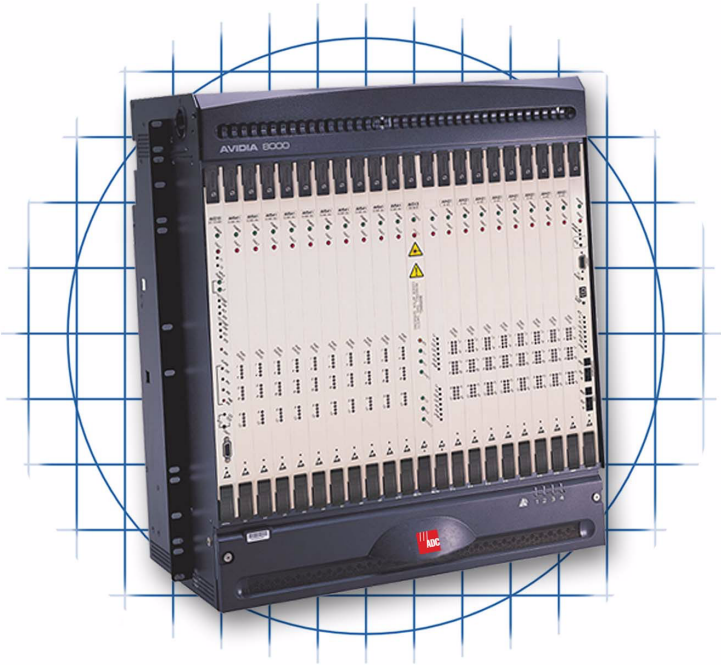
Avidia

AV8000 Installation Manual



Catalog Number
AVD4574I4 Issue 4

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ABOUT THIS INSTALLATION MANUAL

Use this manual to install the Avidia® 8000 23-inch Central Office integrated access concentrator and to:

- learn about the system
- complete wiring for power, grounding, alarms, and clock
- complete cabling for network interface and subscriber interface
- install management, network, and subscriber cards
- connect a PC or network interface for system management
- set up for special applications
- maintain the system
- contact ADC for assistance

The user must read and observe general safety precautions described in Chapter 1, "Prepare for Installation" on page 1 when installing the Avidia system. Follow installation procedures in the order they are given. Appendix D provides a glossary of the terms and abbreviations used in this manual.

ABOUT RELATED DOCUMENTS

This document is part of a set of documents that assist you in planning, installing, configuring, and using an Avidia system. Other documents in the set are described below.

Document Title	Catalog Number	Description
Documents about Chassis and Cards		
AVIDIA 2200 Installation Manual	AVD4503I*x*	Provides installation instructions for the ADC Avidia 2200 integrated access concentrator Also includes a description of and installation for the Avidia 8xT1 and 8xE1 (providing network uplink and management), ADSL subscriber, and POTS splitter cards.
AVIDIA 3000 Installation Manual	AVD4575I*x*	Provides installation instructions for the ADC Avidia 3000 integrated access concentrator and the AV8100 ADSL voice shelf. Also includes a description of and installation for all Avidia cards.
AVIDIA 6000 Installation Manual	AVD4560I*x*	Provides installation instructions for the ADC Avidia 6000 integrated access concentrator. Also includes a description of and installation for all Avidia cards.
Documents about System Configuration		
AVIDIA MuxWare System Configuration and Management User Manual		Provides instruction for configuring an Avidia system and remote devices such as ADC modems or other Avidia concentrators using either a Command-Line Interface or an HTML graphic user interface (GUI).
AVIDIA SwitchWare System Documentation Set	AVD4624I*x*	Five-volume documentation set which provides instruction for configuring an Avidia system and remote devices such as ADC modems or other Avidia concentrators using either a Command-Line Interface or an HTML graphic user interface (GUI). Volumes include: Getting Started; Command Line Interface; Web Interface; technology and Applications; and Glossary.
StarGazer™ Element Management System Documentation Set	AVD4601I*x*	Seven-volume documentation set which provides instruction on how to use the StarGazer network management application. This application provides a suite of features used to manage and fine-tune Avidia and Campus systems. These features include: configuration, performance (port, ATM, and internetworking statistics), faults, events, and system maintenance. Volumes include: Getting Started; Avidia Configuration; Avidia Management; Campus; Network Management; Technology and Applications; and Glossary.

