit	Power
649A	DC Power Unit	Power
650A	AC Power Unit (csi only)	Power
WP-1217A	AC Power Supply for Single-Carrier Cabinets (US Only)	Power
676B/C	DC Power Supply	Power
982LS	Current Limiter for R7si	Power
CFY1B	Current Limiter for R7r	Power
ED-1E546	DEFINITY AUDIX R3 (Circuit-Pack Assembly)	Service
ED-1E546	CallVisor ASAI/DEFINITY LAN Gateway R1 (Circuit-Pack Assembly)	Network
J58890MA-1	CallVisor ASAI/DEFINITY LAN Gateway R2 (Circuit-Pack Assembly)	Network
NAA1	Fiber Optic Cable Adaptor for R7csi	Network
TN417	Auxiliary Trunk (replaced by TN763D)	Trunk

*Continued on next page*

Table 35. Circuit Packs and Circuit Modules

Apparatus Code	Name	Type
TN419B	Tone-Clock for Italy, Australia, and the United Kingdom (replaced by TN2182B)	Control
TN420B/C	Tone Detector (replaced by TN2182B or TN744D)	Service
TN429B/C/D	DIOD Central Office Trunk	Trunk
TN433	Speech Synthesizer, Italian	Service
TN436B	Direct Inward Dialing Trunk for Australia	Trunk
TN437	Tie Trunk for Australia (replaced by TN760D)	Trunk
TN438B	Central Office Trunk for Australia	Trunk
TN439	Tie Trunk for Australia and Japan	Trunk
TN447	Central Office Trunk for the United Kingdom (replaced by TN2147C)	Trunk
TN457	Speech Synthesizer, British English	Service
TN458	Tie Trunk for the United Kingdom (replaced by TN760D)	Trunk
TN459B	Direct Inward Dialing Trunk for the United Kingdom	Trunk
TN464C/D/E/F/G	DS1 Interface, T1 (24-Channel) or E1 (32-Channel)	Trunk
TN465B/C	Central Office Trunk, Multi-Country	Trunk
TN467	Analog Line for the United Kingdom and Australia (replaced by TN2183)	Line
TN468B	Analog Line for the United Kingdom and Australia (replaced by TN2183)	Line
TN479	Analog Line	Line
TN497	Tie Trunk for Italy	Trunk
TN553	Packet Data Line	Line
TN556B/C/D	ISDN-BRI 4-Wire S/T-NT Interface	Line
TN566B	Alarm (see ED-1E546)	Service

*Continued on next page*

**Table 35. Circuit Packs and Circuit Modules**

<b>Apparatus Code</b>	<b>Name</b>	<b>Type</b>
TN567	Multi-Function (see ED-1E546)	Multi-Function
TN568	DEFINITY AUDIX 4.0 Voice Mail System	Service
TN570B/C	Expansion Interface	Network
TN572	Switch-Node Clock	Control
TN573B	Switch-Node Interface	Control
TN574	DS1 Converter (replaced by TN1654)	
TN577	Packet Gateway	Port
TN722B	DS1 Tie Trunk (replaced by TN767B/C/D/E)	Trunk
TN725B	Speech Synthesizer, United States English	Service
TN726B	Data Line	Line
TN735	MET Line	Line
TN742	Analog Line	Line
TN744B/C/D	Call Classifier Tone Detector, Multi-Country	Service
TN746B	Analog Line (US and Canada Offer A Only)	Line
TN747B	Central Office Trunk	Trunk
TN748B/C/D	Tone Detector	Service
TN750B/C	Announcement	Service
TN753B	Direct Inward Dialing Trunk	Trunk
TN754B/C	4-Wire DCP Digital Line	Line
TN755B	Neon Power Unit for all Models except csi	Power
TN756	Tone Detector/Generator	Service
TN758	Pooled Modem	Port
TN760D/E	Tie Trunk	Trunk
TN762B	Hybrid Line	Line
TN763B/C/D	Auxiliary Trunk	Trunk

*Continued on next page*

**Table 35. Circuit Packs and Circuit Modules**

<b>Apparatus Code</b>	<b>Name</b>	<b>Type</b>
TN765	Processor Interface (replaced by TN794 and TN799)	Control
TN767B/C/D/E	DS1 Interface, T1 (24 Channel)	Trunk
TN768	Tone-Clock	Control
TN769	Analog Line	Line
TN771D	Maintenance/Test (all except R7csi)	Service
TN772	Duplication Interface (R6 and some earlier)	Control
TN775B/C	Maintenance	Service
TN776	Expansion Interface for R7si	Network
TN777B	Network Control (R6 and some earlier)	Control
TN778	Packet Control (R6 and some earlier)	Control
TN780	Tone-Clock for All Models Except R7csi	Control
TN786B	Processor for R4 and earlier	Service
TN787F/G/H/J/K	Multimedia Interface	Service
TN788B	Multimedia Voice Conditioner	Service
TN789	Radio Controller	Port
TN790	Processor (R6 and some earlier)	Control
TN791	16-Port Analog Guest Line (International Offers or US and Canada Offer B only)	Line
TN792	Duplication Interface for TN 790B Processor Circuit Packs	Control
TN793	24-Port Analog Line (US and Canada Offer A Only)	Line
TN794	Network Control/Packet Interface	Control
TN798B	Processor	Control
TN799	Control LAN (C-LAN) Interface	Network
TN801	LAN Gateway Interface	Network
TN802	IP Trunk	Trunk

*Continued on next page*

**Table 35. Circuit Packs and Circuit Modules**

Apparatus Code	Name	Type
TN1648B	System Access and Maintenance	Control
TN1650B	Memory	Control
TN1654	DS1 Converter, T1 (24-Channel) and E1 (32-Channel)	Trunk
TN1655	Packet Interface	Control
TN1656	Tape Drive (R7r and earlier)	Control
TN1657	Disk Drive (R7r and earlier)	Control
TN2135	Analog Line for Italy	Line
TN2136	2-Wire DCP Digital Line (replaced by TN2181)	Line
TN2138	Central Office Trunk for Italy	Trunk
TN2139	Direct Inward Dialing Trunk for Italy	Trunk
TN2140B	Tie Trunk for Hungary and Italy	Port
TN2144	Analog Line for the Netherlands (replaced by TN2183)	Line
TN2146	Direct Inward Dialing Trunk for Belgium and the Netherlands	Trunk
TN2147C	Central Office Trunk, Multi-Country (replaces TN447)	Trunk
TN2149	Analog Line for Belgium (replaced by TN2183)	Line
TN2169	Alarm	Service
TN2170	Alarm with Ethernet Interface	Service
TN2180	Analog Line for Spain and Germany (replaced by TN2183)	Line
TN2181	2-Wire DCP Digital Line	Line
TN2182B	Tone-Clock, Tone Detector, and Call Classifier (replaces TN419B)	Control
TN2183	Analog Line, Multi-Country (replaces TN467, TN468B)	Line
TN2184	DIOD Trunk for Germany	Trunk
TN2185B	ISDN-BRI, 4-Wire S/T-TE Interface (replaces TN464F)	Line/Trunk

*Continued on next page*

**Table 35. Circuit Packs and Circuit Modules**

Apparatus Code	Name	Type
TN2198	ISDN-BRI, 2-Wire U Interface	Line
TN2199	Central Office Trunk for Russia	Trunk
TN2202	Ring Generator for France	Power
TN2207	DS1 Interface, T1 (24-Channel) and E1 (32-Channel), for MMCH	Trunk
TN2208	Multi-Function (see ED-1E546, CallVisor ASAI/DEFINITY LAN Gateway R1 (Circuit-Pack Assembly))	Multi-function
TN2208	Tie Trunk for Russia	Trunk
TN2210	Tone Generator	Service
TN2214B	24-Port, 2-Wire DCP Digital Line (International Offers or US and Canada Offer B only)	Line
TN2215	16-Port, Analog Line, Multi-Country (International Offers or US and Canada Offer B only)	Line
TN2224B	24-Port, 2-Wire DCP Digital Line	Line
TN2238	ATM Trunk/Port-Network Interface for Multi-Mode Fiber	Trunk or network
TN2242	TTC 2Mb CMI Trunk for Japan	Trunk
TN2301	Logic Switch for R7r or Later	Service
TN2305	ATM-CES Trunk/Port-Network Interface for Multi-Mode Fiber	Network
TN2306	ATM-CES Trunk/Port-Network Interface for Single-Mode Fiber	Network
TN2308	Direct Inward Dialing Trunk	Trunk
TN2338	ATM Trunk/Port-Network Interface for Single-Mode Fiber	Trunk or network
TN2400	Net/Pac Backplane Connection (R7si field upgrades only)	

*Continued on next page*

**Table 35. Circuit Packs and Circuit Modules**

Apparatus Code	Name	Type
TN2464	DS1 Interface, T1/E1 (International Offers or US and Canada Offer B only)	Trunk
TN2793	24-Port Analog Line (International Offers or US and Canada Offer B only)	Line
TN-CCSC-1	PRI to DASS Converter	Network
TN-CCSC-2	PRI to DPNSS Converter	Network
UN330B	Duplication Interface	Control
UN331B	Processor	Control
UN332/B	Processor	Control

### **631DA1 AC Power Unit**

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

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

### **631DB1 AC Power Unit**

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

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

---

### **644A1 DC Power Unit**

---

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

---

### **645B1 DC Power Unit**

---

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

---

### **649A DC Power Unit**

---

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

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

---

### **650A AC Power Unit (csi only)**

---

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

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

The power unit has 3 switch-selectable ring outputs:

- 85 VAC RMS, 80 mA, 20 Hz, centered about  $-48$  VDC, 180 mA
- 72 VAC RMS, 8 to 80 mA, 25 Hz, centered about  $-48$  VDC, 180 mA

- Two 28 VAC RMS (56 V eff), 220 mA, 50 Hz biased about -48 VDC and 0 VDC, 70 mA balanced

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

## **WP-1217A AC Power Supply for Single-Carrier Cabinets (US Only)**

---

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

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

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

## **676B/C DC Power Supply**

---

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

## **982LS Current Limiter for R7si**

---

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

---

## **CFY1B Current Limiter for R7r**

---

The CFY1 is only in: R7r PPNs, MCC EPNs, and single-carrier cabinet EPNs. The unit connects to the rear of the maintenance circuit pack slot and provides current-limited accessory 48 VDC, emergency transfer logic, current-limited 5 VDC to trip main circuit breaker if high temperature is detected, and duplicated 48 VDC to fans in the EPN cabinet.

---

## **ED-1E546 DEFINITY AUDIX R3** **(Circuit-Pack Assembly)**

---

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

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

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

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

---

## **ED-1E546 CallVisor ASAI/DEFINITY LAN** **Gateway R1 (Circuit-Pack Assembly)**

---

ED-1E546 transports ASAI links between a DEFINITY LAN gateway R1 system and an Ethernet LAN. This unit installs in 5 adjacent slots in a carrier; preferably, the 5 rightmost slots. It is available for all systems except R7csi.

The TN2208 Multi-function circuit pack holds the CPU, controller, and memory devices. The TN2208 operates with the TN2170 Alarm with Ethernet Interface circuit pack to

provide monitoring for system power and environmental status, -48 VDC to +12 VDC power conversion for the disk drive and tape drive, and remote terminal access.

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

### **J58890MA-1 CallVisor ASAI/DEFINITY LAN Gateway R2 (Circuit-Pack Assembly)**

---

The J58890MA-1 is a variation of the MAPD platform that transports ASAI links between a DEFINITY LAN gateway R2 system and an Ethernet LAN. The J58890MA-1 circuit-pack assembly uses the [TN801 LAN Gateway Interface](#), a circuit pack built from industry-standard PC processors, interfaces, buses, and ISA/PCI expansion boards. The unit takes up 2 adjacent slots in a carrier. The unit installs in 2 adjacent slots in a carrier. J58890MA-1 supports all releases except R7csi.

### **NAA1 Fiber Optic Cable Adaptor for R7csi**

---

The NAA1 adapter reroutes fiber-optic cable from the front of an ATM circuit pack to the rear of an R7csi Compact Modular Cabinet. While it looks like a circuit pack, it is electrically and optically passive.

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

---

The TN763D auxiliary trunk circuit pack replaces the TN417.

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

---

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

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

---

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

---

## **TN429B/C/D DIOD Central Office Trunk**

---

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

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

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

---

## **TN433 Speech Synthesizer, Italian**

---

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

---

## **TN436B Direct Inward Dialing Trunk for Australia**

---

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

---

### **TN437 Tie Trunk for Australia (replaced by TN760D)**

---

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

---

### **TN438B Central Office Trunk for Australia**

---

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

---

### **TN439 Tie Trunk for Australia and Japan**

---

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

---

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

---

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

---

### **TN457 Speech Synthesizer, British English**

---

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

---

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

---

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

---

## TN459B Direct Inward Dialing Trunk for the United Kingdom

---

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

---

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

---

All TN464 circuit packs provide

- Board-level, administrable A-Law or  $\mu$ -Law companding
- CRC-4 generation and checking (E1 only)
- Stratum 3 clock capability
- ISDN-PRI T1 or E1 connectivity

The TN778 packet-control circuit pack and the TN765 processor interface (R7si) or TN1655 packet interface (R7r) handle D-channel signaling for the TN464.

- Line-out (LO) and line-in (LI) signal leads (unpolarized, balanced pairs).
- Support for CO, TIE, DID, and off-premises station (OPS) port types that use robbed-bit signaling protocol, proprietary bit-oriented signaling (BOS) 24th channel signaling protocol, or DMI-BOS 24th channel signaling protocol
- Support for Russian incoming ANI (R7)

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

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

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

## **TN465B/C Central Office Trunk, Multi-Country**

---

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

**TN465B** circuit packs provide battery reversed signaling.

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

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

---

The TN467 is replaced by the TN2183 analog line circuit pack.

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

---

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

## **TN479 Analog Line**

---

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

The TN479 supports the terminals listed below.

**Table 36. Terminals and wiring configurations supported by the TN479**

<b>Terminal</b>	<b>Wire Size (metric area/diameter)</b>	<b>Maximum Range</b>
500-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	3,000 ft. (914 m)
2500-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	3,000 ft. (914 m)
7100-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	3,000 ft. (914 m)

*Continued on next page*

**Table 36. Terminals and wiring configurations supported by the TN479**

Terminal	Wire Size (metric area/diameter)	Maximum Range
7101A-Series	not supported	not supported
7103A-Series	not supported	not supported
8100-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	2,500 (762 m)
9100-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	2,500 (762 m)

### **TN497 Tie Trunk for Italy**

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

### **TN553 Packet Data Line**

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

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

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

The TN556 has a range of up to 1900 feet (579 m) maximum from the system to the voice terminal using 24 AWG (0.20 mm<sup>2</sup>/0.51 mm) wire, and uses standard ANSI T1.605

protocol. The TN556 also has multipoint support; 24 terminals can be connected, where each terminal uses 1 B-channel and shares the D-channel. In multi-support applications, 2 voice terminals, or 1 voice terminal and 1 data terminal, or 2 data terminals can connect to each port.

The TN556 circuit pack supports A-Law or  $\mu$ -Law companding. The TN556 also functions as a trunk, connecting to a TE interface (example: a TN2185 in another DEFINITY ECS). It can be used for lines and trunks simultaneously (on the same circuit pack).

**TN556C** are required for ISDN BRI service under R7csi.

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

### **TN566B Alarm (see [ED-1E546](#))**

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

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

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

### **TN568 DEFINITY AUDIX 4.0 Voice Mail System**

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

The TN568 takes up two adjacent slots, except in slot 6 of an R7csi.

The circuit pack includes a writable magneto-optical disk drive for backing up and upgrading system software and a hard disk for storing messages. There is an RS-232 connection for a maintenance and administration terminal, an Ethernet port (for the

Message Manager PC desktop application), an Amphenol connection to the switch, and an RS-232 port for an external, remote-maintenance modem.

## **TN570B/C Expansion Interface**

---

The TN570 expansion interface (EI) is used in R7si and R7r systems. This circuit pack is an interface between the TDM bus and packet bus, and fiber optic links interconnecting cabinets. It is used in a port network (PN) between a PN and another PN in a directly-connected system, and between a PN and an SNI in a switch node carrier in a CSS-connected system.

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

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

The TN570 is replaced by the [TN2238](#) when an ATM switch replaces the Center Stage Switch.

**TN570C** circuit packs are used in SREPN (Survivable Remote Expansion Port Network), R7csi.

## **TN572 Switch-Node Clock**

---

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

## **TN573B Switch-Node Interface**

---

The TN573 switch node interface (SNI) routes circuit, packet, and control messages. The TN573 is an interface (installed in a SN carrier in a CSS that terminates a fiber optic link from a SNI in an SN carrier to an SNI in another SN carrier, an EI in a PPN, and an EI in an EPN. One TN573 is used per PN and supports the TN574 DS1 converter circuit pack.

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

---

## **TN574 DS1 Converter (replaced by [TN1654](#))**

---

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

---

## **TN577 Packet Gateway**

---

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

The X.25 protocol (Levels 1 and 2) are terminated and the data reformatted into the ISDN packet mode protocol for transport across the LAN bus. Supported adjuncts include AUDIX, CMS, and message server adjunct (MSA).

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

To support the distributed communications system (DCS) environment, the TN577 provides X.25 signaling, either through 1 of the RS-423 physical ports, or back through the system (via the TDM Bus) to the appropriate DS1 or tie trunk circuit pack.

---

## **TN722B DS1 Tie Trunk (replaced by [TN767B/C/D/E](#))**

---

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

---

## **TN725B Speech Synthesizer, United States English**

---

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

---

## **TN726B Data Line**

---

The TN726B has 8 serial asynchronous EIA ports with modem interfaces connected through asynchronous data units (ADUs) to EIA ports (such as RS-232) on DTE. The TN726B uses Mode 2 or Mode 3 data transfer protocol. The DTE can be adjuncts and

peripheral equipment such as data terminals, printers, host computers, personal computers (PCs), graphics and facsimile systems, and call detail acquisition and processing systems (CDAPSS).

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

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

### **TN735 MET Line**

---

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

### **TN742 Analog Line**

---

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

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

---

**TN744B** has 8 tone detectors used in vector prompting, outgoing call management (OCM), and call prompting applications in the United States and Canada. The TN744 detects special intercept tones used in network intercept tone detection in OCM. The TN744 also detects tones when a CO answers a call. The TN744 does not classify data calls. Instead, a tone detector circuit pack classifies the calls. If the TN744 does not classify the call within 60 seconds, it is removed from the call and timed far-end supervision classifies the call.

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

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

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

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

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

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

## **TN746B Analog Line** **(US and Canada Offer A Only)**

---

The TN746B has 16 ports. Each port supports 1 voice terminal. LED message waiting indicators are not supported off premises. The TN746 does not support neon message waiting indicators. Auxiliary equipment, such as answering machines, modems, and amplifier handsets, is not supported.

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

The TN746B, along with a TN755B neon power unit per carrier or per single-carrier cabinet, supports voice terminals equipped with neon message waiting indicators

(on-premises use only). The TN746/B supports 3 ringer loads, only 1 voice terminal can have an LED or neon message waiting indicator.

The TN746 supports  $\mu$ -Law companding but not administrable timers. TN746C and later supports A-Law and  $\mu$ -Law companding and administrable timers. The TN746 supports queue warning level lights associated with the DDC and UCD features, recorded announcements associated with the Intercept Treatment feature, and PagePac paging system for the Loudspeaker Paging feature. Additional support is provided for external alerting devices associated with the TAAS feature, neon message waiting indicators, and modems. Secondary lightning protection is provided on the TN746B only. The TN746B supports up to 8 simultaneous ports ringing.

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

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

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

## **TN747B Central Office Trunk**

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

---

## **TN748B/C/D Tone Detector**

---

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

---

## **TN750B/C Announcement**

---

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

**TN750B** can record messages from on- or off-premises voice terminals and can store up to 128 recorded announcements of 8 maximum minutes total. The TN750B has 16 channels and each can play any announcement. Up to 25 call connections can listen to each channel. This means a total simultaneous call capacity of 400 calls in R7si. 256 callers can connect to each channel in R7r.

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

---

## **TN753B Direct Inward Dialing Trunk**

---

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

The TN753/B is required to support Brazil Block Collect Call.

---

## **TN754B/C 4-Wire DCP Digital Line**

---

The TN754B has 8 asynchronous, 4-wire DCP ports that can connect to 7400-series and 8400-series digital voice terminals, attendant consoles, or data modules. The TN754B has administrable A-Law and  $\mu$ -Law companding. The TN754B supports the 8400-series terminal types. The maximum range of the 7400-series terminals using 24 AWG (0.2 mm<sup>2</sup>/0.5 mm) wire. The TN754B does not support group paging.

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

---

## **TN755B Neon Power Unit for all Models** **except csi**

---

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

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

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

---

## **TN756 Tone Detector/Generator**

---

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

---

## **TN758 Pooled Modem**

---

The TN758 has 2 conversion resources ports (such as a trunk data module) for switched connections between digital data endpoints (data modules) and analog data endpoints (modems). The TN758 supports  $\mu$ -Law companding only.

---

## **TN760D/E Tie Trunk**

---

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

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

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

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

---

## **TN762B Hybrid Line**

---

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

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

---

## **TN763B/C/D Auxiliary Trunk**

---

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

**TN763C** supports external recorded announcement equipment.

**TN763D** is administrable to select A-Law or  $\mu$ -Law companding.

---

## **TN765 Processor Interface (replaced by TN794 and TN799)**

---

The [TN794](#) and [TN799](#) replace this circuit pack, though existing circuit packs will work with DEFINITY ECS R7.

The TN765 has 4 data links to the TDM bus and a link through the memory bus to the processor. The TN765 is an interface to the DCS, ISDN, and AUDIX interface service. The TN765 allows direct access to 1 data link from an EIA port on the circuit pack in AC-powered standard reliability systems. The other data links connect to a digital line TN754 circuit and a 7400D data module to access a message service adjunct (MSA), DCS, CMS, ISDN, or AUDIX. Data links can connect to DS1 tie trunks to access DCS or ISDN applications.

The TN765 terminates BX.25 and ISDN link access procedure on the D-Channel (LAPD) protocols. The MCC supports 2 TN765 circuit packs, using a total of 8 data links. Single-carrier cabinets and CSSs support only 1 TN765 circuit pack, using 4 data links. The R7csi does not support the TN765 circuit pack.

---

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

---

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

**TN767B** and later suffix circuit packs support DS1 rate digital facility connectivity. The circuit packs support CO, Tie, DID, and off-premises stations (OPS) port types using the robbed-bit signaling protocol. These circuit packs also support ISDN-PRI connectivity in R7. For these applications, the signaling *D* channel can connect from the TN767 to the TN765 processor interface by a permanent switched call over the TDM bus.

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

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

## **TN768 Tone-Clock**

---

The TN768 is replaced by the TN2182 tone clock - tone detector and call classifier circuit pack.

## **TN769 Analog Line**

---

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

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

The TN769 does not support off premises message waiting indicators.

The TN769 provides secondary lightning protection, and supports  $\mu$ -Law companding.

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

**Table 38. Terminals and wiring configurations supported by the TN769 Circuit Pack**

<b>Terminal</b>	<b>Wire Size</b>	<b>Maximum Range</b>
500-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	20,000 ft. (6,096 m)
2500-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	20,000 ft. (6,096 m)
7102-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	20,000 ft. (6,096 m)
7101A-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	15,200 ft. (4,633 m)

*Continued on next page*

**Table 38. Terminals and wiring configurations supported by the TN769 Circuit Pack**

Terminal	Wire Size	Maximum Range
7103A-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	15,200 ft. (4,633 m)
8100-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	10,000 (3,048 m)
9100-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	10,000 (3,048 m)

### **TN771D Maintenance/Test (all except R7csi)**

The TN771D performs maintenance functions. These functions include packet bus reconfiguration that allows diagnosis and correction of recoverable packet bus failures before the link access procedure on the D-channel (LAPD) links fail. LAPD is a link-layer protocol on the ISDN-BRI and ISDN-PRI data link layer (level 2). LAPD provides data transfer between 2 devices and error and flow control on multiple logical links. It recovers packet bus failures involving up to 3 malfunctioning leads (1 or 2 data or parity leads and 1 control lead) by swapping spare leads with the malfunctioning leads.

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

A TN771D is required in all standard reliability PPNs and critical reliability EPNs, all standard reliability PPNs when packet endpoints (BRI and/or ASAI) are supported, and in all critical reliability systems when packet endpoints are supported.

### **TN772 Duplication Interface (R6 and some earlier)**

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

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

carrier/cabinet and requires a cable connection to the Duplication Interface circuit pack in the basic control carrier/cabinet.