Document Title	Catalog Number	Description
Documents about Megabit Modems		
Megabit Modem 500L, 600F, 700F Installation Guide	MMD4068I*x*	Provides quick installation instructions for the Megabit Modem® 500L, 600F, and 700F. These modems are managed through the 10/100 Base-T ports using a Web browser or through the console port. The 600F and 700F modems provide full-rate service over a single-pair telephone line and have a downstream Asymmetric Digital Subscriber Line (ADSL) transmission up to 7.552 Mbps. The upstream ADSL transmission is up to 928 kbps. The 500L, 600F, and 700F modems G.lite rates are 1.5 Mbps downstream and 512 kbps upstream.
Megabit Modem 400F, 500L, 600F, 700F User Guide	MMD4090I*x*	Provides instruction on the installation, access requirements, and configuration for the 400F, 500L, 600F, and 700F. Installation covers the physical setup of the modem such as where to place the unit and how to connect the cables. Access requirements guide the user in how to access the modem by Web browsing to the modem. Configuration instructs the reader how to use a Web browser to configure the different modem models as well as monitor statistics.
Megabit Modem 300S Installation Guide	425-001-100-*xx*	Provides installation instructions for this SDSL modem. The modem does not require configuration.
Skyrocket USB 200L-B Installation Guide	MMD4094I*x*	Provides quick installation instructions for the Megabit Modem® Skyrocket™ 200L-B. This modem is connected to a USB port on a computer running Microsoft Windows 98, Microsoft Windows 2000, and Microsoft Windows Millennium Edition. The 200L-B modem provides G.lite service over a single-pair telephone line with downstream Asymmetric Digital Subscriber Line (ADSL) transmission up to 1.5 Mbps. The upstream ADSL transmission is up to 512 kbps.
Skyrocket USB 200F-M Installation Guide	MMD4098I*x*	Provides instruction for installing and configuring the Megabit Modem® Skyrocket™ 200F-M. This modem is connected to a USB port on a computer running Microsoft Windows 98, Microsoft Windows 2000, and Microsoft Windows Millennium Edition. The 200F-M provides G.lite, DMT, or T1.413. service. In addition, it supports routing, bridging, and PPP Over ATM.
Megabit Modem 701G User Guide	MMD4099I*x*	Provides instruction on installing and configuring the Ethernet modem through the command-line (console port and telnet session) and Web-based Interface. The MM701G employs G.SHDSL technology for symmetric, fixed-rate or rate-adaptive connection to a DSLAM or another MM701G while supporting PPP Over ATM, bridging, and routing sessions.

DOCUMENT CONVENTIONS

Special messages, identified by the icons, appear in the text. Their meanings are as follows:

Notes contain information about special circumstance. Follow the appropriate warnings and cautions when performing the tasks specified in this manual. You must connect the specified cables and wires only as indicated in the installation instructions. Additionally, read and understand all installation procedures before beginning each procedure.

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Cautions indicate the possibility of equipment damage or the possibility of personal injury. Observe the appropriate ESD (electrostatic discharge) precautions when installing the Avidia system.

ESD Susceptibility indicates that a device or assembly is susceptible to damage from electrostatic discharge.

FCC CLASS A COMPLIANCE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

TABLE OF CONTENTS

PREPARE FOR INSTALLATION 1

This chapter describes preparation and prerequisites for installing an AV8000 system. Before you begin the installation in Chapter 2, complete the following steps in this chapter.

OBSERVING SAFETY PRECAUTIONS

Follow the appropriate warnings and cautions when performing the tasks specified in this manual. You must connect the specified cables and wires only in the order listed and as indicated in the installation instructions. Additionally, read and understand all installation procedures before beginning.

- **Follow local grounding practice to ensure a good frame ground connection to the AV8000 chassis. The frame ground is required for secondary voltage protection.**
- **Electrical and mechanical shock hazards are present throughout the system; be aware of this possibility when power is applied to the chassis. Only qualified personnel should service the system.**
- **Do not connect the AV8000 chassis battery wires to a live power source. Ensure that you remove fuses from the CO equipment bay for each circuit you will use.**
- **The equipment must be connected to a protective ground in accordance with the instructions provided in this manual. Improper grounding may result in an electrical shock.**
- **The minimum bend radius for a fiber-optic cable is 1.5 inches (38.10 mm). Do not use a bend radius of less than 1.5 inches when looping the fiber-optic cable in the cable tray.**
- **Do not look directly at the fiber-optic ports on the front of the OC3 network card or into the end of any fiber-optic cable.**

OBSERVING ESD PRECAUTIONS

Observe these electrostatic discharge (ESD) precautions when installing the AV8000 system. Follow installation procedures in the order that they are given.

This symbol placed next to a paragraph title or within a paragraph indicates that the entire procedure involves equipment sensitive to electrostatic discharge. You must wear an antistatic wrist strap connected to the ESD jack on the AV8000 chassis to perform the installation procedures. You must also observe normal ESD precautions when handling electronic equipment. Do not hold electronic plugs by their edge. Do not touch components or circuitry.

PLANNING THE AVIDIA SYSTEM

Use the following sections to select components for the Avidia system. Allow for future expansion when you select and place components.

Compatibility

Select components for your system that are compatible:

- network card(s) to meet the network interface requirement, as well as the bandwidth and traffic needs of your network (see "Adding to an Existing System" on page 5 for other uses of network cards)

If selecting an ADSL subscriber card, use the Avidia Model AV541-LP (with line protection) to connect directly to an MDF. Use the Avidia Model AV541 to connect to a voice shelf.

- subscriber cards to meet the network, transmission, and distance needs for your subscribers, for example:
  - Does symmetric (frame SDSL, IDSL) or asymmetric (ADSL) transmission best meet the applications needs for the subscriber?
  - Which transmission type provides service to a subscriber who is distant from the CO?
  - Which transmission type provides the appropriate rate for the reach?
- for POTS, use ADSL subscriber cards AV541 (without line protection) and connect to a VOICE shelf to multiplex voice and data
- Customer Premises Equipment (CPE) must be compatible with transmission type of the subscriber card, for example:
  - for ADSL subscriber cards, use Megabit Modem 700F, 600F, 500L, 400F or other DMT ADSL modems
  - for frame SDSL subscriber cards, use Megabit Modem 300S or other SDSL modems
  - for IDSL subscriber cards, use modems recommended as a result of compatibility testing and listed on the ADC.com Web site
  - for cell SDSL subscriber cards, use modems recommended as a result of compatibility testing and listed on the ADC.com Web site

Card Placement

You may want to strategically leave slots available for expansion (see "Adding to an Existing System" on page 5). Install cards in these AV8000 chassis slots:

- management card in slot 1
- OC3, DS3, and DSX-1 network cards in slots 11 and 12 (OC3 card can be used in a subscriber slot for special applications such as subtending, see Chapter 8); typically, use slot 12 as the primary network card slot
- 8xDS1and 8xE1 network card in any subscriber card slot (S2 through S10 and S13 through S21)
- ADSL, cell SDSL, frame SDSL, and IDSL subscriber cards in any subscriber card slot S2 through S10 and S13 through S21, in any combination (it is efficient to place ADSL cards in adjacent slots for cabling purposes when you connect to a Voice shelf to combine voice and data)
- Empty card slots should be filled with one or more of the blank faceplates provided with the AV8000. This not only reduces the levels of electromagnetic radiation emanating from the chassis, but also aids in maintaining optimum cooling for the cards installed in the system.