### **TN775B/C Maintenance**

---

The TN775 and TN775B are used in maintenance and monitor power failure signals in an EPN cabinet in R7si and R7r. These circuit packs also monitor the clock, monitor and control the power supplies and battery charger, and monitor air flow and high temperature sensors. These circuit packs provide 2 serial links to communicate with Expansion Interface (EI) circuit packs, and provide an RS-232 interface for connection to an administration terminal. Each circuit pack contains a 3-position switch to control emergency power transfer.

The TN775C contains a new DC to DC power converter and is used in maintenance to monitor the R7 processor in a survivable remote expansion port network (SREPn) configuration.

### **TN776 Expansion Interface for R7si**

---

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

A system with ASAI/BRI or with PRI signaling from the packet bus (PACCON) requires a TN570 EI circuit pack in place of a TN776 circuit pack.

### **TN777B Network Control (R6 and some earlier)**

---

In R6 and some earlier systems, the TN777B communicates control channel messages between the processor circuit pack and the distributed network of port circuit packs on the TDM bus. The circuit pack also controls the 4 data channels that process and route information directly from the processor circuit pack to customer-connected equipment. Some equipment connections are data services facilities, CDR devices, an on-premises remote pooled modem or administration terminal, or an off-premises administration terminal. Some of these connections require data modules.

The TN777B has the time-of-day clock with battery backup for power failure or low voltage conditions. This circuit pack has a 24-hour clock for record keeping and system maintenance. The TN777B monitors the status of the system clocks and alerts the processor circuit pack in the event of a failure of any clock. The TN777B supports the high reliability option and handles all the control channel messages from the PPN or EPN networks over the TDM bus. This circuit pack uses a translation memory card for software upgrades and for saving translations, announcements, and core dumps. The TN777B also supports ISDN.

### **TN778 Packet Control (R6 and some earlier)**

In R6 and some earlier and earlier systems, the TN778 interfaces the packet bus with the SPE and terminates link access procedure on the D-channel (LAPD) links. The TN778 supports packet bus signaling for ISDN D-channel signaling for ASAI applications and for packet bus maintenance. Packet bus signaling occurs over the LAPD links and terminates (at level 2) on the packet control circuit pack. The TN778 provides a protocol processing capability to interface the SPE with the packet bus and communicates with the SPE using a message-based interface, a shared memory-based interface, and a combination of these interfaces.

Other features include packet bus loop-around testing, monitoring of the packet bus to detect packet bus faults in standard reliability systems, and maintaining of signaling links during planned SPE interchanges with the duplication option.

### **TN780 Tone-Clock for All Models Except R7csi**

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

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

---

## **TN786B Processor for R4 and earlier**

---

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

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

---

## **TN787F/G/H/J/K Multimedia Interface**

---

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

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

**TN787J** introduces multiple PN support.

---

## **TN788B Multimedia Voice Conditioner**

---

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

### **NOTE:**

The TN788B vintage E1 is  $\mu$ -Law only. The TN788B vintage 2 or later is A-Law and  $\mu$ -Law.

The TN788B is the audio processor for the Px64 multimedia conference bridge. The TN788B contains 8 digital signal processors; 4 for encoding and 4 for decoding. Each

encoder/decoder pair is assigned to a Px64 endpoint to process its audio channel. Connection to and from the endpoint's audio is by way of a TN787F/G multimedia interface port. This connection is through the TDM bus timeslots.

Each of the 8 digital signal processors communicate with the main on-board processor through 8 individual dual port random access memory (DPRAMs). No read only memory (ROM) is available on this circuit pack; the DPRAM is used for program download.

## **TN789 Radio Controller**

---

The TN789 circuit pack is an interface between a DEFINITY system and 2 wireless fixed base (WFB) radio units for the DEFINITY wireless business system R1-PWT. The TN789 contains a main processor to handle data line circuit (DLC) and upper medium access (MAC) layers of firmware. The TN789 also contains 2 lower MAC processors; 1 for each radio interface. Each radio interface is referred to as an I2 interface.

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

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

## **TN790 Processor (R6 and some earlier)**

---

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

The reduced instruction set computer (RISC) processor platform runs at 40 MHz and includes all of the functions of the TN786B processor circuit pack as well as providing an operating system base more common with R7r. Diagnostics for the TN790 are enhanced over earlier systems. The TN790 is compatible with the processor interface circuit pack

(TN765), the PACCON circuit pack (TN778), the NETCON circuit pack (TN777B), and the duplication interface circuit pack (TN772).

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

The TN790 is factory-populated with a minimum of 16 MBytes of dynamic random access memory (DRAM).

 **NOTE:**

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

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

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

**TN790B (R7si only)** supports the NETPKT circuit pack ([TN794](#)).

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

---

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

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

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

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

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

**Table 39. Terminals and wiring configurations supported by the TN791 Circuit Pack**

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

## **TN792 Duplication Interface for TN 790B Processor Circuit Packs**

In high- and critical-reliability R7si systems, duplication interfaces copy the contents of memory from the primary Switch Processing Element (SPE) to a standby SPE, so that the latter can take over immediately when the former fails. The TN792 uses the Enhanced M-Bus of the TN790B processor for this memory shadowing function. The Enhanced M-bus supports 32-bit addressing and data access (vs. 16-bit for the M-bus), so it transfers data faster and shadows a larger area of memory than the older bus. The M-bus is still supported, however, for legacy applications.

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

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

The TN792 is compatible with existing duplication cables.

### **TN793 24-Port Analog Line (US and Canada Offer A Only)**

The TN793 is a dual coded, analog line 24-port, that performs all the functions of the TN746B, 16-port analog line circuit pack. Each port supports 1 voice terminal, such as 500 (rotary dial) and 2500 terminals (DTMF dial).

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

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

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

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

**Table 40. Terminals and wiring configurations supported by the TN793**

<b>Terminal</b>	<b>Wire Size</b>	<b>Maximum Range</b>
500-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	20,000 ft (6,096 m)
2500-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	20,000 ft (6,096 m)
6200-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	12,000 ft. (3,657m)

*Continued on next page*

**Table 40. Terminals and wiring configurations supported by the TN793**

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

## **TN794 Network Control/Packet Interface**

The TN794 provides LAPD connections over the TDM bus, as currently provided by the Processor Interface (TN765). The TN794 replaces the NETCON (TN777B) and PACCON (TN778) in R7si systems. It is not backward compatible with earlier releases. The TN794 inserts into the NETCON slot and may require a [TN2400 Net/Pac Backplane Connection \(R7si field upgrades only\)](#). A modified TN790B processor circuit pack and a TN792 DUPINT circuit pack are required for duplicated systems.

## **TN798B Processor**

The TN798 processor platform runs at 25 MHz and integrates many functions of the TN790 processor and the TN777B NETCON circuit packs onto a single circuit pack. These functions include a 32-bit RISC CPU complex and a maintenance processor complex providing serial communications and maintenance functions. In addition, the TN798 terminates ISDN LAPD signaling over the DEFINITY TDM bus from PRI and BRI trunk circuit packs.

The RISC CPU complex provides 4 to 32 MBytes of Flash PROM. The DRAM is provided via 1 SIMM. The TN798 contains 16 MBytes of DRAM. The flash is not interleaved.

The TN798 processor does not provide X.25 communications nor does it provide a duplication option. The TN798 does not contain an on-board modem. Instead, an external modem must be connected to the RS-232E port previously used for the internal modem.

## **TN799 Control LAN (C-LAN) Interface**

The TN799 Control LAN Interface simplifies the connections between adjunct equipment and DEFINITY and reduces costs. It provides TCP/IP connectivity over Ethernet or PPP

(Point to Point Protocol) connections to applications, such as CMS Call Center, INTUITY™, AUDIX®, and DCS.

The TN799 does not support BX.25 connectivity on the R7csi platform. On the other platforms, TN765 Processor Interface and TN577 Packet Gateway circuit packs provide BX.25 connectivity for existing customers as well as TCP/IP service.

The TN799 C-LAN circuit pack is available with R7r, R7si, and R7csi.

## **TN801 LAN Gateway Interface**

---

The TN801 is part of the DEFINITY multi-application platform (MAPD). It allows direct integration of PC-based application into the DEFINITY switch. The TN801 provides DEFINITY packet bus and TDM bus interfacing, physical mounting for a CPU, external interfaces, and mapping of circuit switched connections between the DEFINITY TDM bus and the expansion circuit pack.

## **TN802 IP Trunk**

---

The TN802 Internet Protocol Trunk circuit pack supports voice and fax calls from the DEFINITY ECS across a corporate intranet or the Internet. The IP trunking software runs on an embedded PC operating under Windows NT.

IP trunking is a good choice for basic, corporate voice and fax communications, where cost is a major concern (IP-trunk calls travel over the intranet or Internet, rather than the public, toll network).

IP trunking is usually not a good choice for applications where calls have to be routed to multiple destinations (as in most conferencing applications) or to a voice messaging system. IP-trunk calls are compressed to save network bandwidth. Repeated compression and decompression results in a loss of data at each stage and degrades the final quality of the signal. This is not a problem in normal, corporate voice or fax calls. They go through two or three compression cycles at most. But multipoint conference calls and most voice messaging systems add too many compression cycles for acceptable quality.

The TN802 occupies three adjacent slots in a DEFINITY carrier and cannot be adjacent to another TN802 or ATM circuit pack. It supports a 10Base-T/100Base-T Ethernet interface, a monitor, a mouse, a keyboard, a modem, a serial communications port, and a Universal Serial Bus port. The TN802 External Cable Assembly attaches the standard, PC-type connectors used by these devices to an Amphenol-cable interface on the MAPD circuit pack.

The IP trunk emulates a TN464 UDS1 with up to 30 ports enabled. Internet switching is handled by the TN802 circuit pack's onboard CPU. The TN802 communicates with the DEFINITY via the TDM bus and operates in Native Mode.

## **TN1648B System Access and Maintenance**

The TN1648 is an SPE component used for maintenance. A processor in the TN1648 runs control routines that connect to maintenance software. The TN1648 has a 5-LED alarm panel and a toggle switch to manually inhibit automatic emergency transfer of PPN analog lines.

The TN1648 provides 2 RS-232 interfaces for connection to an administration terminal and, with duplication, connection to a standby maintenance terminal. The TN1648 also provides a tip and ring port with a built-in modem allowing a remote administration terminal to access the system.

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

- PPN alarm monitors and outputs including auxiliary alarms for auxiliary equipment and environmental monitoring for over- temperature conditions
- Power supply sense and control for the carriers
- Emergency transfer control for catastrophic failure. The circuit consists of a 3-position toggle switch. The switch may be moved into the manual on position, manual off position, or automatic position.
- Non-volatile memory containing the time-of-day clock, the initialization and administration system (INADS) telephone number, login password, and product identification
- Alarm panel information with major, minor, and warning LEDs, an ACKnowledge LED, and an emergency transfer LED

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

A cable from the TN1648B connects directly to an external modem. When the external modem is selected, the internal modem is disabled. The TN1648B is backward-compatible with the TN1648.

---

## **TN1650B Memory**

---

The TN1650B memory circuit pack contains 32 Mb of dynamic random access memory (DRAM) and error detection and correction circuitry to ensure information integrity. The TN1650B is used for system software, customer translations, and call processing maintenance.

---

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

---

The TN1654 DS1 converter circuit pack is a replacement for the TN574 DS1 converter circuit pack in R7r systems. The TN1654 converter complex installs in place of the conventional fiber and supports from 1 to 4 T1 or E1 facilities, providing a total of 92 T1 channels (or 120 E1 channels) in each direction between the PPN and the EPN. This capacity is enough for an EPN to easily support several hundred stations.

R7r architecture provides for EPNs that are remotely located from the PPN. EPNs within 5 miles (8 km) of the PPN may be coupled using multimode fiber optic cable or within 22 miles (35.4 km) using single-mode fiber optic cable. When the distance between the PPN and the EPN exceeds 5 miles (8 km) (multimode), or 22 miles (35.4 km), single-mode, or private right-of-way is not available, connect using a DS1 converter complex. A DS1 converter complex consists of a pair, 1 at each end, of DS1 converter circuit packs and the associated T1/E1 facilities.

A new set of Y-cables is required by the TN1654 to connect to a TN570/B Expansion Interface circuit pack for system communication.

---

## **TN1655 Packet Interface**

---

The TN1655 provides the communication path between the SPE and the packet bus in the PPN. This path is used by the EPNs and the CSS, from EI circuit packs in the PPN, to communicate with the processor circuit pack. The TN1655 provides the link access procedure on the D-channel (LAPD) (digital multiplexed interface (DMI)) mode-3 terminations of communication links across the packet bus that link to the processor circuit pack.

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

---

The TN1655 also provides termination to the DCS links—CDR and adjuncts such as AUDIX, and to 8,192 LAPD links. The TN1655 also supports firmware downloading.

### **TN1656 Tape Drive (R7r and earlier)**

The TN1656 contains a small computer system interface (SCSI) tape drive that stores 3 Mb to 120 Mb of system software, including customer translations, bootstrap image, and any core dumps.

### **TN1657 Disk Drive (R7r and earlier)**

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

### **TN2135 Analog Line for Italy**

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

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

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

### **TN2138 Central Office Trunk for Italy**

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

### **TN2139 Direct Inward Dialing Trunk for Italy**

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

---

## **TN2140B Tie Trunk for Hungary and Italy**

---

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

## **TN2144 Analog Line for the Netherlands (replaced by TN2183)**

---

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

## **TN2146 Direct Inward Dialing Trunk for Belgium and the Netherlands**

---

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

Companding can be set to either A-Law or  $\mu$ -Law.

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

---

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

The TN2147C provides multi-country selectable signaling such as loop-start signaling, and earth-calling and loop-calling guarded clearing signaling.

---

## **TN2149 Analog Line for Belgium (replaced by TN2183)**

---

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

---

## **TN2169 Alarm**

---

A component of [ED-1E546](#), the [DEFINITY AUDIX R3 \(Circuit-Pack Assembly\)](#). Like the [TN2170](#), the TN2169 alarm circuit pack monitors system power and environmental status, -48 VDC to +12 VDC power conversion for the disk drive and tape drive, and remote terminal access. Unlike the [TN2170](#), the TN2169 does not support an external Ethernet LAN connection.

---

## **TN2170 Alarm with Ethernet Interface**

---

A component of the [CallVisor ASAI/DEFINITY LAN Gateway R1 \(Circuit-Pack Assembly\)](#) ([ED-1E546](#)) and the [DEFINITY AUDIX R3 \(Circuit-Pack Assembly\)](#) ([ED-1E546](#)). Like the [TN2169](#), the TN2170 monitors system power and environmental status, -48 VDC to +12 VDC power conversion for the disk drive and tape drive, and remote terminal access. In addition, the TN2170 supports an external Ethernet LAN connection.

---

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

---

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

---

## **TN2181 2-Wire DCP Digital Line**

---

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

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

---

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

---

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

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

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

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

---

## **TN2183 Analog Line, Multi-Country (replaces [TN467](#), [TN468B](#))**

---

The TN2183 provides 16 analog line port interfaces. Each port provides a voice channel to the system from a tip/ring pair. Each port also sends or receives signaling to and from a station; such as an analog telephone, answering machine, facsimile, and loop-start CO port AUDIX.

The TN2183 provides rotary digit 1 recall, ground-key recall, and programmable flash timing. Additional support is provided for selectable ringing cadence, LED message waiting, and secondary lightning protection. The TN2183 also supports balanced ringing (when configured for France with TN2202 ring generator circuit pack) and DTMF sending levels appropriate for CONVERSANT. The TN2183 is impedance and gain selectable for multiple countries. For more information, contact your Lucent Technologies representative.

The TN2183 supports the terminals listed below.

**Table 41. Terminals and wiring configurations supported by the TN2183 Circuit Pack**

Terminal	Wire Size	Maximum Range
500-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	20,000 ft. (6,096 m)
2500-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	20,000 ft. (6,096 m)
7102A-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	3,100 ft. (945 m)
8100-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	12,000 ft. (3,657m)

## **TN2184 DIOD Trunk for Germany**

The TN2184 direct inward/outward dialing (DIOD) trunk contains 4 port circuits, each interfacing a 2-wire analog CO trunk with the TDM switching network of the system. Each port allows incoming and outgoing calls to include addressing information being received from the CO for incoming calls and addressing information being sent to the CO for outgoing calls. It detects periodic pulse metering (PPM) signals for call charge accounting on outgoing calls.

The TN2184 combines the features of both a CO trunk and a DID trunk to provide both outgoing and incoming calls with addressing information in both directions.

## **TN2185B ISDN-BRI, 4-Wire S/T-TE Interface (replaces TN464F)**

The TN2185 supports eight 4-wire ISDN BRI line S interfaces, each operating at 192 Kbps, with 2 B-channels (64 Kbps) and 1 D-channel (16 Kbps). The TN2185 interfaces to the DEFINITY LAN bus and the TDM bus to provide the TE side of the BRI interface.

The TN2185 is similar to the TN2198 except the TN2185 is a 4-wire S interface instead of a 2-wire U interface. Another difference is the function of the SCOTCH/NPE and SAKI are replaced by the network control element (NCE).

For each port, information communicates over two 64 Kbps bearer channels called B1 and B2, and over a 16 Kbps channel called the demand channel, or D channel. The D channel is used for signaling. Channels B1 and B2 can be circuit switched simultaneously, or either of them may be packet switched, but not both at once. The D channel is always packet switched. The circuit switched connections have a  $\mu$ -Law or A-Law option (on a per-board basis) for voice operation and operate as 64 kbps clear

channels when in the data mode. The packet switched channels support the LAPD protocol, however, the TN2185 does not terminate on LAPD protocol. The S interface does not support switching of both B channels together as a 128 Kb/s wideband channel.

The TN2185 has a long range up to 18,000 feet (5486 m) maximum from the system to the NT1 device. In a multiple terminal environment, the B channels are shared only on a per-call basis. For example, if the B2 channel is for data, then the B2 by 1 terminal excludes the others from having access to it. When a used device communicates over the D channel to access B1 or B2, that channel is owned until the call is taken down (no party on line). The D channel is always shared among the terminals. Replaces the TN-PRI/BRI PRI to BRI converter (ETSI-BRI) and the TN464F.

## **TN2198 ISDN-BRI, 2-Wire U Interface**

The TN2198 allows connection to the ANSI standard 2-wire U-Interface. The 2-wire interface from the TN2198 connects to an NT1 network interface. The 4-wire interface on the other side of the NT1 may connect to 1 or 2 telephones. The TN2198 does not provide a trunk-side interface as does the TN2185 circuit pack.

The TN2198 contains 12 ports that interface at the ISDN U reference point. For each port, information communicates over two 64 Kbps bearer channels called B1 and B2, and over a 16 Kbps channel called the demand channel, or D channel. The D channel is used for signaling. Channels B1 and B2 can be circuit switched simultaneously. The D channel is always packet switched. The TN2198 requires a packet control circuit pack (TN778) on Category B ONLY. It is a dual coded, analog line 24-port, that performs all the functions of the TN746B, 16-port analog line circuit pack. Each port supports 1 voice terminal, such as 500 (rotary dial) and 2500 terminals (DTMF dial).

The TN2793 supports on-premises (in-building) wiring with either touch-tone or rotary dialing and with or without the LED and neon message waiting indicators. The TN2793 supports off-premises wiring (out-of-building only with certified protection equipment) with either DTMF or rotary dialing, but LED or neon message waiting indicators are not supported off-premises.

The TN2793, along with a TN755B neon power unit per carrier or per single-carrier cabinet, supports voice terminals equipped with neon message waiting indicators (on-premises use only). The TN2793 supports 3 ringer loads, only 1 voice terminal can have an LED or neon message waiting indicator. The TN2793 allows a maximum of 12 simultaneous ports ringing.

The TN2793 supports A-Law and  $\mu$ -Law companding and administrable timers. The TN2793 supports queue warning level lights associated with the DDC and UCD features, recorded announcements associated with the Intercept Treatment feature, and PagePac

paging system for the Loudspeaker Paging feature. Additional support is provided for external alerting devices associated with the TAAS feature, neon message waiting indicators, and modems The TN2793 also supports secondary lightning protection. si and packet bus equipped Category B ONLY. It is a dual coded, analog line 24-port, that performs all the functions of the TN746B, 16-port analog line circuit pack. Each port supports 1 voice terminal, such as 500 (rotary dial) and 2500 terminals (DTMF dial).

The TN2793 supports on-premises (in-building) wiring with either touch-tone or rotary dialing and with or without the LED and neon message waiting indicators. The TN2793 supports off-premises wiring (out-of-building only with certified protection equipment) with either DTMF or rotary dialing, but LED or neon message waiting indicators are not supported off-premises.

The TN2793, along with a TN755B neon power unit per carrier or per single-carrier cabinet, supports voice terminals equipped with neon message waiting indicators (on-premises use only). The TN2793 supports 3 ringer loads, only 1 voice terminal can have an LED or neon message waiting indicator. The TN2793 allows a maximum of 12 simultaneous ports ringing.

The TN2793 supports A-Law and m-Law companding and administrable timers. The TN2793 supports queue warning level lights associated with the DDC and UCD features, recorded announcements associated with the Intercept Treatment feature, and PagePac paging system for the Loudspeaker Paging feature. Additional support is provided for external alerting devices associated with the TAAS feature, neon message waiting indicators, and modems The TN2793 also supports secondary lightning protection. vs systems. The circuit switched connections have a  $\mu$ -Law or A-Law option (on a per-board basis) for voice operation and operate as 64 kbps clear channels when in the data mode. The D channel supports the LAPD protocol and is consistent with the CCITT Q.920 Recommendations for D channel signaling.

In a multiple terminal environment, the B channels are shared only on a per-call basis. For example, if the B2 channel is used for data, then the use of B2 by 1 terminal excludes the others from having access to it. When a device communicates over the D channel to access B1 or B2, that channel is owned until the call is taken (no party on line). The D channel is always shared among the terminals. The TN2198 interfaces with the TDM bus and packet bus in the DEFINITY backplane and terminates with 12 ISDN basic access ports.

The TN2198 has a long range to 18,000 feet (5486 m) maximum from the system to the NT1 device and uses standard protocol ANSI T1.601. The TN2198 has a 160 Kbps line rate, consisting of 2 bearer channels at 64 Kbps channels each, the D channel at 16 Kbps, framing at 12 Kbps, and maintenance at 4 Kbps. The circuit pack uses demand

channel (ringing, tone, and so forth), 16 Kbps channel, and supports up to 24 telephones or data modules per circuit pack.

### **TN2199 Central Office Trunk for Russia**

The TN2199 is a 4-port, 3-wire, loop-start trunk circuit pack that can be used as a DID trunk, CO trunk (2-way, 1-way incoming, or 1-way outgoing CO). The TN2199 combines the functionality of the DID trunk and the 1-way outgoing CO trunk (DIOD trunk). This circuit pack is used with the call classifier circuit pack (TN744D or later) or the tone-clock/tone detector (TN2182B or later) to accomplish MF shuttle signaling (similar to R2-MFC signaling). Supports incoming ANI.

### **TN2202 Ring Generator for France**

The TN2202 ring generator circuit pack supplies 50 Hz ringing power. The TN2202 supplies balanced ringing, by a modified backplane, to terminals connecting to the TN2183 multi-country analog line circuit pack when administered for France analog transmission.

The TN2202 plugs into the power unit slot and is required for each carrier containing analog lines (1 in an single-carrier cabinet or 1 in each port carrier of a MCC). A 1-lead modification is required in each backplane using TN2202. This is true for all products made for France. The TN2202 produces 2 symmetrical voltages (typically 28V rms) with respect to ground, and takes -48 VDC, -5 VDC, and ground from the backplane and generates 2 x 28V rms with added -48 VDC.

### **TN2207 DS1 Interface, T1 (24-Channel) and E1 (32-Channel), for MMCH**

The TN2207 circuit packs support digital signal level 1 (DS1) rate (24 channel) and E1 rate (32 channel) digital facility connectivity. All TN2207 suffixes support CO, Tie, DID, and off premises station (OPS) port types using the robbed-bit signaling protocol, the proprietary bit-oriented signaling (BOS) 24th channel signaling protocol, and the DMI-BOS 24th channel signaling protocol. The circuit packs also support ISDN-PRI connectivity T1 or E1.

In DS1 (24 channel) mode, a DS1 interface is provided to the DS1 facility. The TN2207 circuit packs provide board-level administrable A-Law and  $\mu$ -Law companding, CRC-4 generation and checking (E1 only), and Stratum 3 clock capability.

The TN2207 provides test jack access to the DS1 or E1 line and support the 120A integrated channel service unit (CSU).

All suffixes have line out (LO) and line in (LI) signal leads. The Line Out and Line In leads are unpolarized balanced pairs.

The TN2207 has additional hardware to support direct cabling to a TN787 MMI circuit pack.