Adding to an Existing System

When selecting system components, consider future expansion to your Avidia system, with these as possible options:

If you want to add a:	Then:
AV8000 Chassis	Consider installing the first chassis in the top position in a 7-foot Telco rack to allow further expansion in the middle and bottom positions. Remember, you can have a maximum of three AV8000 chassis per rack, when a fuse panel is not installed in the same rack.
Network card for:	
Redundancy	Add a second network card, of the same type, in slot 11 to have a backup connection to the same network uplink source.
Second network connection	Add a second network card, of the same or of a different type, in slot 11 to connect to a separate or second network uplink source.
Subtending	Add a one or more additional network cards to subtend other Avidia chassis that are downstream from the subtending chassis. This card can be: • another DS3 card in slot 11 • another OC3 card in slot 11 or any subscriber slot (2-10 or 13-21) • 8xDS1 card in any subscriber slot (2-10 or 13-21) • 8xE1 card in any subscriber slot (2-10 or 13-21)
Subscriber card	Leave subscriber slots (2-10 or 13-21) open to accommodate expansion of subscriber services. You may want to group cards in the chassis for ease of cabling. There is no technology limitation, however, for card placement. Available xDSL cards are: • 12-port ADSL (two 12-port ADSL cards are available (AV541 and AV541-LP). Use the AV541-LP card when connecting the ADSL subscriber line directly to the MDF for data transmission that does not include POTS. Use the AV541-LP card when you connect the subscriber line to a voice shelf to multiplex data with POTS. The voice shelf provides the line protection required for the ADSL card. • 24-port cell SDSL • 24-port frame SDSL • 24-port IDSL
POTS with ADSL	Leave space in the CO rack for co-locating a voice shelf. Also, when you combine a voice shelf with an AV8000 chassis for implementing data and POTS, select the ADSL card without line protection. The voice shelf provides line protection for the ADSL card.

INSTALLATION SITE REQUIREMENTS

Chassis Installation Requirements

The AV8000 mounts in a 23-inch, 7-foot or $7^1/_2$-foot CO Telco rack. You can install up to three chassis in one rack. Allow adequate space for ventilation and cabling. The table below shows chassis dimensions and minimum clearances for installation.

Weight	67 lbs (30.39 kg) for chassis without cards
Height	24.47 inches (621.54 mm) (requires 14U space—1U = 1.75" of usable internal rack space)
Depth	12.00 inches (304.80 mm)
Width	23.17 inches (588.52 mm) with mounting brackets 21.17 inches (537.72 mm) without mounting brackets
Clearance between chassis	0.50 inches (12.70 mm) minimum (this clearance applies to the bottom of the chassis only and is required for fan air flow)

Power Requirements

Verify that the power source where you will connect the Avidia system is properly grounded and falls within the recommended voltage range of -42.5 Vdc to -56.5 Vdc, with a minimum of 30 Amps.

Each AV8000 system provides a terminal block with connection points for two -48 Vdc Telco supplied battery sources. Only one battery connection is required, with the second connection provided for redundancy. The system also requires an external fuse panel with separate fusing for each battery source used.

Alarm Requirements

The AV8000 system monitors alarm conditions, including alarms occurring at the remote end. Connect alarm pins, when required by local practice, to indicate the alarm conditions such as audible alarms, visual alarms, or power relay alarms. You can connect an Alarm Cut Off (ACO) pushbutton to disable audible alarm output remotely.

Clocking Requirements

Avidia system clocking provides the capability to synchronize all data transmissions with a common timing source within the Avidia System. Redundancy is provided, through the priority ranking of clock sources, in order to achieve fault tolerance and timing recovery in the case of a clock source failure. User configuration provides for selection and ranking of clock sources. A clock source is selected for individual cards in a system. At this time, only the following subscriber cards support the system clock (Sysref Clock) feature:

- AMC
- DS3
- OC3
- DSI/E1
- IDSL

Clocking Systems

There are four related clocking systems associated with an Avidia chassis. These are discussed in the following sections.

BITS OUT Clock

The first clocking system for the Avidia chassis is the BITS clock. A clock source is selected that will serve as the BITS OUT clock. Potential BITS OUT clock sources are BITS IN 1, BITS IN 2, or none. The BITS OUT clock source is selected by the user, through configuration software, and routed by the primary network card to the BITS OUT wire wrap pins on the back of the Avidia chassis.

Network Card Clock/System Reference Clock

The second clocking system is the System Reference clock (Sysref). Cards in the network card slots, slots 11 and 12, are user configured to select the Sysref clock source. Both network card slots can drive Sysref clock, but not at the same time. Normally, one network card (primary) provides Sysref to the Avidia backplane and the other network card (secondary) uses the Sysref clock off the backplane. The Sysref clock signal is also made available to all of the subscriber cards from the backplane as well. Sysref clock sources are BITS IN 1, BITS IN 2, a network card's ports' recovered receive clock, or the network card's local oscillator. Sysref clock is monitored by the network card for failure.

Subscriber Card Clock

The third clocking system provides clocking for the subscriber card. Subscriber card clock sources are Sysref, subscriber card's ports' recovered receive clock, or subscriber card local oscillator.

Port Clock

The fourth clocking system provides clocking for the subscriber card port. This clock is protocol dependent. Potential port clock sources are:

- Local (uses the card clock source that was selected for the subscriber card)
- Loop (clock received at the port is recovered and used to transmit data).

If you do not configure a clock source for a card, configuration defaults to the card's local oscillator.

Typical Clock Source Configuration

Typically, the primary network card receives the master clock from a BITS clock such as a Stratum 1 clock, through the chassis backplane inputs BITS IN 1 or BITS IN 2. The primary network card outputs the clock signal BITS OUT, to the backplane wire wrap pins, and Sysref to the Sysref backplane bus. The BITS OUT clock daisy chains the master clock (BITS out to BITS in) through network cards from one Avidia shelf to the next in a central office rack. The Sysref clock is distributed on the Backplane of the Avidia shelf for use by the subscriber cards and the secondary network card not currently configured to supply this clock signal.

On the subscriber cards, the Sysref clock can be used to synchronize data transmissions. Or, the user can configure the subscriber card to utilize the recovered received clock from a port for transmitting data.

Clock Priority and Redundancy

Clock sources for the network cards and the subscriber cards are configured and ranked by the user. Ranking allows you to indicate the priorities for each clocking source, through configuration software, so that if the present clocking source should fail, the next lower ranked clock source would take its place providing redundancy for the failed clocking source.

Clock sources are constantly monitored by Avidia software; therefore, when a failed clock becomes available once again, the system automatically switches to this recovered higher ranking clock source.

Clocking the IDSL Card

The IDSL subscriber card requires special clocking consideration. Normally, the BITS IN clock is used for locally clocking the IDSL frame-based card. In this case, the BITS clock must be:

- T1 signal, either framed or unframed
- DSX-1 signal, either framed or unframed
- minimum of one clock pulse per 8 bits time frame
- Alarm Indicator Signal (AIS) acceptable
- only bipolar violation accepted is B8ZS

Environmental Requirements

The AV8000 system is approved for operation in the environment described below when installed according to the instructions in this installation manual.

Ambient Operating Temperature	+32 °F to +122 °F (0 °C to +50 °C)
Relative Humidity	10% to 80% (non-condensing)
Operating Altitude	up to 10,000 feet (3048 m)
Ambient Storage Temperature	-40 °F to +158 °F (-40 °C to +70 °C) 5% to 95% relative humidity
Storage Altitude	-1000 to +30,000 feet (-305 m to +9144 m)
Environment Space	Controlled (indoor)

See Appendix A for additional specifications for the AV8000.

PROVISIONING SYSTEM CABLING

Network Cabling

Network connectors interface the AV8000, through network card(s), to an ATM backbone network, a LAN, or a WAN. Each of the following network cards has its own connector, either on the card or on the AV8000 chassis backplane, for each network interface:

- DS3 (this page)
- 8xDSX-1, 8xDS1, or 8xE1 (this page)
- OC3 network interface (page 11)

DS3

For recommended cabling, use a 75 Ω coaxial cable with 75 Ω BNC connectors. Ground the cable shield at one end only. Otherwise, use your local practice to determine cabling. The maximum length for this network cable is 450 feet (137 m).