### **TN2208 Multi-Function**

---

The TN2208 Multi-Function circuit pack holds a PC-type CPU, controller, and memory devices. In the [CallVisor ASAI/DEFINITY LAN Gateway R1 \(Circuit-Pack Assembly\)](#), the TN2208 operates with the [TN2170 Alarm with Ethernet Interface](#) circuit pack to monitor system power and environmental status, -48 VDC to +12 VDC power conversion for the disk drive and tape drive, and remote terminal access.

### **TN2209 Tie Trunk for Russia**

---

The TN2209 has 4 ports used for Type 1 or Type 5 four-wire E & M lead signaling tie trunks, that can be automatic, immediate-start, wink-start, and delay-dial. The TN2209 provides an interface between these four frequency signaling tie trunk lines and the DEFINITY TDM network. Based on a TN760D each port has modified E, and M signal leads for universal hardware compatibility. The TN2209 provides release link trunks required for the CAS feature and has administrable A-Law and  $\mu$ -Law companding.

### **TN2210 Tone Generator**

---

The TN2210 tone generator provides a 1780 Hz tone for an auxiliary trunk port on a TN763 or SN231. The external alarm interface provides a contact closure to connect to the TN492C remote interface circuit of the DEFINITY common control carrier. The tone is used by the AUTOPLEX system to support CO call associated continuity testing of trunk circuits between the CO and AUTOPLEX system. The circuit will provide an active alarm LED to indicate the circuit pack is in a fault condition.

### **TN2214B 24-Port, 2-Wire DCP Digital Line (International Offers or US and Canada Offer B only)**

---

The TN2214 supports the terminals listed below.

**Table 42. Terminals and wiring configurations supported by the TN2214B**

Terminal	Wire Size	Maximum Range
302C attendant console		
8400-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	3,500 ft. (1,067 m)
9400-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	3,500 ft. (1,067 m)

The TN2214 supports either A-Law or  $\mu$ -Law companding (software selectable).

### **TN2215 16-Port, Analog Line, Multi-Country (International Offers or US and Canada Offer B only)**

The TN2215 has 16 ports. Each port supports 1 voice terminal, such as 500 (rotary dial) and 2500 terminals (DTMF dial). LED message waiting indicators are not supported off premises. The TN2215 does not support neon message waiting indicators. Auxiliary equipment, such as answering machines, modems, and amplifier handsets, is not supported.

The TN2215 supports on-premises (in-building) wiring with either touch-tone or rotary dialing and with or without the LED message waiting indicators. The TN2215 supports off-premises wiring (out-of-building only with certified protection equipment) with either DTMF or rotary dialing, but LED message waiting indicators are not supported off-premises.

The TN2215 supports 3 ringer loads, only 1 voice terminal can have an LED message waiting indicator. The TN2215 allows a maximum of 8 simultaneous ports ringing. The TN2215 supports A-Law and  $\mu$ -Law companding and administrable timers. Secondary lightning protection is provided.

The TN2215 supports the following terminals:

**Table 43. Terminals and wiring configurations supported by the TN2215**

Terminal	Wire Size	Maximum Range
500-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	20,000 ft. (6,096 m)
2500-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	20,000 ft. (6,096 m)
6200-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	12,000 ft. (3,657m)
7102A-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	3,100 ft. (945 m)
8100-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	12,000 ft. (3,657m)

### **TN2224B 24-Port, 2-Wire DCP Digital Line**

The TN2224B has 24 DCP ports that can connect to 2-wire terminals such as the 6400-, 8400-, or 9400-Series digital voice terminals and the 302C Attendant Console.

**Table 44. Terminals and wiring configurations supported by the TN2224B**

Terminal	Wire Size	Maximum Range
8400-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	3,500 ft. (1,066) m)
9400-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	3,500 ft. (1,066) m)

The TN2224B supports either A-Law or  $\mu$ -Law companding (software selectable).

The TN2224B is the equivalent of a TN2224 with enhanced firmware, a 24-MHz microcontroller, and 48k of addressable external RAM.

### **TN2238 ATM Trunk/Port-Network Interface for Multi-Mode Fiber**

TN2238 ATM circuit packs replace [TN570B/C](#) Expansion Interface circuit packs when ATM is used for the center-stage switch of a port network (R7r only), and they support ATM trunking and wide-area network (WAN) connectivity (for ATM Circuit Emulation Service, see [TN2305](#)). The TN2238 can be connected to an ATM-based center stage switch, another TN2238, or an ATM network. It uses standard, multi-mode, 155.52-MHz, OC-3c fiber. The circuit pack provides echo cancellation.

Up to 2 TN2238 ATM trunks and 1 TN2238 ATM port-network expansion interface can be installed per carrier.

For installations that use single-mode fiber, see [TN2338 ATM Trunk/Port-Network Interface for Single-Mode Fiber](#).

### **TN2242 TTC 2Mb CMI Trunk for Japan**

The TN2242 is the Japanese-market counterpart of the [TN464C](#). It supports versions of Channel Associated Signaling and ISDN-PRI signaling that are peculiar to the TTC private networking environment used in Japan. It supports the special line-coding and framing used on 2.048-Mbps Japanese trunks. The TN2242 connects DEFINITY with other vendor equipment and with other DEFINITY switches via the TDM device that is commonly used throughout Japan for this purpose.

### **TN2301 Logic Switch for R7r or Later**

Provides service to the customer when the link to the main R7r processor fails or is severed, or when the R7r processor or center stage switch fails. The TN2301 survivable remote switch (SRS) circuit pack connects the SREPN links (fiber or T1/E1) to the appropriate PPN for call processing. It does this under control of the TN775C maintenance circuit pack which monitors the health of the expansion interface TN570B.

Not for ATM PNC.

### **TN2305 ATM-CES Trunk/Port-Network Interface for Multi-Mode Fiber**

The TN2305 provides an ATM-based replacement for the [TN570B/C](#) expansion interface. This interface uses OC-3c or STM-1 155-Mbps multimode fiber (use the [TN2306](#) with single-mode fiber). The TN2305 supports both trunk and port-network connectivity. As a trunk, the TN2305 uses Circuit Emulation Service (CES) to emulate an ISDN-PRI trunk on an ATM facility. As a port-network expansion interface, the TN2305 connects port networks to an ATM switch that serves as the center-stage switch of an R7r network.

The TN2305 does not support hybrid port-networks that use both ATM and CSS simultaneously. TN2305s must connect all port networks through the ATM switch. Directly connected EPNs are not supported.

---

## **TN2306 ATM-CES Trunk/Port-Network Interface for Single-Mode Fiber**

---

The TN2306 circuit pack has the same features as the [TN2305](#) but supports single-mode fiber.

---

## **TN2308 Direct Inward Dialing Trunk**

---

The TN2308 uses 8 ports for immediate-start and wink-start direct inward dialing (DID) trunks. Each port has tip and ring signal leads.

DEFINITY requires the TN2308 to support Brazil Block Collect Call. TN2308's transmission characteristics comply with Brazilian telecom standards for PBXs.

---

## **TN2338 ATM Trunk/Port-Network Interface for Single-Mode Fiber**

---

Supports the ATM-connectivity features of the [TN2238 ATM Trunk/Port-Network Interface for Multi-Mode Fiber](#) on single-mode fiber. For ATM Circuit Emulation Service on single-mode fiber, see [TN2306](#).

---

## **TN2400 Net/Pac Backplane Connection (R7si field upgrades only)**

---

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

---

## **TN2464 DS1 Interface, T1/E1 (International Offers or US and Canada Offer B only)**

---

The TN2464 DS1 circuit pack supports T1 (24-channel) and E1 (32-channel) digital facilities. In ISDN-PRI applications, the ISDN D-channel connects to the [TN778](#) packet control and the [TN765](#) processor interface (R7si) or the [TN1655](#) packet interface (R7r) via the LAN bus.

The TN2464 circuit pack provides:

- test jack access to the T1/E1 line.
- Board-level administrable A-Law and  $\mu$ -Law companding

- CRC-4 generation and checking (E1 only)
- Stratum 3 clock capability
- support for the [120A Channel Service Unit Module](#)
- CO, TIE, DID, off-premises station (OPS) port types that use robbed-bit signaling protocol, proprietary bit-oriented signaling (BOS) 24th-channel signaling protocol, or DMI-BOS 24th-channel signaling protocol
- Unpolarized, balanced-pair, line-out (LO) and line-in (LI) signal leads.
- Support for Russian incoming ANI.
- Support for the enhanced maintenance capabilities of the enhanced integrated channel service unit (ICSU)
- Support for CONVERSANT®
- Channel-associated signaling protocols for many countries (for details, contact your Lucent Technologies representative)

### **TN2793 24-Port Analog Line (International Offers or US and Canada Offer B only)**

---

The TN2793 installs in Category B ONLY. It is a dual coded, analog line 24-port, that performs all the functions of the TN746B, 16-port analog line circuit pack. Each port supports 1 voice terminal, such as 500 (rotary dial) and 2500 terminals (DTMF dial).

The TN2793 supports on-premises (in-building) wiring with either touch-tone or rotary dialing and with or without the LED and neon message waiting indicators. The TN2793 supports off-premises wiring (out-of-building only with certified protection equipment) with either DTMF or rotary dialing, but LED or neon message waiting indicators are not supported off-premises.

The TN2793, along with a TN755B neon power unit per carrier or per single-carrier cabinet, supports voice terminals equipped with neon message waiting indicators (on-premises use only). The TN2793 supports 3 ringer loads, only 1 voice terminal can have an LED or neon message waiting indicator. The TN2793 allows a maximum of 12 simultaneous ports ringing.

The TN2793 supports A-Law and  $\mu$ -law companding and administrable timers. The TN2793 supports queue warning level lights associated with the DDC and UCD features, recorded announcements associated with the Intercept Treatment feature, and PagePac paging system for the Loudspeaker Paging feature. Additional support is provided for external alerting devices associated with the TAAS feature, neon message waiting

indicators, and modems The TN2793 also supports secondary lightning protection systems. It is a dual coded, analog line 24-port, that performs all the functions of the TN746B, 16-port analog line circuit pack. Each port supports 1 voice terminal, such as 500 (rotary dial) and 2500 terminals (DTMF dial).

The TN2793 supports on-premises (in-building) wiring with either touch-tone or rotary dialing and with or without the LED and neon message waiting indicators. The TN2793 supports off-premises wiring (out-of-building only with certified protection equipment) with either DTMF or rotary dialing, but LED or neon message waiting indicators are not supported off-premises.

The TN2793, along with a TN755B neon power unit per carrier or per single-carrier cabinet, supports voice terminals equipped with neon message waiting indicators (on-premises use only). The TN2793 supports 3 ringer loads, only 1 voice terminal can have an LED or neon message waiting indicator. The TN2793 allows a maximum of 12 simultaneous ports ringing.

The TN2793 supports A-Law and  $\mu$ -law companding and administrable timers. The TN2793 supports queue warning level lights associated with the DDC and UCD features, recorded announcements associated with the Intercept Treatment feature, and PagePac paging system for the Loudspeaker Paging feature. Additional support is provided for external alerting devices associated with the TAAS feature, neon message waiting indicators, and modems The TN2793 also supports secondary lightning protection.

**Table 45. Terminals and wiring configurations supported by the TN2793**

Terminal	Wire Size	Maximum Range
500-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	20,000 ft. (6,096 m)
2500-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	20,000 ft. (6,096 m)
6200-Type	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	12,000 ft. (3,657m)
7102A-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	20,000 ft. (6,096 m)
8100-Series	24 AWG (0.2 mm <sup>2</sup> /0.5 mm)	12,000 ft. (3,657m)

---

## **TN-CCSC-1 PRI to DASS Converter**

---

The TNCCSC-1 circuit pack converts ISDN-PRI to a DASS interface. DASS is a 2-Mbps interface using a 75-Ohm coaxial transmission facility. One TNCCSC-1 circuit pack can support up to 2 TN464F DS1 Interface circuit packs. A Y cable and an 888B 75-Ohm coaxial adapter connect to the public network facility.

---

## **TN-CCSC-2 PRI to DPNSS Converter**

---

The TNCCSC-2 circuit pack converts ISDN-PRI to a DPNSS interface. DPNSS is a 2-Mbps interface using a 75-Ohm coaxial transmission facility. One TNCCSC-2 circuit pack can support up to 2 TN464F DS1 interface circuit packs. A Y cable connects to the public network facility.

---

## **UN330B Duplication Interface**

---

In high- and critical-reliability systems with 2 SPEs, 1 UN330B resides in each SPE and connects to the other UN330B. The UN330Bs provide control and communication paths between the SPEs to keep the standby SPE ready to assume control if the active SPE fails. The UN330Bs select active/ standby mode for the 2 SPEs, shadow (copy) the active SPE memory writes into the standby SPE memory, and support inter-SPE communications.

The duplication channel is a bi-directional high-speed path between the 2 SPEs. When memory shadowing is active, all shadowed memory writes on the active processor's bus are sent across the link and written into the standby processor's memory. Standby memory writes are not sent to the active processor.

---

## **UN331B Processor**

---

The UN331B controls the system and executes stored programs that perform call processing activity and maintenance. The UN331B is a RISC designed around a MIPS R3000A CPU operating at 33 MHz. It employs 32-bit address and data buses to obtain and execute instructions at a rate approaching 1 instruction per clock cycle. The 256 kbyte instruction cache with burst-mode refill and 256 kbyte data cache are key to the performance of the processor. A read/write buffer chip tailors the UN331B to the call processing environment.

Peripheral devices residing on the UN331B are positioned outside the CPU cache structure and interface to the CPU through the read/write buffers. These peripherals

include 512 kbytes of ROM for the monitor, counters/timers, UARTs, control/status/error registers, and the logic that provides bus arbitration and the Bus Time-Out feature.

The UN331B interfaces to the 32-bit multiplexed address/data processor bus (PM-Bus) and the 32-bit processor expansion bus (PX-Bus). The PM-Bus is for all processor write operations and single-word (4-byte) read operations. Multiple-word or burst reads are performed using the PM-Bus to transfer the address to main memory, then the words of the burst are returned using both the PM-Bus and PX-Bus.

## **UN332/B Mass Storage/Network Control**

The UN332 provides an interface between the UN331B processor and the small computer system interface (SCSI) bus for access to the mass storage system (MSS) such as a disk drive. The UN332 also provides TDM network control for the PPN, and terminates 1 end of the processor-multiplexed bus.

## **DEFINITY Adjuncts**

The following table lists the adjuncts for R7 systems. After the table, detailed descriptions of each adjunct are provided.

**Table 46. DEFINITY Adjuncts**

<b>Apparatus Code</b>	<b>Name</b>	<b>Type</b>
105D	Isolating Data Interface	Adjunct
120A	Channel Service Unit Module	Adjunct
122A	Music-on-Hold Interface for France	Port
300A	Single-Mode Fiber Optic Transceiver	Network
315x/316x-Series	Channel Service Unit	Adjunct
400A	T1 Splitter for ATM	Adjunct
402A	E1 Splitter for ATM	Adjunct
700A	700A	Network
9823A/B	Multi-Mode Fiber Transceiver	Network
BU3200A/B	Battery Interface Unit	Power

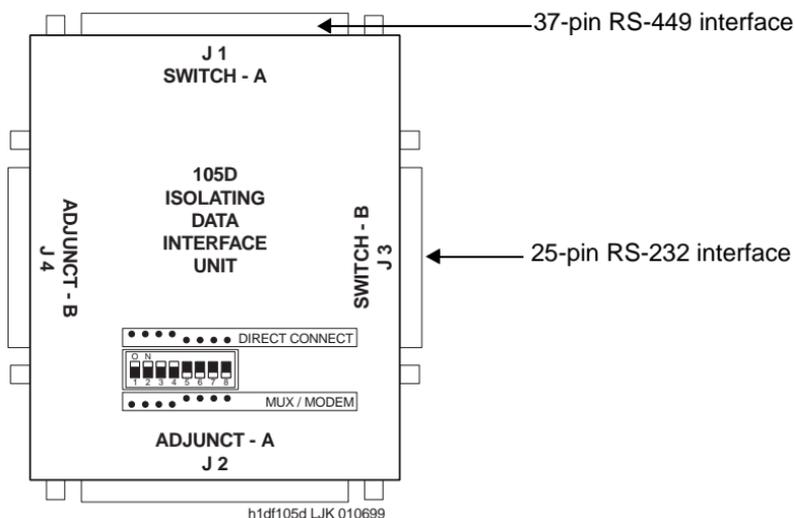
*Continued on next page*

**Table 46. DEFINITY Adjuncts**

BTD08	Busy Tone Disconnect for Loop-Start, 2-Wire, Analog Trunks	Port
<i>Customer-Supplied</i>	ESPA-Compliant Radio-Paging Equipment	Adjunct
<i>Customer-Supplied</i>	External Alarm Equipment	Adjunct
DEFINITY nET90	ATM Interface	Port
J58907AA-1	Personal Communications Manager (Forum)	Adjunct
<i>none</i>	DECT/ETSI-Compliant DEFINITY Wireless Business System for Non-US Markets	Adjunct
RM0850HA100	Rectifier Module	Power

## 105D Isolating Data Interface

The 105D Isolating Data Interface is an adapter that lets you connect adjunct devices and switches that use different data-cable interfaces. The 105D IDI connects one 25-pin RS-232 cable to one 37-pin RS-449 cable. Eight DIP switches let you configure the IDI for a direct connection (switches 0-3 UP, 4-9 DOWN) or a connection via a MUX or modem (switches 0-3 DOWN, 4-9 UP). DIP settings are printed on the IDI (see [Figure 48](#)).



**Figure 48. 105D Isolating Data Interface**

## 120A Channel Service Unit Module

The 120A channel service unit (CSU) module connects to either a TN464E/F or a TN767D/E DS1 circuit pack on 1 end. The other end connects to the network interface smart jack. The 120A is powered from the +5 VDC port carrier power supply and uses a maximum of 1.2 Watts.

In combination with the DS1 circuit pack, it provides the essential functions of external CSUs. The TN464/767 and switch administration support all framing and line coding options.

The 120A is small, a little larger than a wallet, is easier to install than an external CSU, and does not require any option switch settings or DS1 cable.

Vintage 2 of the 120A CSU module (the 120A2) provides enhancements to support the payload loopback function available when the ESF framing format is selected. This 700A loopback jack is controlled from the network side using the data link provided by the ESF framing format. This provides a loopback of data back to the network and operates as defined in AT&T TR54016-1989.

---

## 122A Music-on-Hold Interface for France

---

A highly reliable music source is provided by the wall-mounted 122A adjunct circuit pack. It provides the correct electrical transformation between a port of the TN2183 analog line circuit and a customer- provided music source. The 122A monitors the music source, and, if music is not present at the input, switches to a *Hold Tone* generated by the interface itself.

---

## 300A Single-Mode Fiber Optic Transceiver

---

The 300A is a single-mode lightwave transceiver that transmits and receives light up to 115,000 feet (22 miles or 35 km). Single-mode fiber optic cable connects from the lightwave transceiver on 1 EPN carrier to the lightwave transceiver on another PPN or EPN carrier. The cable consists of 2 separate 8-10-micron core diameter fiber optic cables. The fiber optic connection allows full duplex (simultaneous bi-directional) transmission.

Fiber loss must be less than 17 dB. Saturation may occur if distances are short; simple in-line attenuators may be required if the total loss on the fiber link is less than 10 dBm. An optical time domain reflectometer (OTDR) test is recommended to determine specific fiber optic hardware requirements.

---

## 315x/316x-Series Channel Service Unit

---

The 315x/316x-series of the Channel Service Unit (CSU) is an interface between the T1 digital network and the customer premises equipment. A CSU provides an interface between the DSX1 levels of a DS1 Interface circuit pack and the levels of a DS1 transmission facility. The CSU also

- Isolates the DS1 interface circuit pack from DC voltages that may be on the facility
- Provides jacks to test access to receive and transmit signals between the DS1 circuit pack and the CSU
- Provides secondary surge protection between the DS1 facility and the DS1 circuit pack
- Provides loopbacks for the signals from the DS1 circuit pack and from the facility for fault isolation purposes
- Allows software configuration menus to display for quick and easy operation

The 3150/3160 units can sit on a desktop or a shelf. The Model 3151 is a circuit card and installs in a COMSPHERE® 3000-series carrier.

### **400A T1 Splitter for ATM**

---

The 400A splitter supplies the 8-KHz clock signal from the incoming T1 to an external ATM switch via a twisted pair cable. It attaches to the 50-pin connector behind a DS1 (T1) circuit pack.

In the USA, the 400A resides behind the Channel Service Unit, which serves as a barrier between the 400A and the public network.

### **402A E1 Splitter for ATM**

---

The 402A splitter supplies the 8-KHz clock signal from the incoming E1 to an external ATM switch via a twisted pair cable. It attaches to the 50-pin connector behind a DS1 (E1) circuit pack.

### **700A DS1 CPE Loopback Jack**

---

The 700A is a loopback device intended for permanent installation in DS1 house wiring at the network interface (NI) point when ICSUs are used. The 700A allows all customer wiring between the system and the NI to be looped and tested, either locally or remotely, via the management terminal. Using the 700A, DS1 problems can be quickly isolated to either the customer premises or to the external DS1 span.

The 700A operates with any vintage of TN767E (or later) or TN464F (or later) DS1 circuit packs and with G3V3 Release 3 (or later) software. The unit operates with the 120A2 (or later) integrated channel service unit (ICSU); *not* the 31xx series of CSUs or other external CSUs or earlier ICSUs.

The 700A is required when DC power appears at the interface to the ICSU. The 700A isolates the ICSU from the DC power and properly loops the DC span power. The 700A is also used when no smart jack is installed by the local phone company.

### **9823A/B Multi-Mode Fiber Transceiver**

---

The 9823A-type lightwave transceiver transmits light up to 4,900 feet (0.93 miles or 1.5 km). The 9823B lightwave transceiver transmits light up to 25,000 feet (4.73 miles or 7.6 km). Multi-mode fiber optic cable connects from the lightwave transceiver on 1 carrier to

the lightwave transceiver on another carrier. The cable consists of 2 separate 62.5-micron diameter fiber optic cables or 50-micron diameter fiber optic cables. The fiber optic connection allows full duplex (simultaneous bi-directional) transmission.

## **BU3200A/B Battery Interface Unit**

The battery interface unit (BIU) controls the RM0850HA100 rectifier modules, manages the batteries, and reports the status of system power. The BIU provides the emergency power off option and provides all battery alarm interfaces for internal and external alarms.

## **BTD08 Busy Tone Disconnect for Loop-Start, 2-Wire, Analog Trunks**

This adjunct provides the method to detect disconnect of incoming calls connected by loop start 2-wire analog trunks used in some countries. In these cases, the public switched telephone network (PSTN) sends voice band tones instead of line disconnect, to indicate the caller has disconnected; while the called end remains connected.

This adjunct prevents connecting abandoned calls to the answering call center agent, locking up trunk-to-trunk connections, or locking up connections to repetitive announcements.

## **DEFINITY nET90 ATM Interface**

The asynchronous transfer mode (ATM) Interface is a high speed access concentrator for data networking in local area network (LAN), campus, and wide area network (WAN) environments. Data rates can be as high as 155 Mbps.

The ATM access concentrator (AAC) is a small external adapter with a built-in channel service unit (CSU). The AAC takes a DEFINITY DS1 interface and maps it into a T1 ATM cell stream that can interface ATM switches or provide direct access to ATM network services. The ATM interface allows proper operation of the MMCH feature and can carry voice, video, data, and image information. The AAC adapter uses ATM circuit emulation to provide constant bit rate service. The AAC adapter also divides up to 20 DEFINITY DS0s into as many different locations.

The AAC can take data traffic on a serial V.35/RS-449/X.21 interface or an Ethernet interface and combine this data stream with virtual trunks on the T1 ATM interface.

Each ATM multiplexer can configure to ATM, frame relay, switched megabit data service (SMDS), T1, and E1. The AAC supports up to 4 ports. T3 and E3 require an AAC-3.

---

## **Customer-Supplied ESPA-Compliant Radio-Paging Equipment**

---

The European-standard paging access (ESPA) radio paging interface is the western european standard paging protocol. The interface to the DEFINITY system is via an ASAI link.

---

## **Customer-Supplied External Alarm Equipment**

---

The external alarm allows analog line ports to be used as additional external device alarm inputs to the DEFINITY System. This feature operates with all supported analog line circuit packs and with all maintenance circuit packs. This interface does not include a contact relay closure.

Each analog port used for this feature is administered as an external alarm connection. This administration includes information identifying the port, the external device connecting to the port, the alarm level assigned to the external device, and the "product identifier" of the adjunct or external equipment.