DSX-1, DS1, E1

For recommended cabling for these network interfaces, use 24 AWG twisted-pair copper wire. Otherwise, use your local practice to determine cabling. The maximum lengths for these network cables are:

- DSX-1: 655 feet (199 m)
- DS1: 6 kilofeet (1,829 m)
- E1: 4.8 kilofeet (1463 m)

OC3

An OC3 network card has dual-PHY (two physical) connectors on the card front, behind the safety cover. One interface provides the primary network uplink connection. The second interface provides Automatic Protection Switching (APS), which is a redundant connection. When implementing APS, provide cables and connectors for two physical ports. If not implementing APS, provide a cable and connector for only one physical port. Select the fiber and connector as follows, from the table below:

- For an AV311 OC3 network card, use multimode fiber with SC fiber connectors.
- For an AV312 OC3 intermediate-range (IR) network card, use single mode fiber with SC fiber connectors.
- For an AV313 OC3 long-range (LR) network card, use single mode fiber with SC fiber connectors.

The minimum bend radius for the fiber-optic cable is 1.5 inches (38.10 mm). The diameter of the core/cladding is 62.5/125.5 μm (micrometers).

Use This Fiber	With This OC3 Network Card	Maximum Output Power (dBm)	Minimum Output Power (dBm)	Wavelength (NM)	Minimum Input Power (dBm)	Maximum Input Power (dBm)	Maximum Cable Length
Multimode	AV311	-14.0	-19.0	1310	-30.0	-14.0	6,561 feet (2 km)
Single Mode IR	AV312	-8.0	-15.0	1310	-29.0	-8.0	49,212 feet (15 km)
Single Mode LR	AV313	0.0	-5.0	1310	-32.0	-3.0	131,233 feet (40 km)

Subscriber Cabling

For the subscriber interface, connect the AV8000 system in one of these ways:

- With ADSL Network Cards and ADSL POTS, the AV8000 chassis connects to the Avidia 8100 ADSL voice shelf.
- Without POTS, the AV8000 chassis connects directly to the MDF.

For information about selecting the appropriate ADSL Subscriber Card, see “Install Subscriber Cards” on page 60.

VERIFYING INSTALLATION TOOLS

To install the AV8000, use the following tools:

- hand lift for moving and lifting the AV8000
- #2 Phillips screwdriver
- flat-blade screwdriver (3.5 mm by 0.5 mm blade)
- wire-wrap tool
- insulated handle wire cutters

UNPACKING AND INSPECTING THE AVIDIA SYSTEMS

AV8000 System

Each AV8000 ships in a protective carton. The management card, network cards, and Network Cards ship separately from the chassis. Upon receipt of the system components, verify the contents and the condition.

1 Open each carton and remove all enclosed packing materials. Save the packing materials in case you need to repack the chassis later.

2 Visually inspect the chassis for signs of damage. If the equipment has been damaged in transit, immediately report the extent of the damage to the transportation company and to your sales representative. Order replacement equipment if necessary.

3 Check the contents of each shipping carton against the packing list. Ensure a complete and accurate shipment. If the shipment is short or irregular, contact your sales representative. If you must store the equipment for a prolonged period, store the equipment in its original protective shipping carton.

In addition to this manual, the shipping carton contains eight panhead mounting screws, measuring 12-24 x $^{1}/_{2}$ inch. These are used to install the AV8000 into a 23-inch Telco rack using a Phillips screwdriver.

AV8000 Cards

Each management, network, or subscriber card ships in a protective carton separately from the AV8000. Upon receipt of the system components, verify contents and condition:

1 Open each carton and remove all enclosed packing materials. Save the packing materials in case you need to repack the card later.

2 Visually inspect the card for signs of damage. If the equipment has been damaged in transit, immediately report the extent of the damage to the transportation company and to your sales representative. Order replacement equipment if necessary.

3 Check the contents of each shipping carton against the packing list. Ensure a complete and accurate shipment. If the shipment is short or irregular, contact your sales representative. If you must store the equipment for a prolonged period, store the equipment in its original protective shipping carton.

WHAT TO DO NEXT

Go to Chapter 2, “Install the Chassis” to install the AV8000 chassis.