---

## **J58907AA-1 Personal Communications Manager (Forum)**

---

The Forum Personal Communications Manager (PCM) is available outside the United States. The PCM uses a Communicore<sup>tm</sup> Mobility Manager that serves as an adjunct to DEFINITY ECS, to manage mobility. The system uses cordless telephone generation 2 (CT2) technology, which is a global standard for wireless telephone service. This standard defines the radio interface between the Forum pocket telephones and the base stations in the system.

The PCM system manager provides superior system administration capabilities. The PCM personal communications manager can accommodate even the largest businesses. It has the following maximum capacities:

- 500 wireless telephones
- 126 base stations
- 6 PRI interfaces to DEFINITY
- 1 Sun workstation
- 14.4 (minimum Baud rate) modem for remote maintenance

- 2 maintenance telephones
- 4 million square foot (371,000 square meter) coverage area

The PCM communicates to the DEFINITY ECS via a DS1 interface (ISDN-PRI).

## **DECT/ETSI-Compliant DEFINITY Wireless Business System for Non-US Markets**

---

The DEFINITY Wireless Business System Digitally Enhanced Cordless Telecommunications (DECT) provides mobility management with an adjunct processor. The system uses the DECT/ETSI standard, which defines the interface between the wireless phones and the base stations.

The DEFINITY wireless business system (DWBS) has the following capacities:

- 360 wireless telephones
- 24 base stations
- 12 E1 CAS links to DEFINITY
- 1 administration PC
- 1 modem for remote maintenance

The DWBS-DECT adjunct communicates to the DEFINITY ECS via a DS1 interface (providing E1 CAS).

## **RM0850HA100 Rectifier Module**

---

The rectifier module is used in the J588980CH power distribution unit. It operates as an integral part of a complete power system with battery backup. The modules operate in a redundant, high reliability mode to provide -48 VDC at 850 Watts to a common power bus.



## 4—Technical Specifications

This section includes the following technical specifications on the capabilities, performance, and feature capacities:

- Representative Number of Lines
- Call Performance
- Additional Hardware to Use Features
- Allocation of Buttons
- Cabling Distances
- Initialization and Recovery
- Call Progress Tones
- Indicator Lamp Signals

### Representative Number of Lines/Trunks

Table 47 lists the representative number of lines/trunks for each configuration of PPNs, EPNs, and CSSs in R7. The actual number of lines depends on the features and characteristics of the configuration.

**Table 47. Representative Number of Lines/Trunks**

Configuration	R7csi	Release R7si	R7r
1 processor port network (PPN)	400	400	800
Direct connect with 1 PPN and 2 EPNs	Does not apply	400/2400	2400/400
1 switch node (SN) in the CSS with 1 PPN and 15 EPNs	Does not apply	Does not apply	12,500/ 2000
3 SNs in the CSS with 1 PPN and 43 EPNs	Does not apply	Does not apply	25,000/ 4000

## Call Performance

Table 48 lists call processing performance for R7.



### NOTE:

Call performance can vary with different customer applications. A processor occupancy evaluation (POE) may be required.

**Table 48. Call Processing Performance (Calls Per Hour)**

System Type	R7si	Release csi	R7r
General business	40,000	20,000	100,000
ISDN	16,000	8000	40,000
Automatic call distribution	28,000	14,000	70,000
Inbound call management	12,000	6000	30,000
Outbound call management	16,000	8000	44,000
ASAI desk top	28,000	14,000	70,000

Table 49 lists response times for R7.

**Table 49. Response Times**

Attribute	Response Time
Call processing	General voice path cut-through: 750 ms Attendant ring tip: 260 ms Direct extension selection (DXS) lamp update: 1 second Announcement circuit pack upload (no call processing load): 40 minutes
System management	4 to 6 seconds mean response time
Maintenance	High-priority periodic tests must be completed within 1 hour. High-priority scheduled tests must be completed once each day, but not during busy hours.
Booting and recovery	11 minutes (not including announcements)

## Additional Hardware to Use Features

Table 50 describes all features and any additional hardware required to use features. The hardware consists of circuit packs installed in carriers, devices in an auxiliary cabinet, and external devices. Not all feature applications require additional hardware.

**Table 50. Additional Hardware to Use Features**

Feature	Hardware
Abandoned call search	Central office (CO) trunk circuit pack.
Abbreviated dialing	Additional call progress tone detector ports on a tone detector circuit pack if the special <i>wait</i> character is used frequently.
Abbreviated dialing (enhanced)	No additional hardware required except as required for abbreviated Dialing, above.
ACCUNET service	Data module and printer.
Adjunct switch application interface (ASAI)	<p>Port on BRI line circuit pack and a terminating resistor for each interface to be provided. Supports up to 8 interfaces.</p> <p>R7si: a packet control circuit pack is required for ASAI applications. An EI circuit pack is also required for system connectivity in multiple PN systems. R7r: BRI line circuit pack is required. R7si, R7r: packet applications, such as ASAI, require maintenance/test circuit pack in PPN. In a critical reliability system, a maintenance/test circuit pack is required in each additional EPN.</p> <p>A port on a BRI line circuit pack or DEFINITY LAN Gateway connected to the CallVisor Adjunct. See ISDN-BRI.</p> <p>R7csi: TN556C BRI line circuit pack (does not support LAN gateway)</p>

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Administrable language displays	No additional hardware required.
Administration without hardware	No additional hardware required.
Administered connection	Circuit packs: data line, digital line, BRI line, pooled modem, or DS1 Interface. Data modules: 7400 series voice terminals; 7500 series BRI voice terminals with ADM.
Agent call handling	No additional hardware required. CallMaster voice terminals are recommended for ACD agents.
Alphanumeric dialing	No additional hardware required.
Alternate facility restriction levels	No additional hardware required.
Alternate operations support system alarm number	No additional hardware required.
Announcement	See recorded announcement.
Announcements — intercept treatment	Hardware to support recorded announcement, if equipped. See recorded announcement.
Answer machine detection	Call classifier circuit pack (TN2182 or TN744B or later).

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
ATM port-network connectivity interface	<p>R7r only: ATM interface circuit pack (replaces the TN570B expansion interface), software-selected OC3c or STM-1 facility.</p> <p>Establishes calls between port networks as switched virtual connections (SVCs) based on Q.2931 signaling, as per the ATM forum UNI 3.1 specification. A private ATM network provides the inter-port network switching. Customers adopting this option no longer require switch node carriers and must replace all EIs with identical ATM circuit packs (hybrid EI- and ATM-based port network connectivity is not supported). DS1 converter remote-port networks are not supported.</p>
Attendant auto-manual splitting	No additional hardware required other than an attendant console.
Attendant automatic start	No additional hardware required other than an attendant console.
attendant backup Alerting	No additional hardware required other than an attendant console.
Attendant call waiting	No additional hardware required other than an attendant console.
Attendant calling of inward restricted stations	No additional hardware required other than an attendant console.
Attendant console	This feature requires a port on a TN722B, TN767, or TN464D circuit pack for each trunk to be assigned in the Trunk Group. A TN722B or TN767 provides 24 ports, and a TN464D provides 24 or 32 ports.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Attendant control of trunk group access	This feature requires a port on a TN754B, TN2181, or TN2224 digital line circuit pack for each attendant console to be assigned. For reliability, the attendant consoles should not be assigned to ports on the same TN754B circuit pack. For example, if 3 attendant consoles are to be provided, assign each console to a port on 3 different TN754Bs. If required, all attendant consoles may be assigned to ports on the same TN754B circuit pack.
Attendant crisis alert and other hospitality enhancements	No additional hardware required.
Attendant direct extension selection with Busy lamp field	Selector console.
Attendant direct trunk group selection	No additional hardware required other than an attendant console.
Attendant display	No additional hardware required other than an attendant console.
Attendant intrusion (call offer)	No additional hardware required.
Attendant override of diversion features	No additional hardware required.
Attendant priority queue	No additional hardware required.
Attendant recall	No additional hardware required.
Attendant room status	A DXS module is required.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
Attendant serial calling	No additional hardware required.
Audible message waiting	No additional hardware required.
Audio information exchange (AUDIX) adjunct voice mail system	<p>Voice: AUDIX machine and appropriate ports on analog line circuit packs.</p> <p>Data control link: R7si uses the processor interface (PI) RS-232 connector on the rear panel of the PPN control carrier and a data module. If the PI connector is not available, a port on a TN754 digital line circuit pack and a 7500 data module are required in addition to a PI link.</p> <p>R7r: port on packet gateway circuit pack.</p> <p>AUDIX networking requires ports on 1 or more digital line circuit packs.</p>
AUDIX (audio information exchange) embedded voice mail system	<p>DEFINITY AUDIX assembly resides in 5 consecutive port slots in all. Digital port mode does not require additional hardware for a data control link and supports only 16 AUDIX ports. Control link mode requires the same additional data control link hardware as an AUDIX adjunct listed above. The administration terminal can connect via: direct connection, modems, ADU, G3-MA, and G3-MT. Control link mode is not available with R7csi.</p>
Authorization codes	No additional hardware required.
Auto start and don't split	No additional hardware required.
Automatic callback	No additional hardware required other than an available feature button.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
Automatic alternate routing (AAR) and Automatic route selection (ARS)	No additional hardware is required for a stand-alone system. For a private network, additional tie trunks and tone detector circuit packs may be required. For a private network, additional tie trunks and tone detector circuit packs may be required.
Automatic call distribution (ACD) Does not require added hardware.	If needed: 1 port on an analog line circuit pack per auxiliary queue warning level lamp. Hardware to support recorded announcement or music-on-hold. See Recorded announcement and music-on-hold. Voice terminals (not 2500-type sets) are required for agents. If CMS is used, CMS hardware is required (see CMS).
Automatic circuit assurance	Voice terminal with display or a speech synthesis circuit pack.
Automatic incoming call display	715 BCS management terminal, display-equipped voice terminal, or voice terminal that can display information through an attached data terminal. The terminals require a PRI or DCS link; otherwise, they are station-to-station only.
Automatic transmission measurement system (ATMS)	TN771C maintenance/test circuit pack or later.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
Automatic wake-up	If voice prompting is used, a voice synthesizer circuit pack is needed. Each circuit pack has 4 ports to provide voice prompting. If voice synthesis announcements are used, 2 ports are reserved for announcements. AUDICHRON is used for customized recorded announcements. Journal printer and interface. For automatic wake-up with integrated announcement, the integrated announcement circuit pack is needed.
Barrier code aging	System printer and cable if a printed report is desired.
Basic call management system (BCMS) reports	System printer and cable if a printed report or a print schedule is desired.
Brazil block collect call	TN753B analog DID circuit pack vintage 1 or later, TN465B CO circuit pack vintage 1 or later, and TN464F digital line circuit pack vintage 9 or later.
Bridged call appearance — multi-appearance voice terminal	Multi-appearance voice terminal with available 2 light (red and green) buttons. A Call Coverage module or expansion module can provide up to 20 bridged call appearances.
Bridged call appearance — single-line voice terminal	Multi-button set with available 2 light (red and green) buttons. A Call Coverage module or expansion module can provide up to 20 bridged call appearances.
Busy tone disconnect	A busy tone disconnect adjunct and cables are required.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Busy verification of terminals and trunks	No additional hardware required. Need feature buttons on multi-button set.
Call-by-call service selection (PRI) feature)	R7si: DS1 Interface and PI or PACCON circuit packs. R7r: DS1 interface circuit pack. R7csi: The processor supplies the function and PI or PACCON are not required.
Call charge information	Same hardware as ISDN and CDR. See ISDN-PRI and Call Detail Recording (CDR).
Call coverage	No additional hardware is required.
Call coverage of calls redirected off-net	TN2182 vintage 4 or later tone-clock-tone detector and call classifier circuit pack and/or TN744C vintage 3 or later call classifier-detector circuit pack required.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
<p>Call detail recording (CDR)                      Hardware depends on the type of CDR used</p>	<p>All except R7r: a CDR output device can connect to the RS-232 port on the processor circuit pack to eliminate the need for data modules for the output devices below.                      R7r: a CDR output device connects to either:</p> <ol style="list-style-type: none"> <li>1. Packet data circuit pack cross-connected to a port on a digital line circuit pack connected to a second data line circuit pack port and then to an ADU, or</li> <li>2. Packet data circuit pack cross-connected to a port on a digital line circuit pack connected to a BRI line circuit pack connected to a 7500 Data Module or a digital line connected to a data module.                      Reused equipment: printer, PC, or tape unit.                      94A LSU — data module connected to a digital line circuit pack port, or a modem connected to a port on an analog line circuit pack with a pooled modem. Host computer — Private line terminated at the system with a data module. A private line modem is used if off-premises (out-of-building).</li> </ol>
<p>Call forwarding all calls</p>	<p>No additional hardware is required.</p>
<p>Call forward busy/                      don't answer</p>	<p>No additional hardware is required.</p>

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Call management system (CMS)	CMS adjunct and R7si: port on a digital line circuit pack and a PI. R7r: port on a packet gateway circuit pack and, depending on distance, a 105B IDI or DSU. Alternately, a port on a packet gateway is connected to a data module. The data module is connected to an administered connection through a port on each of a pair of digital line circuit packs and terminates at the CMS. R7csi not available.
Call park	No additional hardware required.
Call prompting	Each call prompting announcement requires a port on an integrated announcement circuit pack or an external announcement facility. If an external announcement facility is used, each announcement requires a port on an analog line circuit pack. The call-classifier or tone-clock circuit pack is required for touch-tone receivers to collect digits input by callers.
Call vectoring	Announcement hardware is required. See Call Prompting.
CallVisor ASAI	A port on a BRI line circuit pack or DEFINITY LAN gateway connected to the CallVisor adjunct. See ISDN-BRI.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
Calling party number/billing number (CPN/BN)	R7si: an interface link (requires a PI or PACCON circuit pack) and a data module are assigned. Alternately, a port is used on a digital line circuit pack instead of a data module. The link is administered on the system's processor channel assignments form. The link is used as an interface to an ISDN Gateway adjunct to support CPN/BN. Optional ASAI Link (see ASAI for more information). Display terminals also require ACD related hardware. See the ACD feature. G3V4 and later systems do not support ISDN Gateway.
Call pickup (includes call pickup alerting)	No additional hardware required.
Call waiting termination	No additional hardware required.
CAS (branch or main)	A tie trunk circuit pack for the release link trunk. Alternately, the PRI DS1 interface circuit pack can be used for the release link trunks of the CAS network.
Class of restriction	No additional hardware required.
Class of service	No additional hardware required.
CDR call splitting, CDR privacy	Terminal and data module.
CDR multimedia applications server interface (MASI)	No additional hardware required.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Code calling access	Loudspeaker paging equipment and 1 port on an auxiliary trunk circuit pack per zone, can be shared with the loudspeaker paging access feature.
Conference - attendant	No additional hardware required.
Conference - terminal	No additional hardware required.
Conference/intrusion tones	No additional hardware required.
Constellation voice/ data terminal support	A 6544 cluster controller is required to provide data connection to the host. One of the following adjunct voice terminals is required: 7401D, 7406D, 602A1, or 603D1. The adjunct voice terminal can function as a stand-alone station even if the Constellation is powered down.
Consult	No additional hardware required.
Cordless telephone support	An appropriate analog line or hybrid line circuit pack is used for the cordless set.
Coverage callback	No additional hardware required.
Coverage incoming call Identification	No additional hardware required other than available feature button on a multi-button set.
Customer provided equipment (CPE) alarm	A customer-provided alarm such as a lamp, bell, or other device.
Czech Republic of Slovakia Digital MFC	Digital tie (DS1 interface 24/32) and call classifier circuit packs.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
D-channel backup	PRI DS1 interface circuit pack and PRI facilities. See ISDN-PRI.
Data call setup	Each DCP data module requires 1 port on a digital line circuit pack. A data module shares the port with the associated voice terminal. Reused equipment: each personal terminal 510D or 515 BCT requires 1 port on a digital line circuit pack for shared use of voice and data. Each 7400, 7401D, 7404D, 7406D, 7407D or 64xx/84xx/94xx voice terminal requires 1 port on a digital line circuit pack for shared use of voice and data. Each BRI data module requires 1 port on a BRI line circuit pack. Each 7505D w/ADM, 7506D with ADM, 7507D with ADM, 8510D with ADM, or 8520D with ADM terminal requires 1 port on a BRI line circuit pack for shared use of voice and data. Each 7500 or 8500 data module requires 1 port on a BRI line circuit pack for data. Each modem requires 1 port on an analog line circuit pack. Modem pooling requires either a modem pool circuit pack or a port on a digital line circuit pack with a data module, and 1 port on an analog line circuit pack with analog modem for each conversion resource. Keyboard dialing to off-premises (out of building) data endpoints requires call progress tone detector ports on a tone detector circuit pack.
Data hot line	No additional hardware required.
Data only off-premises extensions	Data module and 1 port on a TN754B, TN2181, or TN2224 digital line circuit pack.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Data privacy	No additional hardware required.
Data restriction	No additional hardware required.
DCS features (All)	All except R7csi which uses DCS + and R7r: a port on a packet gateway circuit pack and a data module or DSU are required. A tie trunk circuit pack or DS1 circuit pack for the tie trunks between switches.
DCS plus	PRI D-channel link: a PRI DS1 interface circuit pack is required and, if required by the network provider, 1 CSU per span.
DCS over BX.25	R7si, R7r: A tie trunk circuit pack for the tie trunks between switches. R7si: A port on a TN765 PI circuit pack. R7r: A port on a TN577 packet gateway circuit pack and a data module or DSU. R7csi: Not available.
DCS under ISDN	R7si, R7r: A port on a DS1 interface. A tie trunk circuit pack for the tie trunks between switches. R7 csi: Not available.
DCS+ (DCS over ISDN)	R7si, R7r: A port on a DS1 interface. A tie trunk circuit pack for the tie trunks between switches. R7 csi: Not available. R7si: TN778 PACCON circuit pack.
Default dialing	No additional hardware required.
DEFINITY extender	DEFINITY DCP extender and external data module required to connect to DCP display stations such as the 8400-series DCP terminals (2-wire mode only).

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
DEFINITY wireless business system DEFINITY forum personal communications manager	TN789 radio controller and DS1 interface circuit packs.
Demand print	A message server adjunct (MSA) equipped with appropriate messaging server software and associated printers.
Dial access to attendant	No additional hardware required.
Dial plan	No additional hardware required.
Dialed number identification service (DNIS)	For non-ISDN type calls, a port on a DID Trunk or DS1 interface circuit pack to support MEGACOM 800 DNIS. Also requires the answering voice terminals be equipped with a display if display of trunk information is desired.
Digital multiplexed interface (DMI)	One PRI DS1 interface circuit pack per 24 or 32 DMI trunks (depends on the circuit pack).
Direct agent announcement	Except for integrated announcements, each announcement requires announcement equipment plus a port on an analog line circuit pack. For music on delay announcement, a music source and a port on an auxiliary trunk circuit pack are required.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Direct department calling and uniform call distribution (no added hardware required)	If needed: 1 port on an analog line circuit pack per queue warning level lamp. Hardware for support of recorded announcement, or music-on-hold if there is to be a delay announcement or music. See Recorded Announcement and Music-on-Hold.
Distinctive ringing	No additional hardware required.
Do not disturb	If voice prompting is used, 1 or more ports on a voice synthesizer circuit pack.
DS1 integrated CSU	DS1 interface circuit pack (TN767D or TN464E and later) and integrated CSU module.
DS1 tie trunk service	One DS1 interface circuit pack is required per 24 voice-grade DS1 tie trunks or per 23 AVD DS1 tie trunks. E1-32 channel is not supported in the United States and Canada.
Dual DCP I-channels	Refer to AUDIX for hardware requirements.
DXS button enhancements	Attendant console with DXS console addition.
ECMA conformance in ISDN-PRI	DS1 Interface (24/32) circuit pack.
EIA Interface	One data line circuit pack per 8 EIA interfaces, and 1 data module per port on the circuit pack are required.
Emergency access to the attendant	Requires a 301A Basic or 302A enhanced attendant console if a unique emergency tone is required at the console; otherwise, normal ringing is heard for an emergency call and the attendant display flashes.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Enhanced voice terminal display	8400-series DCP terminal, 603E1 CallMaster III, or 9400-series DCP terminals are required. The 9400-series terminals are for European use only. 6400-series DCP terminals are available for R7 and later.
ESPA radio -paging	European standard paging access equipment required.
Extended user administration of redirected calls	No additional hardware required.
External device alarming	No additional hardware required.
Facility busy indication	No additional hardware required other than a feature button with a light.
Facility test calls	No additional hardware required.
Fiber link administration	For a public network, a CSU. For a campus network, a digital data module+ or similar device.
Go to cover	No additional hardware required.
Hold	No additional hardware required.
Hold - automatic	No additional hardware required.
Hot line service	No additional hardware required.
Hunt group	No additional hardware required.
Facility and non-facility associated signaling	See ISDN-BRI.
Flexible billing	An ASAI adjunct processor is required.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Generalized MFC	DS1 interface 24/32 and call classifier circuit packs.
German — digital	DS1 interface 24/32 for German digital trunks (such as PRI).
Greece MFC	DS1 interface 24/32 and call classifier circuit packs.
Inbound call management (ICM)	ASAI hardware (See ASAI feature). Use of ACD feature required (see ACD feature).
Individual attendant access	No additional hardware required.
Integrated announcement	See Recorded Announcement.
Integrated directory	If the terminal is connected to an associated data terminal, the 7404D voice terminal requires an optional Messaging Cartridge.
Intercept treatment	Requires announcement equipment and 1 port on an analog line circuit pack for each announcement and for each external analog announcement device, or an AUX trunk port for each external AUX trunk device. See Recorded Announcements. A TN750C Announcement circuit pack can provide up to 256 announcements. Intercept treatment can be administered to the attendant console.
Intercom - automatic	No additional hardware required.
Intercom — dial	No additional hardware is required.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
Internal automatic answer (IAA)	All multi-function voice terminals with speakerphone or headset may be used except ISDN-BRI voice terminals plus a port interface on a Hybrid Line circuit pack.
Inter-PBX attendant calls	Tie trunk group between the branch and main locations.
IP trunk	<p>All: TN802 MAPD IP Trunk circuit pack, TN802 External Cable Assembly, three adjacent, vacant slots in the carrier, one BRI line circuit pack for up to 12 endpoints (point-to-point 4-wire T interface or 2-wire U interface) or one BRI line circuit pack for up to 24 endpoints (passive bus), one TN2185 BRI trunk circuit pack for up to eight 2B+D interfaces.</p> <p>R7csi: TN556C ISDN-BRI S/T-NT (does not support TN2198).</p> <p>R7si: TN570 expansion interface circuit pack (for system connectivity in multiple port network systems), maintenance/test circuit pack in the PPN (for packet applications), maintenance/test circuit pack in each additional EPN (for critical reliability systems).</p> <p>R7r: Maintenance/test circuit pack in the PPN (for packet applications), maintenance/test circuit pack in each additional EPN (for critical reliability systems).</p>
ISDN-BRI line	<p>All: BRI line circuit pack</p> <p>R7si: a packet interface circuit pack for PRI over the packet interface, TN778 packet-control (PACCON) circuit pack.</p>

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
ISDN-BRI trunk	One BRI trunk circuit pack for up to eight 2B+D interfaces. R7si: TN778 PACCON.
ISDN-PRI	One PRI DS1 (T1/E1) interface circuit pack provides a signaling link and up to 23 ISDN-PRI trunk group members and up to 30 for E1 channels. R7si: a processor interface circuit pack for PRI over PI, a packet control circuit pack for PRI via the LAN bus and PACCON. R7r, R7csi: no additional hardware beyond DS1 interface.
Last number dialed	No additional hardware required.
Leave word calling	Display terminal to store and retrieve the LWC message.
Line lockout	No additional hardware required.
Listed directory numbers	No additional hardware required.
Look ahead interflow	No additional hardware is required. Interconnecting facilities must be ISDN-PRI with no interworking. Calls that interwork may interflow successfully but the ability to do so on an intelligent basis is lost, as is the look ahead interflow DNIS information.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
Loudspeaker paging access	Requires loudspeaker paging equipment and 1 port on an auxiliary trunk circuit pack for each individual paging zone port (9 maximum). Paging interface equipment consisting of a 909-type voice coupler adapter (only if equipment is not FCC-registered) and a 24-volt power supply, per zone. This hardware can be shared with the code calling access feature. If PagePac paging system equipment is used, 1 port on a CO trunk circuit pack, or 1 port on an analog line circuit pack, or 1 port on an auxiliary trunk circuit is used, depending on the PagePac arrangement.
Loudspeaker paging access - deluxe	Loudspeaker paging equipment and 1 port on an auxiliary trunk circuit pack per zone. Paging interface equipment consisting of a 909-type voice coupler adapter (only if equipment is not FCC- registered) and a 24-volt power supply, per zone. This hardware can be shared with the code calling access feature.
Malicious call trace	A display set and optional CPE recording device.
Manual message waiting	No additional hardware required.
Manual originating line service	No additional hardware required.
Manual signaling	No additional hardware required.
MERLIN/system 25 - voice terminal support (731xH Series)	No additional hardware required.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
Messaging server interface	R7si requires a processor interface circuit pack. A port on a digital line circuit pack is required to provide the MS interface. This application also requires an ADU and a port on a data line circuit pack or a modem and an analog line circuit pack. R7r: The BX.25 connection requires a PGATE circuit pack. R7csi: Not available.
Mexico 2-way	DS1 interface 24/32 and call classifier circuit packs.
MFC enhancements	DS1 interface 24/32 and call classifier circuit packs.
MF shuttle	DS1 interface 24/32 and call classifier circuit packs.
MF signaling	No additional hardware required.
Misoperations handling	No additional hardware required.
Modem pooling	One pooled modem circuit pack per 2 integrated conversion resources provided. Each combined conversion resource requires 1 port on the digital line circuit pack, 1 port on an analog line circuit pack, and an analog modem and data module or 7400 terminal.
Multi-appearance preselection and preference	Multi-button electronic telephone (MET).
Multimedia applications server interface (MASI)	DS1 interface 24/32 and call classifier circuit packs.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Multimedia call appearances	Requires no additional hardware.
Multimedia call early answer on vectors and stations	Requires no additional hardware.
Multimedia call handling (MMCH)	Multimedia interface circuit pack and multimedia voice conditioner circuit pack to provide multimedia call processing. A digital line port and BRI data port per multimedia complex.
Multiple call handling on request or forced	A multi-appearance set is required.
Multimedia call redirection to MM endpoint	Requires no additional hardware.
Multimedia data conferencing via expansion services module (ESM)	ESM adjunct device (terminates T.120 protocol and provides data conference control and data distribution), TN2207 modified PRI circuit pack, TN787 multimedia interface circuit pack, a cable to connect the TN2207 to the TN787
Multimedia hold, conference, transfer, and drop	Requires no additional hardware.
Multimedia multiple-port network	Requires no additional hardware.
Multimedia queuing with voice announcement	Requires no additional hardware.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
Multimedia service-link architecture support of voice/data mode	Requires no additional hardware.
Music-on-hold access	Music source and 1 port on an auxiliary trunk or analog line circuit pack are required. A 909-type voice coupler is required if the system is not FCC-registered (United States only). A music source and 1 port on a TN746B or TN468B or later Analog Line circuit pack. A KS23395, L4 Music-on-Hold interface to convert a loop start port into a Music-on-Hold port. The port must be administered for this purpose. Also, a 909-type voice coupler is required if the music source is not FCC-registered (United States only). France: a port on the TN2183 Analog Line circuit pack and the 122A Music-on-Hold interface unit (wall-mounted).
Names registration	A PMS can connect through a data module and a port on a digital line circuit pack, or through an ADU and a port on a data line circuit pack. A journal printer requires a data module and a port on a digital line circuit pack, or an ADU and a port on a data line circuit pack.
National ISDN-1	DS1 Interface circuit pack.
Native support of 6402D display terminal	Requires no additional hardware.
Network access — public	One port on a CO or DIOD trunk circuit pack or 1 port on a DS1/E1 interface circuit pack or tie trunk circuit pack.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Night Service - hunt group, night console service and night station service	No additional hardware required other than a button to activate and deactivate the feature.
Night service — trunk answer from any station	Ringling device and 1 port on an analog line circuit pack.
Night service - trunk group	No additional hardware required other than a button to activate and deactivate the feature.
NT interface on TN556B/C	Requires no additional hardware.
NT QSIG peer protocol	Requires no additional hardware.
Off-premises data extensions	Trunk data module or DCP extender and 1 port on a digital line circuit pack or DS1 circuit pack.
Off-premises station	Cross-connecting capabilities and 1 port on an analog line circuit pack or DS1 circuit pack.
PC application software translation exchange (PASTE)	A port on a digital line or BRI line circuit pack connected through a Personal Computer configured with the PC/PBX, PC/ISDN, or PassageWay circuit pack and application software to an appropriate voice terminal.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
PC interface (hardware varies depending on the configuration group used)	<p>Group 1: 7404D voice data station, 31815 PC cartridge, standard EIA RS-232 connecting cables, an IBM-compatible PC (6300 with DOS 2.11 or later, 6300 Plus with DOS 3.1 or later, PC/XT with PC-DOS 2.0 or later, or PC/AT with PC-DOS 3.1 or later). 384K or more of RAM is recommended on PCs running integrated software applications.</p> <p>Group 2: 7400-series DCP terminals, PC/PBX interface card, an IBM-compatible PC (6300 or 6300 Plus with DOS 3.1 or later, or PC/XT with PC-DOS 3.1 or later). 448K or more of RAM is recommended on PCs running integrated software applications.</p> <p>Group 3: 7500-series ISDN-BRI Voice Terminal, up to 4 PC/ISDN expansion cards, an IBM-compatible PC (6300, 6300 Plus, PC/XT, PC/AT, PS/2, or Compaq), and DOS 3.1 or later.</p>
PC/PBX connection	A port on a digital line circuit pack for each PC/PBX connected.
Personal central office line (PCOL)	A port on a central office trunk circuit pack for each trunk assigned as a PCOL.
Personal station access	Digital line ports and a digital voice terminal.
Personalized ringing	No additional hardware required.
PMS (property management system)	.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
Power Failure Transfer	<p>One emergency transfer panel per 5 or 6 trunks assigned to Power Failure Transfer, depending on panel used. The following panels are available:</p> <ul style="list-style-type: none"><li>■ 808A Panel — Serves up to 5 failure transfer terminals. The unit provides automatic ground start or loop start</li><li>■ Z1A Panel — Serves up to 6 power failure transfer terminals. A ground-start key is required at each preselected voice terminal when ground-start trunks are used</li></ul>
PRI Converter	<p>DASS - 1 TN464F DS1/E1 circuit pack and 1 TNCCSC-1 circuit pack. DPNSS - 1 TN464F DS1/E1 circuit pack and 1 TNCCSC-2 circuit pack. BRI - 1 TN464F DS1/E1 circuit pack and 1 TNPRI/BRI circuit pack.</p>
Priority Calling	No additional hardware required.
Privacy - Attendant Lockout	No additional hardware required.
Privacy - Manual Exclusion	No additional hardware required.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — *Continued***

Feature	Hardware
Property Management System (PMS)	For all except R7r, either: <ol style="list-style-type: none"> <li>1. Using a digital line port and a data module, or</li> <li>2. Using a digital line port and an ADU</li> </ol> For R7r, either: <ol style="list-style-type: none"> <li>1. A packet data circuit pack cross-connected to a port on a data line circuit pack, connected to a second data line circuit pack port and then to an ADU, or</li> <li>2. A packet data circuit pack cross-connected to a port on a data line circuit pack connected to either a BRI line circuit pack connected to a 7500 Data Module or to a digital line connected to a data module. Data line circuit pack with an ADU or a data module and port on a digital line circuit pack.</li> </ol>
Public Network Call Priority	No additional hardware required.
Pull Transfer	No additional hardware is required in a stand-alone configuration. In a network environment, the TGU/TGE tie trunks (TN497) are the only trunks that support the flash signaling necessary to complete the pull transfer operation between systems.
QSIG Global Networking	Same as ISDN-PRI. See ISDN-PRI.
QSIG call offer	

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
QSIG call completion	No additional hardware is required.
QSIG called/busy name display and called/busy number ID	No additional hardware is required.
QSIG call named ID	No additional hardware is required.
QSIG manufacturers specific information (MSI)	No additional hardware is required.
QSIG path retention	No additional hardware is required.
QSIG to best ISDN support	No additional hardware is required.
Queue Status or Queue Status Indication	One port on an analog line circuit pack for each auxiliary queue warning lamp.
Reason Codes	No additional hardware is required.
Recall Signaling	No additional hardware required.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
<p>Recorded Announcement</p> <p>(Announcements are provided by a port on an analog line circuit pack, a port on an auxiliary trunk circuit pack, or an integrated announcement circuit pack)</p>	<p>All except R7r: each analog announcement has announcement equipment, such as a unit configured with an analog interface, and 1 port on an analog line circuit pack. These systems can also use an announcement unit configured with an auxiliary trunk interface and port on an auxiliary trunk circuit pack. Each integrated announcement, accessed by a call, requires 1 port on an integrated announcement circuit pack. Up to 128 announcements can be recorded on the integrated announcement circuit pack. A network control circuit pack restores messages after a power failure.</p> <p>R7r: each analog announcement has announcement equipment, such as a unit configured with an analog interface, and 1 port on an analog line circuit pack. Can also use a unit configured with an auxiliary trunk interface and 1 port on an auxiliary trunk circuit pack. Each integrated announcement, accessed by a call, has 1 port on an integrated announcement circuit pack. Up to 256 announcements can be recorded. Requires a system access port resource (packet data and data line combination) to save and restore announcements to the integrated announcement circuit pack(s).</p>
<p>Recorded Telephone Dictation Access</p>	<p>Telephone dictation machines and, depending on type of machine, 1 port on an analog line circuit pack or 1 port on a auxiliary trunk circuit pack for each machine assigned.</p>

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
Release Link Trunk Group	Requires a port in a TN722B, TN767, or TN464D circuit pack for each trunk to be assigned in the trunk group. A TN722B or TN767 provides 24 ports, and a TN464D provides 24 or 32 ports.
Remote Access	Dedicated trunks, such as a dedicated port on a CO trunk, or an extension number accessed by a tie trunk, DID or DIOD port circuit, if remote access is not available via DID.
Remote administration	For on-premises remote: A data module and associated ADU and system access protocol or data module and a terminal. For off-premises remote: A pooled modem circuit pack on site, or access to the RMATS modem. For off site, a data terminal modem and communication emulation software in a PC.
Remote call coverage	No additional hardware required.
Restricted/unrestricted call lists	No additional hardware required.
Restriction - controlled	No additional hardware required.
Restriction - fully restricted service	No additional hardware required.
Restriction - miscellaneous terminal	No additional hardware required.
Restriction - toll	No additional hardware required.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Restriction -voice terminal: inward, manual terminating line, origination, outward, public and termination	No additional hardware required.
Ringback queuing	No additional hardware required.
Ringling _abbreviated and delayed	No additional hardware required.
Ringer cutoff	No additional hardware required other than available feature buttons.
Rotary dialing	No additional hardware required.
Russia MFR for ANI	DS1 interface 24/32 and call classifier circuit packs.
R2-MFC	Analog or digital trunk and call classifier, such as a TN2182 or a TN744B or greater suffix circuit pack.
Security violation notification	Voice terminal with a display. Security violation notification via announcements requires the integrated announcement circuit packs.
Send all calls	No additional hardware required.
Software defined data network	No additional hardware required unless a tie trunk is used. If so, 1 tie trunk circuit pack or 1 DS1 circuit pack.
Spain MFE	DS1 Interface 24/32 and call classifier circuit packs.
Station hunting	No additional hardware required.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Station security code	No additional hardware required.
Subnet Trunking	Additional call progress tone detector ports on tone detector circuit packs, if routing patterns containing "wait" symbols are used heavily and if dial tone detection is preferable to waiting for interval time-out.
Survivable remote EPN (SREPN)	Enhanced single-carrier cabinet, TN790B processor and TN794 or TN2400 (upgrade only) circuit pack, TN2301 circuit pack, TN775C circuit pack, 9823A/B fiber optic transceivers, TN1654 DS1 converter circuit pack for T1, fiberoptic cables  The SREPN allows a DEFINITY R7r EPN to provide service to the customer when the link to the main R7r processor fails or is severed.
SVN Refer Call with Announcements	Integrated announcement circuit pack.
Switch Based Bulletin Board	No additional hardware required.
System Administration Report Scheduler	See report scheduler and system printer.
Telecommuting Access	Requires a DEFINITY Extender at both the home site and the office location (the location of the DEFINITY ECS).
Temporary Bridged Appearance	No additional hardware required.
Tenant Partitioning	No additional hardware required.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Terminal Translation Initiation	Display/voice terminal and associated data module required to dial into the system to activate the extension.
Terminating Extension Group	No additional hardware required.
Timed Reminder and Attendant Timers	No additional hardware required.
Transfer	No additional hardware required.
Transfer — Outgoing Trunk to Outgoing Trunk (with Security)	Feature can be activated for trunk groups with trunks assigned to the following trunk circuit packs: TN747B Central Office Trunk, TN760C Analog Tie Trunk, and TN722B, TN767, or TN464C DS1 circuit pack.
Trunk Flash	No additional hardware required.
Trunk Group Busy/Warning Indicators to Attendant	No additional hardware required other than available feature buttons.
Trunk Identification by attendant	No additional hardware required other than available feature buttons.
Trunk to Trunk Transfer	No additional hardware required.
Uniform Call Distribution	Requires an analog line circuit pack for each auxiliary queue warning lamp. An announcement circuit pack is recommended if calls will be sent to a call queue.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
Uniform dial plan	No additional hardware is required except as needed for DCS. See DCS feature. Tie lines are required if system-to-system communication via DCS is not over the Public Switched Telephone Network (PSTN).
United Kingdom (UK) Networking (Name/Number)	DS1 Interface - T1, 24 Channel - E1, 32 Channel circuit pack.
VDN of origin announcement	Integrated announcement circuit pack.
Visually impaired attendant service (VIAS)	At least 1 TN433 (Italy) or TN457 (United Kingdom) speech processor circuit pack is required. The TN725B (United States) speech processor circuit pack does not support VIAS.
Voice Conditioner Circuit Pack	Saronix 66.667-MHz oscillators (replace Pletronics 66.667-MHz oscillators)
Voice mail system via mode code	A port on an existing analog circuit pack.
Voice message retrieval	Speech synthesizer circuit pack, which has 4 ports to provide voice message retrieval. Traffic engineering is required to determine the number of circuit packs.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

<b>Feature</b>	<b>Hardware</b>
Voice response integration (VRI)	An analog line or DS1 interface circuit pack (line side T1/E1). The TN744 call classifier circuit pack is not required by call prompting for the returning of digits in-band from CONVERSANT to the DEFINITY system; a TN748 tone detector is used. Basic call vectoring must be enabled to use <b>converse-on</b> vector step. Call prompting must be enabled.
Voice terminal alerting options	No additional hardware required.
Voice terminal display	Display-equipped voice terminal that can be a: <ul style="list-style-type: none"><li>■ Digital terminal requiring 1 port on a digital line circuit pack</li><li>■ BRI terminal requiring 1 port on a BRI circuit pack</li><li>■ Hybrid terminal requiring 1 port on a hybrid line circuit pack</li></ul>
VuStats	Terminal with display
Wideband switching	One DS1 interface circuit pack (TN464C or later) for line-side and another for network facilities. Same as ISDN-PRI. See ISDN-PRI. Also requires wideband data modules.

*Continued on next page*

**Table 50. Additional Hardware to Use Features — Continued**

Feature	Hardware
World class BRI	Same as ISDN-BRI. See ISDN-BRI.
World class Tone detection	Tone Detection Modes 1, 2, and 3 are meaningful only if the tone detectors are TN420B or greater or TN2182B, or TN744D. Modes 4 and 5, the tone validation timer, and the interdigit pause are meaningful only if the tone detectors are TN744C, TN420C, or TN2182. Tone detection for countries using the same tone plan as the United States is also available using an alternate tone detector. The TN420B only recognizes tone detection modes 1, 2, and 3. TN420C, TN744, and TN2182B recognize modes 1, 2, 3, 4, and 5, and tone validation and interdigit pause. TN2182 and TN744C recognize mode 6. TN748C provides precise tone detection for the United States tone plan.
World class gone Generation	Any tone generator circuit pack can be used. Many circuit packs are capable of producing all North American and international tones including 440 Hz at 17.25 dB.

## **Allocation of Buttons**

The allocation of buttons in [Table 3](#) is by station type. The minimum button capacity was calculated by administering each terminal with the default number of call appearances and adding a non-call appearance/bridged-appearance button to the highest allowed button for every possible screen.

The maximum button capacity was calculated by administering each terminal with the default number of call appearances, then adding additional call appearances as the highest allowed button number for each SAT screen which contained buttons.

**Table 3. Allocation of Buttons by Station Type**

Station Type	Typical Button Units R7csi, si		Typical Button Units R7r
	Minimum	Maximum	
Analog sets: 500, 2500, 6200, 7101A, 7103A, 7104A, 8110, DS1SA, and DS1FD	76	76	76
Other Analog Ports <sup>1</sup> , Wired Spare Ports, and Non-wired Spare Ports	76	76	76
10MET set — 10 buttons	64	64	64
20MET set — 20 buttons	184	184	184
30MET set — 30 buttons	304	304	304
Terminal — 510 BCT	388	400	388
Terminal — 515 BCT	280	364	
602A1 Callmaster I	412	496	412
603A1 Callmaster II	412	448	412
603D1 Callmaster III	412	448	412
603E1 Callmaster III	412	448	674
606A1 Callmaster IV	952	1552	
Digital set — 6402	184	184	—
Digital set — 6408	112	112	—
Digital set — 6408D	448	508	—
Digital set — 6408D+	448	508	—
Digital set — 6416D+	544	700	—
Digital set — 6416D+w/XM24B expansion module	832	1276	—
Digital set — 6424D+	640	892	—
Digital set — 6424D+w/XM24B expansion module	928	1468	—
Voice/data — 6538	112	112	—

*Continued on next page*

**Table 3. Allocation of Buttons by Station Type — Continued**

Station Type	Typical Button Units R7csi, si		Typical Button Units R7r
	Minimum	Maximum	
Hybrid set — 7303S	124	124	124
Hybrid set — 7305S	412	412	412
Hybrid set — 7309H	124	124	124
Hybrid set — 7313H	124	124	—
Hybrid set — 7314H	268	268	—
Hybrid set — 7315H	364	448	—
Hybrid set — 7316H	412	412	—
Hybrid set — 7317H	508	592	—
Digital set — 7401D/7401+	112	112	112
Digital set — 7403D	124	124	124
Digital set — 7404D	76	76	76
Digital set — 7404D w/display	232	268	232
Digital set — 7405D	412	412	412
Digital set — 7405D w/display	568	652	—
Digital set — 7405D w/cov	652	652	—
Digital set — 7406D	340	340	340
Digital set — 7406D w/display	412	436	412
Digital set — 7406+	340	340	340
Digital set — 7406+ w/display	412	436	412
Digital set — 7407D	568	652	568
Digital set — 7407+	568	652	568
Digital set — 7410D	124	124	102
Digital set — 7410+	124	124	124
Digital set — 7434D	412	412	412
Digital set — 7434D w/display	568	940	—
Digital set — 7434D w/call coverage module	652	652	652
Digital set — 7444D	568	940	568

*Continued on next page*

**Table 3. Allocation of Buttons by Station Type — Continued**

Station Type	Typical Button Units R7csi, si		Typical Button Units R7r
	Minimum	Maximum	
Digital set — 8403B	184	184	204
Digital set — 8405B/B+	64	64	124
Digital set — 8405D/D+	352	376	352
Digital set — 8410B	124	124	124
Digital set — 8410D	352	436	124
Digital set — 8411B	124	124	124
Digital set — 8411D	352	436	352
Digital set — 8434 D	676	1048	676
Digital set — 8434 with XM24B			
Expansion Module	964	1552	—
Digital set — 9403B	184	184	184
Digital set — 9410D	352	436	124
Digital set — 9434D	676	1048	676
Basic attendant console (302A, 302B)	412	—	—
Enhanced attendant console (302C)	—	—	—
Attendant selector console (26B1)	—	—	—
ISDN-BRI			
— 7505D	232	288	232
— 7506D	304	444	304
— 7507D	532	107	532
— 8503D	64	64	64
— 8510T w/display	232	372	232
— 8520T w/display	352	692	352

*Continued on next page*

**Table 3. Allocation of Buttons by Station Type — Continued**

Station Type	Typical Button Units R7csi, si		Typical Button Units R7r
	Minimum	Maximum	
Wireless 9601A <sup>2</sup>	—	—	—
ADJLK <sup>3</sup>	4	4	4
ADX8D	568	652	568
ADX16A	76	76	76
ADX16D	568	652	568
ASAI	4	4	—
CP9530	76	—	—
DIG800	568	652	—
K2500	76	76	—
MDC9000	52	64	—
MDW9000	52	64	—
PC	482	580	—
VRU <sup>4</sup>	76	76	—
VRUFD	62	76	—
VRUSA	62	76	—
WCBRI	24	24	—
105TL	28	28	—

1. Includes music-on-hold, recorded announcement, and loudspeaker paging.
2. The radio controller supports 24 simultaneous calls and 2 wireless fixed bases.
3. Needs ASAI interface and ASAI prop adjunct links turned on in “sys-param customer options.”
4. Needs DTFMF turned on in “sys-param customer options.”

The following notes apply to the button and data module records in [Table 3](#):

- Any DCP station (except 8400-series) can add a 7400B, requiring 1 data module record.
- A data module can be added to a 7403D or 7405D, requiring 1 data module record.
- A data module (ADM-T) can be added to a 7505D, 7506D, or 7507D, requiring 1 data module record.
- An ISDN-BRI endpoint record is required for each distinct ISDN-BRI endpoint. Thus each voice-only, data-only, or voice-data endpoint uses 1 of these records.

## Cabling Distances

When the system layout is being determined, consider the maximum cabling distances to the system cabinet. Table 4 lists the allowable intra-premises cabling distances. If using mixed wire sizes, use the table columns for 26 AWG (#4) (0.14 mm<sup>2</sup>) wire. These distances are based on a minimum of -42.5 VDC at the equipment connecting to the system.

**Table 4. Allowable Intra-premises Cabling Distances**

Equipment	24 AWG Wire (0.26 mm <sup>2</sup> )		26 AWG Wire (0.14 mm <sup>2</sup> )	
	Feet	Meters	Feet	Meters
Enhanced attendant console (302C1)				
With selector console				
Phantom powered	800	244	500	152
Locally powered	5000	1524	3400	1037
Without selector console				
Phantom powered	1400	427	900	274
Locally powered	5000	1524	3400	1037
510D or 515 terminals	3000	914	2200	670
513, 610 BCT, 615 MT, 715, 2900/715, 715 BCS-2, 4410 or 4425 terminals (see also "data modules" or "EIA interface"). Maximum distance from terminal to data module or ADU	50	15.2	50	15.2

*Continued on next page*

**Table 4. Allowable Intra-premises Cabling Distances — Continued**

Equipment	24 AWG Wire (0.26 mm <sup>2</sup> )		26 AWG Wire (0.14 mm <sup>2</sup> )	
	Feet	Meters	Feet	Meters
Data modules:				
Z702AL1-DSU data module base	5000	1524	4000	1219
Z703AL1-DSU data module base	5000	1524	4000	1219
7404D data module	5000	1524	4000	1219
DTDM	3400	1037	2200	670
High-speed data link	5000	1524	4000	1219
MTDM	5000	1524	4000	1219
3270 data module	5000	1524	4000	1219
7400A/B data module	5000	1524	4000	1219
8400B Plus data module	5000	1524	4000	1219
EIA interface (data line circuit pack and ADU):				
19.2 kbps	5000	1524	4000	1219
9.6 kbps	7000	2130	6000	1827
4.8 kbps	12000	3654	10000	3050
2.4 kbps	20000	6100	16000	4875
1.2 kbps	40000	12200	30000	9150
0.3 kbps				
Voice terminals:				
Analog				
8-port circuit pack (TN742 or TN769), on-premises or out-of-building — same premises (notes 1 and 2)				
500- or 2500- type (note 3)	20000	6100	13000	3962
7100 series	15200	4633	10000	3050
8100 series on/off premises and out of building	15200	4633	10000	3050

*Continued on next page*

**Table 4. Allowable Intra-premises Cabling Distances — Continued**

Equipment	24 AWG Wire (0.26 mm <sup>2</sup> )		26 AWG Wire (0.14 mm <sup>2</sup> )	
	Feet	Meters	Feet	Meters
16-port circuit pack (TN746/B or TN2183), on-premises only no out-of-building or bridging <sup>1</sup> 500 or 2500 type terminals without adjuncts	3100	945	2000	610
8100 series	3000	914	2000	610
8100 series	3000	914	2000	610
16-port circuit pack (TN746/B or TN2183), on-premises or out-of-building, same premises <sup>1, 2</sup> 500 or 2500 type <sup>3</sup>	20000	6100	13000	3962
7100 series	15200	4633	10000	3050
8100 series	15200	4633	10000	3050
Hybrid (TN762) 7300 series (Phantom powered)	1000	305	750	229
7300 series (with Local power)	2000	610	2000	610
Digital (TN754B, TN2181, or TN2224) 7400D, 8400, or 9400 Series				
Phantom powered	3500	1066	2200	670
Locally powered (no Digital Line Protectors)	5000	1524	4000	1219
Digital (TN2181 and TN2224), 2-wire				
6400 series (cabling distance can increase to 5500 feet/1992 m using 22-AWG/0.32-mm <sup>2</sup> wire)	3500	1066	2200	670

*Continued on next page*

**Table 4. Allowable Intra-premises Cabling Distances — Continued**

Equipment	24 AWG Wire (0.26 mm <sup>2</sup> )		26 AWG Wire (0.14 mm <sup>2</sup> )	
	Feet	Meters	Feet	Meters
Digital (TN754)				
7400D series				
On-premises-only	3500	1066	2200	670
Out-of-building, same premises	3500	1066	2200	670
Out-of-building, with Digital Line	5000	1524	4000	1219
Protectors				
ISDN-BRI (TN556)				
7500 and 8500 series				
Termination resistor (3 feet)	1900	579	1600	488
Termination resistor (250 feet)	1600	488	1300	396
MET sets (TN735)	1000	305	650	198

1. An out-of-building, same-premises, analog terminal requires a carbon block, gas tube, or equivalent solid state device at each end of the interbuilding cable.
2. Use only 500- or 2500-type terminals off-premises to a CO.
3. Point-to-point connections and terminals are within 33 feet (10 m) of the jack.