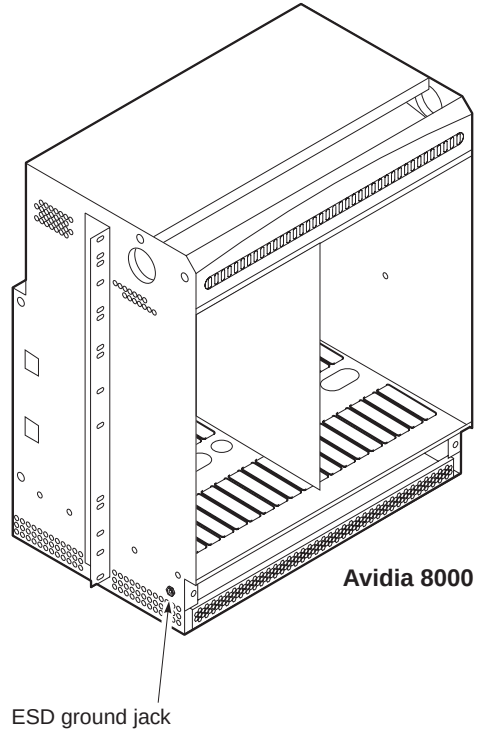
2 INSTALL THE CHASSIS

This chapter describes how to install an AV8000 chassis in a standard 23-inch Telco rack. Refer to the following sections:

ATTACHING AN ESD WRIST STRAP TO CHASSIS

Procedures marked with the ESD symbol require you to use an antistatic wrist strap attached to the ESD ground jack on the AV8000 chassis. See the following illustration to locate the ground jack on each chassis.

You must wear an antistatic wrist strap connected to the ESD jack on the AV8000 chassis to perform the installation procedures. You must also observe normal ESD precautions when handling electronic equipment. Do not hold electronic plugs by their edge. Do not touch components or circuitry.



INSTALLING THE AV8000 CHASSIS

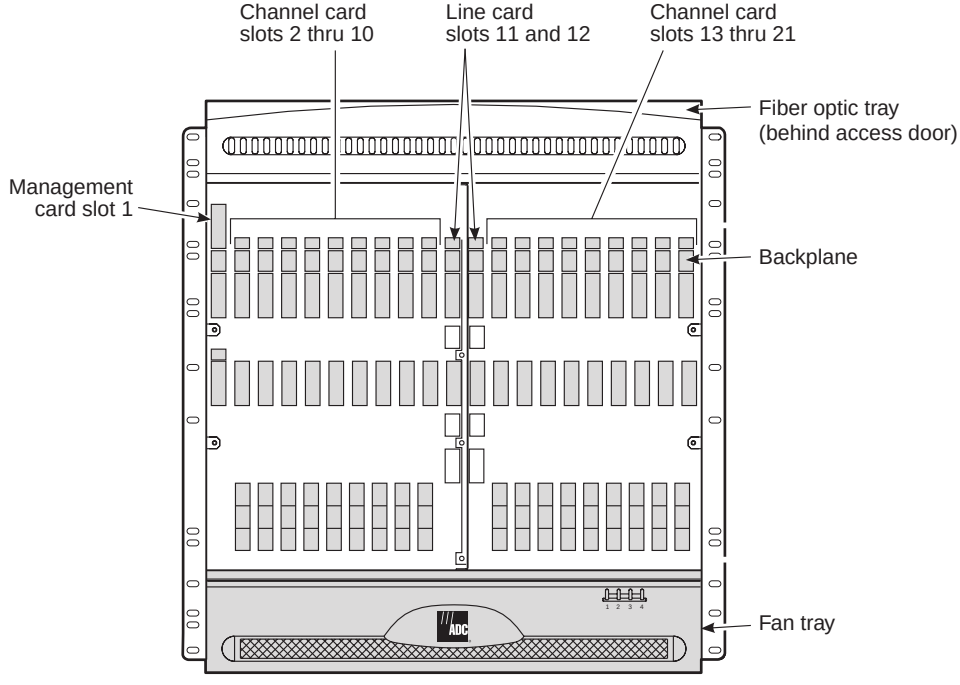
Install the AV8000 by following these procedures in the order given:

- Install the chassis into the rack (see below).
- Connect the chassis ground (page 18).
- Connect the battery (page 19).
- Connect alarms (page 23).
- Connect BITS clock (page 27).