### **ISDN-BRI Two-Wire Line Cabling Distances**

The TN2198 BRI 2-Wire line circuit pack supports various cabling configurations using 22, 24, and 26 AWG (0.34 mm<sup>2</sup>, 0.26 mm<sup>2</sup>, 0.14 mm<sup>2</sup>, respectively) wire. Up to 18,000 feet (5486 m) (maximum) may be used between the TN2198 and the NT1 network interface. Refer to [Table 5](#) for the cabling distances from the NT1 network interface to the 7500- and 8500-series voice terminals using 24 AWG (0.26 mm<sup>2</sup>) and 26 AWG (0.14 mm<sup>2</sup>) wire. If 22 AWG (0.34 mm<sup>2</sup>) wire is used, contact your Lucent Technologies representative. Distances from the power closet to the voice terminal are typically less than 250 feet (75 m).

**Table 5. Cabling Distances from the NT1 to the ISDN-BRI Voice Terminal**

Equipment		24 AWG (0.26 mm <sup>2</sup> )		26 AWG (0.14 mm <sup>2</sup> )	
		Feet	Meters	Feet	Meters
NT1 to ISDN-BRI Four-Wire Voice Terminal (7500 and 8500 Series)	Termination resistor (3 feet) (0.9 m)	1900	579	1600	488
	Termination resistor (250 feet) (75 m)	1600	488	1300	396

## Fiber Optic Cabling Distances

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

- Maximum Power Output: -5 dBm
- Wavelength: 1310 nm
- Mode Field Diameter: 8.8 microns

## CLASS 1 LASER PRODUCT IEC 825 1993



### CAUTION:

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

Contact your Lucent Technologies representative for more information.

For the maximum fiber optic cabling distances for a system, determine:

- The mean loss and the length of the outside plant fiber cable
- The mean loss and the length of fiber cable shipped with the cabinet (including any fiber riser cable)
- The mean loss of an ST connector and the number of ST connections
- The mean loss due to the total number of splices
- Higher-order mode loss

### NOTE:

If estimated fiber limits such as loss, length, excessive splices, and so forth are expected, OTDR (Optical Time Domain Reflectometer) tests should be made to ensure a successful installation of a remote EPN fiber link.

For multi-mode fiber: The 9823A lightwave transceiver transmits up to 4,900 feet or 0.93 miles (1.5 km). The 9823B lightwave transceiver transmits up to 25,000 feet or 4.73 miles (7.6 km). Multi-mode fiber optic cable consists of 2 separate 62.5-micron diameter or 50-micron diameter fiber optic cables. The transmission speed across a fiber link between the PPN and an EPN is 32.768 Mbps.

For single-mode fiber: The 300A lightwave transceivers transmits light up to 115,000 feet or 22 miles (35 km). Fiber loss must be less than 17dB. Saturation may occur if distances are short; attenuators may be required if the total loss on the fiber link is less than 10dBm. Single-mode fiber optic cable consists of 2 separate 8- to 10-micron core cables. The transmission speed across a fiber link between the PPN and an EPN is 32.768 Mbps.

## **DS1 Remoting Transmission Distance**

When the distance between cabinets is greater than 115,000 feet or 22 miles (35 km), or if fiber optic cabling right-of-way is not available, use DS1 remoting for greater distances. Contact your Lucent Technologies representative for network engineering guidelines.

## **Initialization and Recovery**

The time needed to initialize a system or for a system to recover from being reset depends on the line size of the system, active features, trunks, and adjuncts connecting to the system. The system needs several minutes to initialize or recover automatically from being reset.

## **Call Progress Tones**

This section details the tones generated by the systems for the United States. See [Table 6](#) for the default call progress tones generated country code 1.

**Table 6. Default Call Progress Tones**

<b>Tone</b>	<b>Frequency</b>	<b>Pattern (ms)</b>
Answerback 3 tone	2225 Hz	3000 on, followed by silence; no repeat
Answerback 5 tone	2225 Hz	5000 on, followed by silence; no repeat
Bridging warning tone <sup>1</sup>	440 Hz	1750 on, 12000 off, 650 on; repeated
Busy tone	480 Hz + 620 Hz	500 on, 500 off; repeated
Call waiting tones:		
Internal	440 Hz	200 on, followed by silence; no repeat
External or handled by attendant	440 Hz	200 on, 200 off, 200 on followed by silence; no repeat
Priority call	440 Hz	200 on, 200 off, 200 on, 200 off, 200 on followed by silence; no repeat
Call waiting ringback tone	440 Hz + 480 Hz; 440 Hz	900 on (440 Hz + 480 Hz), 200 on (400 Hz), 2900 off; repeated
Centralized attendant call: incoming call identification	480 Hz & 440 Hz & 480 Hz	100 on (480 Hz), 100 on (440 Hz), 100 on (480 Hz), followed by silence; no repeat
Coverage tone	440 Hz	600 on, followed by silence; no repeat
Confirmation tone	350 Hz + 440 Hz	100 on, 100 off, 100 on, 100 off, 100 on followed by silence; no repeat
Continuous confirmation tone	350 Hz + 440 Hz	100 on, 100 off; repeated
Dial tone	350 Hz + 440 Hz	continuous

*Continued on next page*

**Table 6. Default Call Progress Tones — Continued**

Tone	Frequency	Pattern (ms)
Dial zero, attendant transfer, and test calls	440 Hz	100 on, 100 off, 100 on followed by silence; no repeat
Recall on don't answer, audible ringing	440 Hz	300 on, followed by silence; no repeat
Hold recall, hold confirmation	440 Hz	50 on, 50 off, 50 on, 50 off, 50 on, 50 off, 50 on, 50 off, 50 on followed by silence; no repeat
Camp-on recall, camp-on confirmation	440 Hz	100 on, followed by silence; no repeat
Executive override tone	440 Hz	3000 on, followed by silence; no repeat
Intercept tone	440 Hz & 620 Hz	250 on (440 Hz), 250 on (620 Hz); repeated
Precedence audible alert tone	440 Hz + 480 Hz	1600 on, 300 off; repeated
Recall dial tone	350 Hz + 440 Hz	100 on, 100 off, 100 on, 100 off, 100 on, 100 off, followed by continuous dial tone
Reorder tone	480 Hz + 620 Hz	250 on, 250 off; repeated
Remote hold tone	440 Hz	50 on, 50 off; repeated
Ringback tone	440 Hz + 480 Hz	1000 on, 3000 off; repeated
Voice signaling tone	440 Hz	1000 on, followed by silence; no repeat
Zip tone	480 Hz	500 on, followed by silence; no repeat

*Continued on next page*

1. Used with the Busy Verification and Executive Override features, and Service Observing feature when the warning tone is enabled.

Table 7 lists the call progress tones available for customizing the tones. The tones in the list can be generated only when using a TN780 or TN2182 Tone-Clock circuit pack and the tone customizing feature is used. Tag tones are available only on the TN2182. The tones are used to customize from 1 to 20 tones in the 5 administrable tone plans.

In Table 7, **Level** is the tone amplitude in decibels (dBm). **0** dBm is referenced to 1 milliwatt. To customize these tones, refer to *DEFINITY Enterprise Communications Server R7 Administrator's Guide*.

**Table 7. Customizable Call Progress Tones**

Frequency	Level (dBm)
Null	None
330 Hz	-8.0 <sup>1</sup>
330 Hz + 440 Hz	-5.0 + 8.5 <sup>1</sup>
330 Hz + 440 Hz	-8 + -11 <sup>1</sup>
350 Hz	-17.25
350 Hz + 425 Hz	-4.0 <sup>1</sup>
350 Hz + 425 Hz	- 4.0
350 Hz + 440 Hz	-13.75
350 Hz + 440 Hz	-13.0 <sup>1</sup>
350 Hz + 440 Hz	-13.75 <sup>1</sup>
375 Hz + 425 Hz	-15.0
404 Hz	-11.0
404 Hz	-16.0
404 Hz + 425 Hz	-11.0
404 Hz + 450 Hz	-11.0
425 Hz	-4.0 <sup>1</sup>
425 Hz	-5.0 <sup>1</sup>

*Continued on next page*

**Table 7. Customizable Call Progress Tones — Continued**

Frequency	Level (dBm)
425 Hz	-8.0 <sup>1</sup>
425 Hz	-11.0 <sup>1</sup>
425 Hz	-17.25 <sup>1</sup>
440 Hz	-11.0 <sup>1</sup>
440 Hz	-13.0 <sup>1</sup>
440 Hz	-17.25
440 Hz + 350 Hz	-13.0 <sup>1</sup>
440 Hz + 480 Hz	-13.0 <sup>1</sup>
440 Hz + 480 Hz	-19.0
480 Hz + 620 Hz	-13.0 <sup>1</sup>
480 Hz + 620 Hz	-24.0
525 Hz	-11.0
620 Hz	-17.25
697 Hz or 700 Hz	-8.5/-8.0
770 Hz or 900 Hz	-8.5/-8.0
852 Hz or 1100 Hz	-8.5/-8.0
950 Hz	-5.0 <sup>1</sup>
950 Hz	-10.0 <sup>1</sup>
Chimes (860 Hz)	- 3.0
941 Hz or 1300 Hz	-8.5/-8.0
DMW (1000 Hz)	0.0
Square (1000 Hz)	+ 3.0

*Continued on next page*

**Table 7. Customizable Call Progress Tones — Continued**

Frequency	Level (dBm)
1004 Hz	0.0
1004 Hz	-16.0
1209 Hz or 1500 Hz	-7.5/-8.0
1336 Hz or 1700 Hz	-7.5/-8.0
1400 Hz	-5.0 <sup>1</sup>
1400 Hz	-10.0 <sup>1</sup>
1400 Hz	-11.0
1477 Hz or 2600 Hz	-7.5/-8.0
1633 Hz or 1004 Hz	-7.5/ 0.0
1700 Hz	-16.0 <sup>1</sup>
1800 Hz	-5.0 <sup>1</sup>
1800 Hz	-10.0 <sup>1</sup>
2025 Hz	-12.1
2100 Hz	-12.1
2225 Hz	-12.1
2804 Hz	-16.0
Count	None

<sup>1</sup>. Available only with TN2182 Tone-Clock circuit pack.

## Audible Ringing Patterns

Table 8 lists the administrable audible ringing patterns that can appear on analog line circuit pack ports. The times under the columns "0 - 5" are in milliseconds. *DEFINITY Enterprise Communications Server R7 Administrator's Guide* contains ringing pattern administration.

**Table 8. Ringing Patterns**

Bursts	Set Number	0	1	2	3	4	5
One	on	900	1000	1000	1000	1000	1000
	off	4100	2150	4000	4000	4000	2150
Two	on	400	300	600	400	300	400
	off	200	300	200	200	300	200
	on	300	400	200	400	300	400
	off	4100	2150	4000	4000	4100	2150
Three	on	200	100	200	200	200	200
	off	100	200	200	200	100	200
	on	200	100	200	200	200	200
	off	100	200	200	200	100	200
	on	300	400	200	200	300	200
	off	4100	2150	4000	4000	4100	2150

The following circuit packs default to the associated ringing pattern sets:

- TN2180 — Set 1
- TN2135 — Set 2
- TN2144 — Set 3
- TN468B — Set 4
- TN2149 — Set 4
- TN2181, TN2183, and TN2224 — Set 0 (administrable ringing cadence)

The following list shows the intended use for administered ringing pattern sets:

- Set 0 — United States

- Set 1 — Japan and Spain
- Set 2 — Italy
- Set 3 — Netherlands and Sweden
- Set 4 — Australia, Belgium, and United Kingdom
- Set 5 — India, Malaysia, New Zealand, and Singapore

## Multi-Frequency Compelled Tones

---

With multi-frequency compelled (MFC) signaling used on direct inward dialing (DID) and direct outward dialing (DOD) trunks in countries outside the United States, a system responds to the frequencies generated by the CO with answering frequencies.

The MFC tones and signaling sequence follows the International Telecommunications Union (ITU-T) recommendations for MFC signaling defined in Volume VI, Fascicle VI.4 of the 1989 CCITT blue books.

Refer to *DEFINITY Enterprise Communications Server R7 Administrator's Guide* for more details.

## Indicator Lamp Signals

---

Table 9 lists the light signals generated by the system for the attendant console and multi-appearance voice terminals.

**Table 9. Light Signals Generated**

Light Signal	Pattern in Milliseconds (ms)
Dark	Off
Lighted	On
Flashing	500 on, 500 off; repeated
Fluttering	50 on, 50 off; repeated
Broken flutter	5 cycles of 50 on, 50 off, followed by 500 off; repeated
Wink	350 on, 50 off; repeated

---

## **A — Wireless Business Solutions**

---

### **Overview**

---

This appendix briefly describes the DEFINITY wireless business system (DWBS) and the personal communications manager (PCM).

### **FreeWorks™ Wireless Telecommunications**

---

FreeWorks provides a complete global wireless system. The DEFINITY WBS Release 1 personal wireless telephony (PWT) product provides wireless applications within the United States. The PCM product provides cordless telephone generation 2 (CT2) technology for countries outside the United States.

The DEFINITY wireless business system - adjunct DECT provides digital (DECT) technology for countries outside the United States.

Any of the above-mentioned products provide greater mobility to business customers by integrating wireless capabilities into the DEFINITY ECS.

Each of the 3 systems is ideally suited to personnel associated with building security, maintenance, and sales and may be added to an existing system while retaining the same features and quality of service.

---

## **DEFINITY Wireless Business System**

### **Components**

---

The DEFINITY WBS R1-PWT consists of the following main components:

- Mobility manager software
- Wireless fixed bases
- Pocket telephones
- Cell antenna units
- Radio controllers
- Battery chargers

The following sections describe each of the above main components. Contact your Lucent Technologies representative to help in determining the types and numbers of components required at each site.

#### **Mobility Manager Software**

The mobility manager software provides maintenance and administration functions for the wireless network. This software also provides the common control and tracking of the pocket telephones as they change location inside the business premises. The mobility manager also directs all control and voice information to the appropriate radio controller for each pocket telephone.

#### **Radio Controllers**

The radio controllers are circuit packs inside the DEFINITY ECS. Each radio controller connects and controls up to 2 wireless fixed bases (WFBs). Radio controllers provide the interface between the system and the network of WFBs. The controllers connect to the WFBs by an I2 proprietary interface. The radio controller is responsible for much of the intelligence needed to maintain the quality of the radio links established between elements.

The radio controller circuit pack operates in all applicable DEFINITY cabinets over the full range of temperature and humidity specifications:

- 40 to 120 °F (4.4 to 48.9 °C)
- 10% to 95% relative humidity at 84 °F (28.8 °C)
- 10% to 45% relative humidity at 110 degrees °F (43.3 °C)

## Wireless Fixed Bases (WFBs)

The WFBs are the radio base stations that change incoming calls from the system into radio signals used for transmission through the air to the appropriate pocket telephones. The bases also change the incoming radio signals from the pocket telephones into binary data before they are sent to the system.

Each base can support up to 12 simultaneous conversations. The base can also support one internal cell antenna unit (CAU) or up to 4 remote external CAUs. Each base connects to a radio controller by an I2 interface. Each base connects to 1 to 4 CAUs via an I3 proprietary interface. [Table 10](#) details the WFB dimensions and weight

**Table 10. WFB Physical Characteristics**

Height	Width	Depth	Weight	Heat Dissipation (Per Hour)
5 inches (12.7 cm)	7 inches (17.8 cm)	2 inches (5.08 cm)	2 Pounds (0.9 kg)	6.82 to 34.1 BTUs (1.72 to 8.6 Kilocalories)

The WFB meets the requirements for "Equipment not Normally Customer Carried" and is intended for use indoors.

- 0 to 120° F (-17.8 to 48.9 °C)
- 0% to 95% relative humidity

Each WFB can be phantom-powered by the I2 interface on the TN789 radio controller circuit pack or powered from an auxiliary AC power supply (WP-92464).

The TN789 can supply 250 mA of load current if no CAUs are installed. The auxiliary AC power supply supplies 400 mA of load current.

Each WFB can dissipate from 1.8 Watts to 10 Watts of power (depending on number of simultaneous calls).



### NOTE:

The auxiliary power supply is required if one or more CAUs connect to the WFB.

## Cell Antenna Unit (Optional)

The cell antenna unit (CAU) is an optional remote antenna connecting to a WFB. The antenna expands a coverage area and can be located as far as 100 cable feet (30.5 m) from its associated base. Up to four CAUs connect to a WFB. Each antenna connects to and is powered from the base by an RG59, 75 Ohm coaxial cable. The CAUs use an I3 interface. The frequency bandwidth of the antenna is 1910 MHz to 1930 MHz.

The CAU meets the requirements for "Equipment not Normally Customer Carried" and is intended for use indoors.

- 0 degrees to 120 °F (-17.8 to 48.9 °C)
- 0% to 95% relative humidity

Each CAU weighs 0.5 pound (0.22 kg) and can dissipate up to 2 Watts of power. The average heat dissipation is 6.82 BTUs (1.7 gram-calories) per hour.

## Wireless Terminals

Wireless terminals (9601-type) are pocket-sized, portable telephones designed to operate indoors. The telephones provide 2 call appearances: a display that supports basic business communications needs, and a 12-button dial pad. The telephone may be used as a supplement to a wired desk telephone, or it may be used in place of a desk telephone.

Up to 260 telephones can be used throughout the entire coverage area of 3 million square feet (914,400 square meters). The telephone does not physically connect to the system or to any system component. Instead, the telephone uses wireless communications to a network of WFB. Only the bases physically connect to the system.

## Battery Chargers

The battery charger can be either wall or desk mounted and can charge a fully discharged battery in less than 1.5 hours. The charger can simultaneously charge a pocket telephone battery and a spare battery pack. The battery charger meets the requirements for "Equipment not Normally Customer Carried" and is intended for use indoors.

- 32 to 120 °F (0 to 48.9 °C)
- 0% to 95% relative humidity

---

## **DEFINITY Wireless Business System Books**

For more information about installing the DEFINITY wireless business system, refer to *DEFINITY Wireless Business System Installation and Test*, 555-232-102.

For information about connecting the wireless fixed base to the DEFINITY system, refer to *DEFINITY ECS Interface Wireless Business System*, 555-232-108.

For more information on how to use the wireless telephone handsets, refer to the *DEFINITY Wireless Business System Pocket Phone User Guide*, 555-232-105.

For more information about the DEFINITY wireless business system, refer to *DEFINITY Wireless Business System Multi-language User Guide*, Comcode 407 648 112.

## **Personal Communications Manager Books**

For more information about planning, installing, and maintaining the Forum personal communications manager, refer to *Personal Communications Manager Release 1.1 Support Guide*.

For information about the personal communicator, refer to *Personal Communicator - 2055 User Guide*.

For more information on how to use the system, refer to *Getting Started with Personal Communications Manager*.

---

## **Wireless Terminals Feature Access**

The class of restriction (COR) and class of service (COS) features can be used to limit unauthorized access to features or services for a specific handset. Any telephone not administered on a system displays a "service denied" indication.

A pocket telephone previously administered on a system may be removed from service because it has been returned to customer inventory or reported as lost or stolen. The mobility manager provides a "marking" option. If a "marked" telephone attempts to access the system, a specified referral point is notified. Marked telephones are identified by their serial numbers so a user's extension number can be assigned to a different telephone.

Wireless Business Solutions

*FreeWorks™ Wireless Telecommunications*

230

---

## B — System Capacity Limits

### Overview

This appendix provides information on the overall characteristics and capacities of the DEFINITY Systems.

### System Capacity Limits

The maximum parameters for the DEFINITY hardware and software items are listed on the following pages. These parameters apply to compact single-carrier cabinets, compact modular cabinets, single-carrier cabinets, and multi-carrier cabinet systems in category A (ECS and ProLogix Solutions) and category B (BCS and Guestworks).

Terminal and digital station capacities are reduced by such administered items as: attendant consoles, number of EAS login IDs, and number of ACD agents.

#### NOTE:

Not all maximum capacities listed in [Table 11](#) can be reached simultaneously with all versions or all configurations of the system. See Station Button Capacity for the system button limitations.

#### NOTE:

In [Table 11](#) a single entry denotes that capacities for category A and category B are the same. If the capacities are different, a slash (/) separates the entries (for example, 8/NA). An asterisk, \*, indicates that the software capacity limit cannot be achieved due to hardware capacity limits for this platform.

**Table 11. Maximum System Parameters (Category A/B)**

ITEM	R7csi	R7si	R7r
<b>Abbreviated Dialing (AD)</b>			
AD lists per system	2400*	2400	5000
AD list entry size	24	24	24
AD entries per system	12,000*	12,000	100,000
Auto dialing button			
Entries per system <sup>1</sup>			
Enhanced list (system list)	1	1	1
Maximum entries	10,000	10,000	10,000
Group lists	100	100	1000
Maximum entries	100	100	100
Group lists per extension	3	3	3
System list	1	1	1
Maximum entries	100	100	100
Personal lists	2400*	2400	5000
Maximum entries	100	100	100
Personal lists per extension	3	3	3
<b>Applications Adjuncts</b>			
CallVisor ASAI adjuncts	4 <sup>2</sup> /NA	8/NA	8/16/NA
Asynchronous links (RS-232) <sup>3</sup>	5	9	10
CDR output devices	2	2	2

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
Journal printers: System printer	2:1	2:1	2:1
Property management systems	1	1	1
Maximum Links <sup>4</sup>	25	25	33
BX.25 physical links <sup>5</sup>	NA	8	16
C-LAN TCP/IP Ethernet Links	2	2	2
C-LAN TCP/IP PPP Links	25	25	32
C-LAN IP Routes 4.1	270	400	650
Application processors	1/NA	1/NA	7
Voice processing adjuncts			
Traditional AUDIX	NA	1	8
DEFINITY AUDIX	1	1	1
DEFINITY AUDIX DCP emulation	1	1	1
DEFINITY AUDIX control link	NA	1	1
INTUITY AUDIX			
INTUITY AUDIX (Via mode code)	1	1	1
INTUITY AUDIX (Via BX.25)	NA	1	8
INTUITY AUDIX (Via TCP/IP)	1	1	8
INTUITY AUDIX (MAPD)	1	1	1
Mode code voice mail systems	1	1	1
DEFINITY ONE coresident AUDIX	NA	NA	NA
Other adjuncts			
CMS adjuncts	1/NA	1/NA	1/NA

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
ICM adjuncts (ISDN gateway)	NA	NA	NA
BX.25 Processor channels	NA	64	128
BX.25 Hop channels	NA	64	128
TCP/IP Processor Channels (includes Gateway Channels)	128	256	384
<b>Automatic Call Distribution (ACD)</b>			
Announcements per split	2	2	2
Announcements per system	128	128	256
Splits	99	99	600
with Hospitality Parameter Reduction	NA	NA	NA
ACD members per split	200	200	999
Maximum administered ACD members	1000*/150	1000/150	10,000/150
Logged-In splits per agent	500	500/150	5,200/150
Maximum agents when each logs into			
1 split	NA/500	NA/500	NA/5200
2 splits	500	500	5000
3 splits	333	333	3333
4 splits	250	250	2500
Logged-In splits per agent			
No CMS	4	4	4
R2 CMS	3/NA	3/NA	3/NA
R3 CMS	3/NA	3/NA	3/NA

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
R3V2 CMS	4/NA	4/NA	4/NA
R3V4 CMS <sup>6</sup>	4/NA	4/NA	4/NA
R3V5 or later CMS	4/NA	4/NA	4/NA
Queue slots per group	200	200	999
Queue slots per system	1500	1500	15,000
<b>ARS/AAR</b>			
AAR/ARS patterns (shared)	254	254	640
ARS/AAR analysis tables	2000	2000	2,000
Choices per RHNPA table	12	12	12
Digit conversion entries	400	400	400
AAR/ARS digit conversion			
Digits deleted for ARS/AAR	28	28	28
Digits inserted for ARS/AAR	18	18	18
AAR/ARS sub-net trunking			
Digits deleted for ARS/AAR	28	28	28
Digits inserted for ARS/AAR	36	36	36
Entries in each RHNPA table	1000	1000	1000
FRLs	8	8	8
Inserted digit strings <sup>7</sup>	1200	1200	3000
Patterns for measurement			
Shared patterns for measurement	20	20	25

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
RHNPA tables	32	32	32
Routing plans	8	8	8
ARS toll tables	32	32	32
Entries per toll table	800	800	800
Trunk groups in ARS/AAR pattern	6	6	16
UDP (entries)	10,000	10,000	50,000
TOD charts	8	8	8
Toll analysis table entries	1000	1000	1000
<b>Attendant Service</b>			
Attendant consoles (day:night) <sup>8</sup>	15:1	15:1	27:1
Attendant console 100s groups per attendant	20	20	20
Attendant control restriction groups	96	96	96
Centralized attendant service			
Release link trunks at branch	99/NA	99/NA	255/NA
Release link trunk groups at branch	1/NA	1/NA	1/NA
Release link trunks at main	400/NA	400/NA	4000/NA
Release link trunk groups at main <sup>9</sup>	99/NA	99/NA	666/NA
Other access queues			
Maximum number of queues	12	12	12

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
Maximum number of queue slots	80	80	80
Size range of reserved queue	2-75	2-75	2-75
Reserved queue default size	5	5	5
Queue length	80	80	300
Switched loops per console	6	6	6
<b>Authorization</b>			
Authorization codes	5000	5000	90,000
Station security code length	7	7	7
Classes of restriction	96	96	96
Classes of service	16	16	16
Length of authorization code	4-7/NA	4-7/NA	4-7/NA
Length of barrier code	4-7/NA	4-7/NA	4-7/NA
Length of account codes	1-15	1-15	1-15
Restricted call list	1	1	1
Remote access barrier codes	10/NA	10/NA	10/NA
CDR account code list	1	1	1
Toll call list	1	1	1
Unrestricted/allowed call lists	10	10	10
Total call list entries	1000	1000	1000
<b>Automatic Callback Calls</b>	240	240	1500
<b>Automatic Wakeup</b>			

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
Simultaneous display requests	10	10	30
Wakeup requests per system	2400	2400	15,000
Wakeup requests per extension	1/2	1/2	1/2
Wakeup requests per 15-minute interval	450	450	950
<b>Basic CMS (BCMS)</b>			
Measured agents or Login IDs	400/25	400/25	2,000/25
Measured agents per split	200/25	200/25	999/25
Measured splits	99/5	99/5	600/5
Measured trunk groups	32	32	32
Measured VDNs	99/10	99/10	512/20
Maximum agents displayed by monitor BCMS split command <sup>10</sup>	100	100	100
Maximum BCMS terminals	3	3	4
Maximum active maintenance commands for the system	1	1	5
Maximum simultaneous BCMS terminals in monitor mode <sup>11</sup>	1	1	3
Reporting periods			
Intervals	25	25	25
Days	7	7	7
<b>Cabinets</b>			
Expansion port network (EPN)			

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
Multicarrier cabinet (medium-capacity MCC)	NA	2	43
Single-carrier cabinet (SCC or CMC)	NA	8	164
Inter-port network connectivity			
Port networks	1	3	44
Maximum number of PNs per cabinet	1	1	2
Switch nodes (Simplex)	NA	NA	3
Switch nodes (Duplex)	NA	NA	6
DS1 converter complex (simplex)	NA	NA	41
DS1 converter complex (duplex)	NA	NA	82
Processor port network (PPN)			
Multicarrier cabinet (MCC)	NA	1	1
Single-carrier cabinet (SCC)	NA	4	NA
Compact Modular Cabinet (CMC)	3 <sup>12</sup>	NA	NA
<b>Call Appearances</b>			
Bridged images per appearance <sup>13</sup>	all: 26 (16 with ASAI)		
Call appearances per station <sup>14</sup>	all: 44 (52 with 8434D)		
Maximum appearances per extension	10	10	10
Minimum appearances per extension	0	0	0
Total bridged appearances	2400 <sup>*</sup>	2400	25,000

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
Maximum simultaneous off-hook per call <sup>15</sup>	5	5	5
<b>Call Coverage</b>			
Coverage answer groups (CAG)	200	200	750
Coverage paths	999	999	9999
Coverage paths including in call coverage report	100	100	100
Coverage path per station	4	4	4
Coverage points in a path	6/3	6/3	6/3
Remote coverage points	999	999	999
Maximum users per coverage path <sup>16</sup>	3500*	3500	36,065/ 3500
Members per coverage answer group	8	8	8
Time of day coverage tables	999	999	999
Time of day changes per table	5	5	5
Remote administration Coverage paths	2/NA	2/NA	2/NA
<b>Call Detail Recording</b>			
Intra-switch call trackable extensions	1000	1000	5000
Maximum number of CDR records buffered in switch	500	500	9614

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
Number of records buffered for the primary output device to cause secondary device to be busied out for 2 minutes	200	200	1800
<b>Call Forwarding</b>			
Call forwarded digits (off-net)	16	16	16
Call forwarded numbers	2400	2400	25,000
<b>Call Park</b>			
Attendant group common shared extension numbers per system <sup>17</sup>	80	80	80
Number of Parked Calls	723	723	10,604
<b>Call Pickup Groups</b>			
Call pickup members per group	50	50	50
Call pickup members per system	2400*	2400	25,000
Number of groups	800*	800	5000
<b>Call Vectoring</b>			
Maximum skills a call can simultaneously queue to	3	3	3
Priority levels	4	4	4
Recorded announcements/audio sources for vector delay	128	128	256
Steps per vector	32	32	32
Vector directory numbers	512/10	512/10	20,000/20
CMS measured VDNs <sup>18</sup>	512	512	8000

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
Vectors per system	256/10	256/10	512/20
Number of collected digits for call prompting or CINFO	16	16	16
Number of dial-ahead digits for call prompting	24	24	24
Vector routing tables	10/NA	10/NA	100/NA
BSR Application-Location Pairs	1000	1000	1000
<b>CallVisor ASAI</b>			
Active station control associations	2000 <sup>2</sup> /NA	2000/NA	6000/NA
Call controllers per call	1 <sup>2</sup> /NA	1/NA	1/NA
Call monitors per call	28 <sup>2</sup> /NA	28/NA	28/NA
Station controllers per station	4 <sup>2</sup> /NA	4/NA	4/NA
Maximum simultaneous calls being classified	80 <sup>2</sup> /NA	80/NA	600/NA
Number of CallVisor ASAI links (open & proprietary)	8 <sup>2</sup> /NA	8/NA	8/16 <sup>3</sup> /NA
Notification requests (monitors)	300 <sup>2</sup> /NA	300/NA	10,000/NA
Monitors per VDN or split	6 <sup>2</sup> /NA	6/NA	6/NA
Simultaneous active call controlled calls	300 <sup>2</sup> /NA	300/NA	3000/NA
Switch to adjunct associations (routing)	127 <sup>2</sup> /NA	127/NA	127/NA
Number of open multiquest billing requests	100 <sup>2</sup> /NA	100/NA	1000/NA
Maximum calls with send DTMF active	16 <sup>2</sup> /NA	16/NA	32/NA

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
Selected listen - disconnect paths	75 <sup>2</sup> /NA	75/NA	300/NA
ASAI traffic			
Messages/second per ASAI/BRI link	20/NA	30/NA	30/NA
Msgs/sec per LAN-gateway link	NA	no info.	180/NA
Msgs/sec per system	80/NA	no info.	240/NA
LAN gateway board max links			
Lan gateway links per multifunction circuit pack	NA/NA	4/NA	4/NA
LAN gateway links per MAPD	NA	8/NA	8/NA
<b>Conference Parties</b>	6	6	6
Simultaneous 3-way conference calls <sup>19</sup>	483	483	7084
Simultaneous 6-way conference calls <sup>20</sup>	240	240	3520
<b>Data Parameters</b>			
Administered connections	128	128	128
Alphanumeric dialing			
Maximum entries	200	200	1250
Characters per entry	22	22	22
PRI endpoints (PE)	8	25	50
Access endpoints (number of trunks)	400	400	4000
<b>Multimedia Parameters</b>			
TN787D MMI boards	4/NA <sup>21</sup>	4/NA	12/NA <sup>21</sup>

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
TN788B VC boards <sup>21</sup>	25/NA	25/NA	69/NA
MMI and VC boards in multiple PNs	NA	Yes/NA	Yes/NA
Multimedia One Number conferences per system	800/NA <sup>21</sup>	800/NA	2000/NA
Multimedia Dynamic Conference Records	64/NA	64/NA	192/NA
Maximum BRI connections	84/NA <sup>21</sup>	1000/NA	7000/NA
MASI nodes	15/NA	15/NA	15/NA
MASI links	15/NA	15/NA	15/NA
MASI trunk groups	96/NA	96/NA	120/NA
<b>Digital Data Endpoints</b>	800	800	7500
<b>Dial Plan</b>			
Direct inward dialing listed directory numbers	8	8	20
Expert agent selection (EAS) agent login IDs <sup>22</sup>	1500*/NA	1500/NA	10,000/NA
Extensions	3500*	3500*	36,065
Extension number portability <sup>23</sup>	10,000	10,000	50,000
Feature dial access codes	77	77	77
Number of digits in a feature access code	1-4	1-4	1-4
Integrated directory entries <sup>24</sup>	2416*	2416	25,028
Maximum extension size	5	5	5

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
Minimum extension size	1	1	1
Miscellaneous extensions <sup>25</sup>	900	900	3317
Names			
Number of names <sup>26</sup>	4215	4215	36,511
Number of characters in a name	27	27	27
Non-DID LDNs	50	50	666
Prefix extensions	Yes	Yes	Yes
Trunk dial access codes			
Number of access codes	317 <sup>*</sup>	317	884/317
Number of digits	1-4	1-4	1-4
<b>Do Not Disturb (DND)</b>			
Do not disturb requests per system	2400 <sup>*</sup>	2400	25,000
Simultaneous display requests	10	10	30
<b>Expert Agent Selection (EAS)</b>			
Skill groups	99/NA	99/NA	600/NA
VDN skill preferences	3/NA	3/NA	3/NA
Maximum skills a call can simultaneously queue to	3/NA	3/NA	3/NA
Maximum agent login IDs administered <sup>27</sup>	1500	1500	10,000
Maximum agent login IDs staffed	500	500	5200

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
Maximum administered ACD members (skill pairs) <sup>27</sup>	6000	6000	40,000
Maximum staffed ACD members	NA/1000	NA/1000	NA/10,000
Maximum agent/skill pairs staffed	1000/NA	1000/NA	10,000/NA
Maximum skills per agent			
No CMS	20/NA	20/NA	20/NA
R3V2 CMS	4/NA	4/NA	4/NA
R3V4 CMS	4/NA	4/NA	4/NA
R3V5 or later CMS	20/NA	20/NA	20/NA
Skill levels (preferences) per agent skill	16	16	16
Maximum agents logged-in			
When each has 20 skills assigned	50/NA	50/NA	500/NA
When each has 10 skills assigned	100/NA	100/NA	1000/NA
When each has 4 skills assigned	250/NA	250/NA	2500/NA
When each has 2 skills assigned	500/NA	500/NA	5000/NA
When each has 1 skill assigned	500/NA	500/NA	5200/NA
<b>External device alarming</b>	32	32	90
<b>Facility busy indicators</b>			
Buttons per tracked resource	100	100	500
Number of indicators (station and trunk groups)	3600*	3600	10,000
<b>Hunt Groups (Non-ACD)</b>			

*Continued on next page*

Table 11. Maximum System Parameters (Category A/B) — *Continued*

ITEM	R7csi	R7si	R7r
Announcements per group	1/2	1/2	1/2
Announcements per system	128	128	256
Groups	99	99	600
Group members per group	200	200	999
Group members per system, including ACD uses (Auto-Available splits/skills) and non-ACD uses (INTUITY/AUDIX, Remote AUDIX, etc.)	1000	1000	10,000
Queue slots per group	200	200	999
Queue slots per system	1500	1500	15,000
<b>Intercom Translation Table (ICOM)</b>			
ICOM groups per system	32	32	256
Auto/manual	32	32	256
Dial	32	32	256
Members per ICOM group			
Auto	32	32	32
Dial	32	32	32
Members per system	1024*	1024	8,192
<b>Last Number Dialed</b>			
Entries per system <sup>28</sup>	3216*	3216	32,528
Number of digits	24	24	24
<b>Leave Word Calling (Switch-Based)<sup>29</sup></b>			
Messages stored	2000*	2000	6,000

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
Messages per user	125	125	125
Remote message waiting indicators			
Per extension	80/NA	80/NA	80/NA
Per system	240/NA	240/NA	1250/NA
Simultaneous message retrievers	60	60	400
System-wide message retrievers	10	10	10
<b>Malicious Call Trace</b>			
Maximum simultaneous traces	16	16	16
<b>MLDN</b>			
Via direct inward dialing	8	8	20
Via direct inward dialing with tenant partition	20/NA	20/NA	100/NA
Via Central Office	99	99	666
<b>Modem Pool Groups (Mode-2/Analog)</b>			
Group members per system	160/NA	160/NA	2016/NA
Number of groups	5/NA	5/NA	63/NA
Members per group	32/NA	32/NA	32/NA
<b>Networking</b>			
Centralized attendants service (CAS) nodes	99/NA	99/NA	99/NA
Distributed communications system (DCS) nodes <sup>30</sup>			

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
BX.25 (Private)	NA	20/NA	20/NA
TCP/IP	20/NA	20/NA	20/NA
ISDN PRI	20/NA	20/NA	20/NA
Hybrid (combination of PRI, BX.25, and & TCP/IP)	20/NA	20/NA	20/NA
EN nodes <sup>31</sup>	999/NA	999/NA	999/NA
<b>Paging</b>			
Code calling IDs	125	125	125
Loudspeaker zones	9	9	9
<b>Partitions</b>			
Attendant groups	15/NA	15/NA	27/NA
Extension partition groups	8/NA	8/NA	8/NA
Extension partition	8/NA	8/NA	8/NA
Tenant partition	20/NA	20/NA	100/NA
Multiple music-on-hold sources	20/NA	20/NA	100/NA
<b>Personal CO Lines (PCOL)</b>			
PCOL appearances	16	16	16
PCOL lines (trunk groups)	200	200	200
PCOL trunks per trunk group	1	1	1
<b>Port Circuit Pack Slots<sup>32</sup></b>			
Per expansion port network			
Multicarrier cabinet standard reliability	NA	99	99

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
Single-carrier cabinet standard reliability	NA	71	71
Small cabinet standard reliability (upgrade only)	NA	39	39
Per processor port network			
Multicarrier cabinet standard reliability	NA	89	80
Single-carrier cabinet standard reliability	NA	64	NA
Enhanced single-carrier cabinet standard reliability	NA	70	NA
Compact modular cabinet	28 <sup>33</sup>	NA	NA
<b>Recorded Announcements/Audio Sources for Vector Delay</b>			
Analog and auxiliary trunk announcements			
Analog and auxiliary trunk queue slots per announcement	150	150	1000
Analog and auxiliary trunk queue slots per system	150	150	1000
Trunk calls connected per announcement	150	150	1000
Integrated announcements			
Integrated announcement circuit packs	5	5	10

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
Channels connected per integrated announcement circuit pack	16	16	16
Calls connected per integrated announcement	50	50	1000
Integrated announcement recording time (minutes: seconds) per circuit pack			
16 kB recording	8:32	8:32	8:32
32 kB recording	4:16	4:16	4:16
64 kB recording	2:08	2:08	2:08
Integrated queue slots per system	200	200	4000
Total recorded announcements	128	128	256
<b>System Administration</b>			
Number of logins	15	15	20
Administrable history file entries	500	500	1250
Simultaneous administration commands	1	1	5
Simultaneous maintenance commands	1	1	5
Simultaneous system maintenance sessions	5	5	8
Number of scheduled reports	50	50	50

*Continued on next page*

Table 11. Maximum System Parameters (Category A/B) — *Continued*

ITEM	R7csi	R7si	R7r
Access Security Gateway Session History Log Entries	100	100	250
<b>Speech Synthesis Circuit Packs</b>	6	6	40
Channels per speech circuit pack	4	4	4
<b>Terminating Extension Groups (TEG)</b>			
TEGs	32	32	32
Users that may share a TEG	4	4	4
<b>Time Slots</b>			
Simultaneous circuit-switched calls <sup>12</sup>	241 <sup>37</sup>	723	7712
Total slots	512 <sup>37</sup>	1536	22,528
Time slots for voice and data <sup>34</sup>	483 <sup>37</sup>	1449	21,208
Time slots per port network	512 <sup>37</sup>	512	512
<b>Tone Classifiers</b>			
Tone receivers (general) <sup>35</sup>	200	200	840
TTR queue size	4	4	4
Prompting TTR queue size	80	80	80
<b>Trunks</b>			
DS1 circuit packs	30 <sup>*35</sup>	30	166
Queue slots for trunks	198	198	1332
Measured trunks in system	400*	400	4000
Total PRI interfaces	16/8	30	166

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
PRI interface via TN799 C-LAN	8/8	NA	NA
PRI interface via TN794 NetPkt	NA/8	30/NA	NA
PRI interface via processor interface (PI)	NA	NA	NA
PRI LAPD physical links via PACCON <sup>36</sup> (packet controller)	NA	NA	NA
PRI interfaces via TN1655 PackInt	NA	NA	NA
PRI Interfaces via TDM Bus	8	NA	NA
Emulated circuits per ATM-CES interface	8	8	8
PRI D-channels per ATM-CES interface	8	8	8
ATM-CES interfaces used for port-network (PN) connectivity, per system	2	2	2
ATM-CES interfaces used for PRI circuit-emulation, per system	2	6	88
ATM circuit-emulation and port network-connectivity interfaces, per system	2	6	176
BRI trunks <sup>37</sup>			
BRI Interfaces via TN799 C-LAN	80	NA	NA
BRI Interfaces via TN794 NetPkt	NA	240	NA
BRI trunks via PACCON	NA	NA	NA
BRI trunks via TN1655 PackInt	NA	NA	NA
BRI trunks via TN2185	2	2	2
BRI via TDM bus	64	NA	NA
BRI trunks total	144	240	1328

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
ISDN temporary signaling connections			
TSCs in system	656	656	4256
Call associated TSCs	400	400	4000
Non call associated TSCs	256	256	256
Administered TSCs	128	128	128
Ringback queue slots	198	198	1332
Trunk groups			
Trunk group hourly measurements	25	25	75
Trunk groups in the system	99	99	666
Trunk members in a trunk group	99	99	255
ISDN services			
Incoming call handling treatment (per trunk group)	18	18	54
Incoming call handling treatment (per trunk system)	288	288	576
User defined services	24	24	60
Usage allocation entries (per plan)	15	15	15
<b>Voice Terminals</b> <sup>38</sup>			
Associated data modules (such as DTDMs)	800	800	7500

*Continued on next page*

**Table 11. Maximum System Parameters (Category A/B) — Continued**

ITEM	R7csi	R7si	R7r
BRI stations <sup>39</sup>			
Point-to-Point	84 <sup>2</sup>	1000	7000
Multipoint (passive bus)	168 <sup>2</sup>	1000	7000
Digital stations	900	2400	25,000
Display stations	900	2400	10,000
Stations <sup>40</sup>	900	2400	25,000
Station button capacity (K Units) <sup>41</sup>	656.4	662.4	5260
Station button feature capacity <sup>42</sup>	15,900	15,900	15,900
<b>VuStats</b>			
Measured agents or login IDs	400/NA	400/NA	2,000/NA
Measured splits	99/NA	99/NA	600/NA
Measured trunk groups	32/NA	32/NA	32/NA
Measured VDNs	99/NA	99/NA	512/NA
Reporting periods			
Intervals	25/NA	25/NA	25/NA
Days	1/NA	1/NA	1/NA
Displays			
Display formats	50/NA	50/NA	50/NA
Simultaneous updating displays	100/NA	100/NA	500/NA
<b>DEFINITY Wireless Business System Terminals (9601)</b>			

*Continued on next page*

Table 11. Maximum System Parameters (Category A/B) — Continued

ITEM	R7csi	R7si	R7r
Maximum number of terminals	250	250	250
Radio controller circuit packs <sup>43</sup>	30	30	30
Wireless fixed bases	60	60	60
Cell antenna units (CAU)	240	240	240
Coverage (million square feet)	3	3	3
Button capacity for wireless	656.4	662.4	5260

1. There is no limit on the maximum number of auto dial buttons (other than the system limit on button capacity). See Station Button Capacity for system button limitations.
2. BRI stations are supported on R7csi over C-LAN using the TN556C only. ASAI is only available via BRI transport.
3. In R7si, 8 netcon channels plus one direct connect.
4. Each C-LAN circuit pack has one Ethernet connection and 16 PPP connections.
5. In SCC, only 4 BX.25 physical links are supported in the configuration.
6. R3V3 CMS was renamed to R3V4 CMS to match the DEFINITY System numbering.
7. Number of available 12 character inserted-digit-strings available for AAR/ARS preferences.
8. The number of attendant consoles listed is per software limitations. 1 console per cmc cabinet is supported without supplemental power.
9. This is the same as the number of trunk groups in the system.
10. The monitor split command displays status for the first 100 agents logged into the split regardless of how many additional agents log into the split.
11. BCMS monitoring is a maintenance command limited by the active maintenance commands limit. It is reduced by 2 in the r system configuration because 2 active command slots are reserved for the INADS and SAT logins.

12. Release 7csi is limited to 3 carriers (28 slots). The A (1st) carrier provides 8 slots in addition to 2 slots that are required by the TN798/B processor and TN2182/B tone clock circuit packs. The B (2nd) and C (3rd) carriers provide 10 universal slots each.
13. 26 bridged appearances (principal + 25) are supported on all R7 platforms, provided that ASAI is not used. The capacity is 16 with ASAI.
14. The number of call appearances is the sum of primary and bridged appearances; at most 10 can be primary. A maximum of 54 administrable buttons are supported for the 7434 terminal without display — the 8434D terminal with display can support up to 52 call appearances.
15. Does not apply to conferencing.
16. The maximum number of users per coverage path equals the number of extensions.
17. Shared extensions must be shared among all attendant groups in the system including tenant partition scenarios.
18. Measured limits depend on the CMS release used.
19. Simultaneous 3-way conference call =  $(483 / 3) \times (\text{number PNs})$ .
20. Simultaneous 6-way conference call =  $(483 / 6) \times (\text{number PNs})$ .
21. R6csi and later systems support BRI stations with the TN556C only. R7csi supports the TN2198 over C-LAN. ASAI requires BRI transport.
22. Login IDs count against the “extensions” switch capacity.
23. These are uniform dialing plan (UDP) entries.
24. The integrated directory entries = stations + attendant consoles.
25. Used for PCOL groups, common shared extensions, access endpoints, administered TSCs, code calling IDs, LDNs, hunt groups, announcements, and TEGs (phantom extensions).
26. The number of names = number of stations + attendant consoles + trunk groups + digital data endpoints + miscellaneous extensions.
27. This limit can be reached only if 4 skills or less are assigned per login.
28. The last number dialed entries = stations + digital data endpoints + attendant consoles.
29. Leave Word Calling is available in the APB only if the Voice Mail Option is purchased.
30. The actual software limit is 63, but due to performance considerations the recommended number of DCS nodes is 20.

31. These are node number addresses.
32. Only port slots are included in this count. For example, there are 100 port slots per MCC EPN cabinet with 99 port slots and one slot dedicated to the Tone/Clock circuit pack. Other service circuits may further reduce the number of port slots available. In R7r and R7si, the service slot may be equipped with service circuit packs that do not require tip and ring connections.
33. R7csi supports PRI D-channels over the TDM bus. Each D-channel for PRI uses one timeslot pair. An R7csi with 8 PRIs uses 8 timeslot pairs, allowing a maximum of 233 simultaneous circuit switched calls.
34. 483 time slots for voice and data per port network.
35. The TN2182 Tone/Clock/Detector is used for multiple tone detection functions. The number of TN748, TN420, or TN744C circuit packs is limited only by the number of available slots. The number of TN2182 circuit packs is limited. There is a single limit on the total number of tone receiver (classifier) ports for the system: TN748/TN420 have 4 ports for TTR use, TN748/TN420 have 2 ports for GPTD use, TN744C has 8 ports for call prompting/call classification/ MFC/TTR/GPTD use, and TN2182 has 8 ports for call prompting/call classification/MFC/ TTR/GPTD use.
36. Two PI interfaces are supported in R7si with the MCC. PRI via the PI is not type-approved in Germany, France and Italy. In these countries PRI over PACCON must be used on si. For csi, PRI over the TDM bus will be type-approved for all countries.
37. The TN2185 BRI trunk circuit pack provides 8 ports. Each port (2B+D) provides 2 BRI trunks.
38. The following items detract from the total number of available "stations:"
  - Analog music-on-hold
  - Attendants
  - Modem pool conversion resources
  - TAAS port
  - Stations (digital, display, BRI, and so forth.)
  - Analog announcements
  - Analog external alarm port
  - Agent login IDs
  - ACD agents

- 
39. All BRI stations can be display stations.
  40. Including extensions administered without associated hardware (Release 7si and Release 7r).
  41. The station button capacity (units) replaces maximum button modules (from pre-R1V5.1)
  42. The following button features share a common resource in memory:  
Call Forwarding, Call Forward Busy Don't Answer, Send Extension Calls (SAC w/extension), Station Busy Indicators, Trunk Group Status, Hunt Group Status, PCOL GRoup Status, Data Module, Terminating Extension Group Status, Attendant Group Status/DXS, Remote Trunk Group Select.
  43. TN789 Radio Controller Circuit Packs cannot be used in remote DS1 EPNs.
-

System Capacity Limits

*System Capacity Limits*

260

# Index

## Numerics

- 2-wire DCP circuit packs
  - TN2181, 146
  - TN2224, 154
- 2-wire U-interfaces (TN2198), 149
- 4-wire E & M lead signaling tie trunks, 145
- 4-wire S/T-NT interfaces, 120
- 4C3S-75 solid state protectors, 59
- 105D Isolating Data Interface, 161, 162
- 1217A, 113
- 16-port DCP circuit packs, 146
- 24-port DCP circuit packs, 154
- 48-VDC batteries, 45
- 120A CSUs, 162
- 122A music on hold interface, 163
- 300A fiber optic transceivers, 163
- 315x-series CSUs, 163
- 507B sneak fuse panels, 59, 60
- 631DA1/B1 AC power units, 43, 111
- 644A1 DC power units, 112
- 645B1 DC power units, 43, 112
- 649A DC power units, 43, 52, 112
- 650A AC power units, 43, 112
- 676B DC power units, 56, 113
- 700A DS-1 CPE loopback, 164
- 982LS current limiters, 113
- 7400D data modules, 130
- 9601-type wireless terminals, 228
- 9823A/B lightwave transceivers, 164

## A

- AC power
  - battery chargers, 43
  - circuit breakers, 42
  - converting to DC power, 65
  - distribution units, 43
  - grounding, 52
  - power feeders, 37
  - receptacle strips, 65
  - single phase, 37
  - supply
    - WP-91153, 55
    - WP-92464, 227
  - three phase, 37
  - units
    - 631DA1/B1, 43, 111
    - 650A, 112
- acoustic noise levels, 36, 37
- adjuncts, table, 160
- administered ringing patterns, 223
- administration, 19
- ADUs (TN726/B), 123
- air purity, 35
- alarm circuit packs, 114, 146
- alarm panel information, 142
- alarm with ethernet (TN2170), 114
- alarm with Ethernet interface, 146
- alarms
  - external, 166
- allocation of buttons, 207
- altitude and air pressure, 33
- analog line circuit packs
  - TN468B, 119
  - TN479, 119
  - TN742, 124
  - TN746/B, 125, 128, 137, 152, 153
  - TN769, 131
  - TN2135, 144
  - TN2144, 145

analog line circuit packs, (continued)

TN2149, 146

TN2180, 146

TN2183, 147

announcement circuit packs, 127

applications layers, 11

approved grounds, 52

architecture, 11

ASAI links, 120

Asynchronous Transfer Mode

(ATM), 66, 94, 164, 165

LAN-emulation, 165

T-1/E-1 splitter, 164

ATM. See Asynchronous Transfer Mode (ATM).

audible ringing patterns, 223

AUDIX, circuit-pack assembly, 114

Australia

ringing patterns, 224

TN419B tone clock, 115

TN436B DID trunk, 116

TN437 tie trunk, 117

TN439 tie trunk, 117

TN468B analog line, 119

AUX connectors, 65

auxiliary cabinets, 15

auxiliary trunk circuit packs

TN417, 115

---

## B

backup power, 45, 48

batteries

48 VDC, 45

BIUs (BU3200A/B), 165

chargers, 45, 228

small assemblies, 48

BCCs (J58890L), 13, 77, 80

Belgium, 145, 224

BTD08 busy tone disconnect, 165

BU3200A/B BIUs, 165

bus buffers, 103

busy tone disconnect, 165

button allocations, 207

---

## C

cabinets

AC powered, 55

acoustic noise levels, 36

auxiliary (J58886N), 65

cabling distances, 212

CBCs, 54

components, 12

cooling fans, 58

DC powered, 60, 113

dimensions/clearances, 23

earthquake protections, 61

environmental considerations, 33

lightning protection, 60

minimum configurations, 88

power sources, 37

version comparisons, 20

cabling distances, 101, 212, 215

call classifier circuit packs

TN2182/B, 220

call processing performance, 170

call progress tones, 217, 220

call-classifier circuit packs

TN2182/B, 147

calls per hour, 170

CallVisor ASAI, 115

CallVisor ASAI over DEFINITY LAN Gateway port assemblies

R1 (ED-1E546), 114

- carriers
    - circuit pack slots, 79
    - COMSPHERE 3000-series, 164
    - power control (TN1648), 142
    - version comparisons, 20
  - CAUs, 228
  - CBCs, 54, 60
  - CE marks, iii
  - center-stage switch (CSS), 65
  - CFY1B current limiters, 68, 114
  - circuit breakers, 42, 44, 45
  - circuit packs, 105 to ??, 105 to 111
    - apparatus code tables, 105
    - carrier slots, 68, 79
    - sneak current protection, 60
    - types, 102
  - CMCs (J58890T), 12 to 15
    - configurations, 27
    - dimensions, 23
    - fan units, 58
    - heat dissipation, 33
  - CO trunk circuit packs
    - TN438B, 117
    - TN447, 117
    - TN465/B/C, 119
    - TN747B, 126
    - TN2138, 144
    - TN2147/C, 145
    - TN2199, 151
  - commercial floor loading code, 26
  - Communicore mobility manager, 166
  - COMSPHERE 3000-series carriers, 164
  - concrete encased grounds, 53
  - conduit, as ground, 54
  - configurations, 4, 169
  - connector blocks, DC, 65
  - control cabinets
    - duplicated (J58890M), 77, 82
  - control carriers, 16, 65, 67, 68
  - control circuit packs, 102
  - control LAN Interface
    - TN799, 140
  - control LAN interface, 140
  - CONVERSANT connectivity
    - TN464F, 118, 157
    - TN2183, 147
  - converters, AC to DC power, 65
  - cooling fans, 58
  - corrosive gas contaminants, 35
  - coupled bonding conductor (for grounding), 54
  - critical reliability systems, 91, 93
  - CSS, 3, 10
  - CSS. See center-stage switch (CSS).
  - CSUs
    - 120A units, 162
    - 315x-series, 163
  - CT2 technology, 166, 225
  - Current Limiter, 113, 114
  - current limiters
    - 982LS, 113
    - CFY1B, 68, 114
  - customer premises equipment (315x-series CSUs), 163
- 
- ## D
- data line circuit packs, 120, 123
  - data modules (7400D), 130
  - data networking (nET90), 165
  - DC power
    - circuit breakers, 42
    - connector blocks, 65
    - distribution units
      - J58890CF, 50
      - J58890CG, 56
    - grounding, 52
    - relays, 45, 46
    - requirements, 42, 43

## DC power, (continued)

## units

- 644A1/B1, 112
- 645B1, 112
- 649A, 52, 112
- 676B, 56, 113

## DCCs, 92

## DCS X.25 signaling, 123

DEFINITY AUDIX R3 port assemblies  
(ED-1E546), 114

## Definity AUDIX slim, 107

## DEFINITY nET90 interface, 165

## DID trunk circuit packs

- TN436B, 116
- TN459B, 118
- TN753, 127
- TN2139, 144
- TN2146, 145

## DIOD trunk circuit packs

- TN429/B, 116
- TN2184, 148

## disk drives, 114, 144

## DLC packs

- 2-wire DCP (TN2136), 144
- 2-wire DCP (TN2181), 146
- 2-wire, 24-port DCP (TN2224), 154

## DMLs (TN1655), 143

## DS-1 converter circuit packs

- TN574, 122
- TN1654, 143

## DS-1 CPE loopback jacks, 164

DS1 remoting transmission  
distances, 217

## DS-1 tie trunk circuit packs, 123

## DSLACs, 145

## duplicated control cabinets

- (J58890M), 13, 16, 77

## duplicated control carriers

- (J58890AJ), 65, 68

## duplication interfaces

- TN772, 132, 137
- UN330B, 159

## duplication strategy, 18

---

**E**

## E-1 (32-channel) circuit packs

- TN464C/D/E/F, 118, 151
- TN1654, 143

## earth, 53

## earthquake protections, 61

## ED-1E546 port assemblies, 114

## EIA interface, 120

## EIs

- TN570/B/C, 89, 122, 133
- TN776, 133

electrical components, power distribu-  
tion units, 44electromagnetic compatibility  
standards, iiemergency transfer control circuit  
packs, 142

## EMI filters, 46

## enhanced DC rectifier cabinet, 56

## environmental considerations, 33

## EPN cabinets (J58890A), 15, 66, 90

## EPNs, 3

## ESD, 102

## ethernet interface (TN2170), 114, 146

## expansion control cabinets

- C8890AF, 74
- J58890AF, 66, 68
- SCCs, 13

## expansion port carriers (J58890BB), 66

## external alarms, 166

---

**F**

## features

additional hardware

requirements, 171

wireless terminal access, 229

fiber optic cabling distances, 216

fiber optic transceivers, 163

floor area requirements, 23

Floor Grounds, 54

floor grounds, 54

floor loads, 26

floor plans, 27

Forum Personal Communications Manager (PCM), 166

## France

50-Hz 8RG power unit slots, 69, 80

122A music on hold, 163

TN2202 ring generator, 151

## FreeWorks wireless

telecommunications, 225

fuse panels (J58889AB), 65

## fuses

20-amp, 46

sneak current protectors, 60

---

**G**

Germany, 148

ground isolation, 51

ground ring, 53

ground wiring, 43

grounding, AC and DC, 52, 53, 54

---

**H**

hardware, table of additional

requirements, 171

heat dissipation, 33

high reliability systems, 91, 93, 96

high speed access concentrators

(nET90), 165

humidity, 34

Hungary, 145

hybrid line circuit packs, 129

---

**I**

IDFs, 101

India, 224

indicator light signals, 224

initialization, 217

international requirements, 18, 42, 43

intra-premises cabling, 212

ISDN-BRI line interfaces

2-wire U-LT, 149, 215

4-wire S/T-NT, 120

4-wire S/T-TE, 148

ISDN-PRI

DASS converters, 159

DPNSS converters, 159

Isolating Data Interface, 161, 162

isolator interfaces, 51

## Italy

ringing patterns, 224

TN433 speech synthesizer, 116

TN2138 CO trunk, 144

TN2139 DID trunk, 144

TN2140/B tie trunk, 145

---

**J**

- J58886N auxiliary cabinets, 65
- J58889AB fuse panels, 65
- J58890A EPN/PPN cabinet, 65, 66
- J58890AF expansion control cabinets, 66, 68
- J58890AH control carriers, 65, 67, 70
- J58890AJ duplicated control carriers, 65, 68, 71
- J58890AP processor carriers, 65, 68, 72
- J58890BB port carriers, 65, 66, 68, 73
- J58890CE-2 AC power distribution units/battery chargers, 43
- J58890CF-2 DC power distribution units, 50
- J58890CG DC power distribution units, 56
- J58890CH-1 AC power distribution units, 47
- J58890H port cabinets, 13, 85
- J58890L BCCs, 13, 77, 80
- J58890M duplicated control cabinets, 77, 82
- J58890MA-1 CallVisor ASAI over DEFINITY LAN Gateway port assemblies, 114
- J58890R enhanced DC rectifier cabinets, 56
- J58890SA SN carriers, 16, 65, 66, 68, 76
- Japan
  - ringing patterns, 224
  - TN429/B DIOD trunk, 116
  - TN439 tie trunk, 117
- JC8890AF expansion control cabinets, 74

---

**K**

- KS-21906, L9 48 VDC battery, 45

---

**L**

- LAN Gateway, 115
- large battery power backup, 49
- LASER devices, 216
- light intensity, 35
- light signals, 224
- lightning protection, 60
- lightwave transceivers, 164
- lines, representative numbers, 169
- Local Area Network (LAN), 140, 146, 165
  - DEFINITY LAN gateway, 80
  - CallVisor ASAI, 114
- loopback tests, 132

---

**M**

- main system configurations, 4
- maintenance circuit packs
  - TN771D, 132
  - TN775/B, 89, 133
  - TN1648, 142
- Malaysia, 224
- mass storage (UN332), 160
- MCCs (multicarrier cabinets)
  - AUX connector capacity, 65
  - auxiliary cabinets, 65
  - carrier types, 15, 67
  - configuration guidelines, 29
  - control carriers, 70
  - DC power distribution, 51
  - DC powered layout, 64

**MCCs, (continued)**

- duplicated control carrier, 71
- expansion control cabinet, 74
- fan units, 58
- ground integrity, 60
- port carriers, 73
- power distribution, 46, 47
- power systems, 23
- PPN cabinets, 65
- SN carriers, 76

**MDFs, 32, 101**

memory circuit packs, 143

MET line circuit packs, 124

MF Espana, 125

MFC signaling, 224

microprocessor/external RAM, 104

Mobility Manager, 226, 229

multifunction circuit packs

TN567, 114

TN2208, 114, 152

multimedia interfaces, 135

multimedia voice conditioners, 135

multimode fiber transceivers, 164

music on hold interfaces, 163

---

**N**

neon power units, 128, 131

NETCON. See network control circuit pack.

Netherlands, 224

network control (UN332), 160

network control circuit pack, 137

network control/packet interface circuit packs

TN794, 140

New Zealand, 224

nonUS power requirements, 42, 43

NPEs, 104

---

**O**

OPS ports

TN464C/D/E/F, 118, 151, 157

TN767C/D/E, 130

Oryx/Pecos operating system, 11

OTDR tests, 217

overvoltage protections, 59

---

**P**

PACCON. See packet control circuit pack.

packet bus logical links, 9

packet control circuit pack, 134, 137, 149

packet data line circuit packs, 120, 124

packet gateway circuit pack, 123

packet interfaces, 118, 143

peripherals, ground isolation, 51

PGATE. See packet gateway circuit pack.

pipe grounds, 53

PNs, 8

pocket telephones, 226

POEs, 170

pooled modem circuit packs, 128

port cabinets, 13, 85

port carriers, 65, 66, 68

port circuit logical links, 9

port circuit packs, 102

power

AC to DC converters, 65

backup, 47, 48

control for carriers, 142

current limited, 68

DC requirements, 42, 43

feeders, 37

- power, (continued)
    - global requirements, 42, 43
    - single phase 240 VAC, 37
    - sources, 37
    - transformers, 54
    - WFBs, 227
  - power converters
    - 631DA1/B1, 43, 111
    - 644A1/B1, 112
    - 645B, 43
    - 645B1, 112
    - 649A, 43, 52, 112
    - 650A, 43, 112
  - Power Supply, AC, 650A, 112
  - Power Supply, AC, WP-1217A, 113
  - Power Supply, DC, 644A, 112
  - Power Supply, DC, 645B, 112
  - Power Supply, DC, 649A, 112
  - power units
    - AC
      - 631DA1/B1, 43, 111
      - 650A, 112
      - J58890CE-2, 43
    - DC
      - 644A1/B1, 112
      - 645B1, 112
      - 649A, 52, 112
      - 676B, 56, 113
    - distribution, 44
    - distribution (J58890CH-1), 47
    - electrical components, 44
    - neon (TN755B), 128, 131
  - PPNs
    - alarms (TN1648), 142
    - cabinets, 15, 65, 89
    - SPEs, 3
  - PRI converters
    - DASS (TNCCSC-1), 159
    - DPNSS (TNCCSC-2), 159
  - processors
    - circuit packs
      - TN790, 8, 136
      - TN798, 8, 140
    - interfaces (TN765), 118, 130, 136
    - J58890AP carriers, 65, 68, 72
    - UN331B, 8, 159
  - PROM (TN790), 137
  - protections, system, 59
  - protective grounds, 53
- 
- ## R
- radio controller (TN789), 136
  - radio frequency noise, 36
  - RC. See radio controller.
  - RCs (TN789), 226
  - receptacle strips, 65
  - recovery (resets), 217
  - rectifier modules, 165, 167
  - relays, DC power, 45, 46
  - reliability systems, 91
  - representative lines/trunks, 169
  - requirements
    - floor areas, 23
    - international, 18, 42
    - sites, 23
  - response times, 170
  - ring generators, 46, 128, 151
  - ringing patterns, 223
  - RISC processors, 8
  - RM0850HA100 rectifier modules, 165, 167
  - Russia
    - MF (TN744B/C/D), 125
    - MFR (TN2182/B), 147
    - MFR (TN744B/C/D), 125
    - TN2199 CO trunk, 151

---

**S**

SAKIs, 103

SCCs (single carrier cabinets)

- acoustic noise levels, 37
- configurations, 28
- DC power supply (676B), 56
- duplicated control cabinets, 82
- fan units, 59
- port cabinets (J58890H), 85
- power systems, 55
- types, 77
- typical stacks, 79

SCSI drives, 144

service circuit packs, 103

Singapore, 224

single mode fiber optics, 163

single phase 240 VAC, 37

single point ground terminals, 54

site requirements, 23

small battery power backup, 48

SN carriers, 16, 65, 66, 68, 76

SN clock circuit packs, 76, 122

sneak fuse panels (507B), 60

sneak protectors, 59

SNIs (TN573/B), 9, 76, 122

solid state voltage protection, 59

Spain

- MFE (TN744B/C/D), 125
- ringing patterns, 224

speech synthesizers

- TN433, 116
- TN457, 117
- TN725B, 123

SPEs, 8

standard reliability, 91, 92, 94

standards

- electromagnetic compatibility, ii

Sweden, 224

system

- access/maintenance, 142
- administration, 19
- architecture, 11
- cabinet components, 12
- components, 3
- configurations, 4
- duplication options, 18
- initialization, 217
- layout/cabling distances, 212
- protections, 59
- recovery, 217
- reliability configurations
  - critical, 91, 93
  - high, 91, 93, 96
  - standard, 91, 92, 94
- response times, 170
- version comparisons, 20

---

**T**

T-1 (24-channel) circuit packs

- TN574, 122
- TN1654, 143

T-1 digital network interface, 163

tape drives, data cassettes, 114

tape drives, SCSI, 144

TCP/IP, 140

TDM buses, 8

technical specifications, 169

temperature, 34

terminals

- grounding, 54
- supported, 17
- wireless, 228

three phase VAC power, 37

- tie trunk circuit packs
  - TN437, [117](#)
  - TN439, [117](#)
  - TN458, [117](#)
  - TN760B/C/D, [129](#), [152](#)
  - TN2140/B, [145](#)
- TN2305 ATM-CES Trunk/Port-Network interface, [155](#)
- TN2499 Net/Pac field upgrade, [156](#)
- TN417 auxiliary trunk, [115](#)
- TN419B tone clock, [89](#), [115](#)
- TN420 tone detector, [115](#)
- TN429/B DIOD trunk, [116](#)
- TN433 speech synthesizer, [116](#)
- TN436B DID trunk, [116](#)
- TN437 tie trunk, [117](#)
- TN438B CO trunk, [117](#)
- TN439 tie trunk, [117](#)
- TN447 CO trunk, [117](#)
- TN457 speech synthesizer, [117](#)
- TN458 tie trunk, [117](#)
- TN459B DID trunk, [118](#)
- TN465/B/C CO trunk, [119](#)
- TN468B analog line, [119](#)
- TN479 analog line, [119](#)
- TN553 packet data line, [120](#), [124](#)
- TN556/B/C ISDN-BRI line, [120](#)
- TN566/B alarm, [114](#)
- TN567 multifunction, [114](#)
- TN570/B/C EI, [89](#), [122](#), [133](#)
- TN572 SN clock, [76](#), [122](#)
- TN573/B SNI, [9](#), [76](#), [122](#)
- TN574 DS-1 converter, [122](#)
- TN577 PGATE, [123](#)
- TN722B DS-1 tie trunk, [123](#)
- TN725B speech synthesizer, [123](#)
- TN726/B DTE, [120](#), [123](#)
- TN735 MET line, [124](#)
- TN742 analog line, [124](#)
- TN746/B analog line, [125](#), [128](#), [137](#), [152](#), [153](#)
- TN747B CO trunk, [126](#)
- TN748/B/C/D tone-detector, [127](#)
- TN750/B/C announcement, [127](#)
- TN753 DID trunk, [127](#)
- TN755B neon power, [128](#), [131](#)
- TN756 tone-detector, [128](#)
- TN758 pooled modem, [128](#)
- TN760B/C/D tie trunk, [129](#), [152](#)
- TN762B hybrid line, [129](#)
- TN765 processor, [118](#), [130](#), [136](#)
- TN768 tone clock, [131](#)
- TN769 analog line, [131](#)
- TN771D maintenance/test, [132](#)
- TN772 duplication, [132](#), [137](#)
- TN775/B maintenance, [89](#), [133](#)
- TN776 EI, [133](#)
- TN777B network control circuit pack, [133](#), [137](#)
- TN780 tone clock, [134](#)
- TN787F/G multimedia, [135](#)
- TN788B multimedia, [135](#)
- TN789 RC, [136](#), [226](#)
- TN790 processor, [8](#), [136](#)
- TN798 processor, [8](#), [140](#)
- TN1648 system maintenance, [142](#)
- TN1650B memory, [143](#)
- TN1654 DS-1 converter, [143](#)
- TN1655 packet interface, [118](#), [143](#)
- TN1656 tape drive, [144](#)
- TN1657 disk drive, [144](#)
- TN2135 analog line, [144](#)
- TN2136 DLC 2-wire DCP, [144](#)
- TN2138 CO trunk, [144](#)
- TN2139 DID trunk, [144](#)
- TN2140/B tie trunk, [145](#)
- TN2144 analog line, [145](#)
- TN2146 DID trunk, [145](#)
- TN2147/C CO trunk, [145](#)
- TN2149 analog line, [146](#)
- TN2169 alarm, [114](#), [146](#)
- TN2170 alarm/ethernet, [114](#), [146](#)

TN2180 analog line, 146  
TN2181 digital line, 146  
TN2182/B tone clock/detector & call classifier, 220  
TN2182/B tone clock/detector & call-classifier, 147  
TN2183 analog line, 147  
TN2184 DIOD trunk, 148  
TN2185 ISDN-BRI 4-wire, 148  
TN2198 ISDN-BRI 2-wire, 149, 215  
TN2199 CO trunk, 151  
TN2202 ring generator, 46, 128, 151  
TN2208 multifunction, 114, 152  
TN2224 2-wire, 24-port DCP, 154  
TN794 network control/packet interface, 140  
TN799 Control LAN (C-LAN) interface, 140  
TN799 control LAN interface, 140  
TN801 LAN Gateway interface, 141  
TN802 IP Trunk, 141  
TNCCSC-1, 159  
TNCCSC-2, 159  
tone clock circuit packs  
  TN419B, 89, 115  
  TN768, 131  
  TN780, 134  
  TN2182/B, 147, 220  
tone detector circuit packs  
  TN420, 115  
  TN2182/B, 220  
tone-detector circuit packs  
  TN748/B/C/D, 127  
  TN756, 128  
  TN2182/B, 147  
trunks, 169

---

## U

UN330B duplication, 159  
UN331B processors, 8, 159  
UN332 network control, 160  
United Kingdom  
  ringing patterns, 224  
  TN447 CO trunk, 117  
  TN457 speech synthesizer, 117  
  TN458 tie trunk, 117  
  TN459B DID trunk, 118  
  TN468B analog line, 119  
  TN4198B tone clock, 115  
UPS, 45, 47, 48

---

## W

WATS trunks, 126  
WFB. See wireless fixed base.  
WFBs, 227  
Wide Area Network (WAN), 165  
wireless fixed base, 136  
wireless terminals, 228, 229  
WP-1217A Power Supply, 113  
WP-91153 AC power, 55  
WP-92464 AC power, 227

---

## X

X.25 links, 9