Install the Chassis Into the Rack

Install the chassis into a standard 23-inch, 7-foot Telco rack:

1 Ensure that the mounting brackets are securely attached to each side of the chassis.



2 Position the chassis in the rack using a hand lift, if required. Allow a minimum of 0.5-inch (12.70-mm) clearance between the bottom of the chassis and the top of the next chassis.

3 Align the Telco rack vertical mounting holes with the chassis mounting bracket holes.

4 Secure each mounting bracket by inserting eight 12-24 x $^{1}/_{2}$ inch panhead screws and using a Phillips screwdriver.

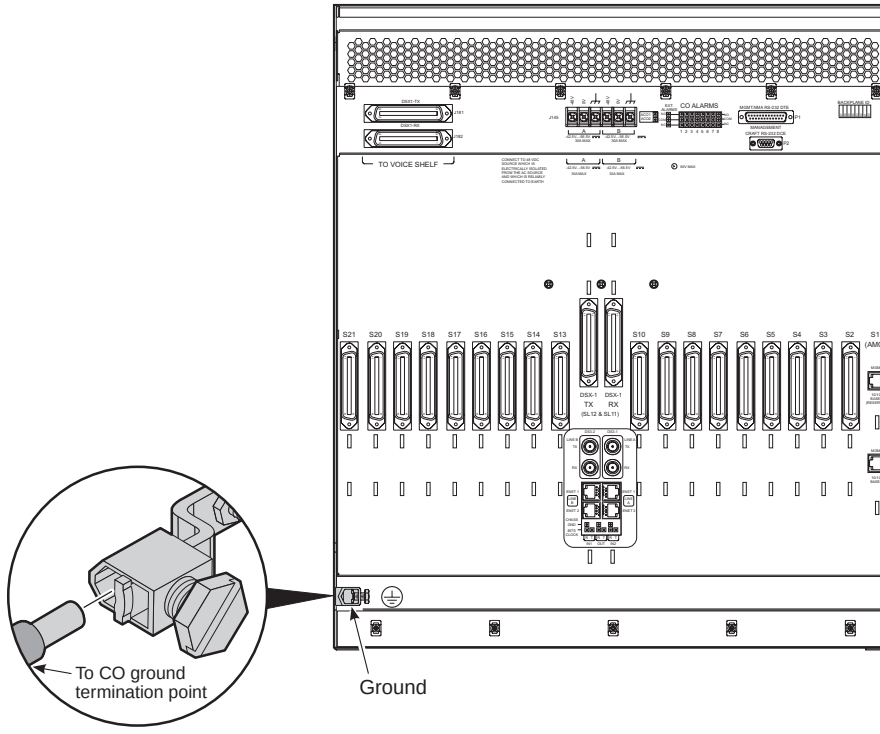
Connect the Chassis Ground

Recommendation: A minimum 6 AWG (American Wire Gauge) stranded copper with a maximum length of 5 feet (1.52 m).h

1 Using wire cutters with insulated handles, strip 0.5 inch (13 mm) of insulation from both ends of the ground wire.

Follow local grounding practice to ensure a good frame ground connection to the AV8000. The frame ground is required for secondary voltage protection. Improper grounding may result in an electrical shock.

2 Insert one end of the ground wire into the chassis ground lug, and tighten the screw. Ensure that the ground wire has a secure connection.



3 Connect the other end of the ground wire to the CO ground termination point or building earth ground. Ensure that the ground wire has a secure connection.

Connect the Battery

The AV8000 chassis requires connection to one -48 Vdc Telco supplied battery source.
A second battery source can be used for power that is redundant but isolated. The system also requires an external fuse panel with separate fusing for each battery source used (primary and secondary when used).

Recommendation: 10 AWG (2.99 mm diameter) stranded copper.

For conductor wires to connect the battery, use the color determined to be appropriate by your local practice, standards, or codes. These colors are a recommendation only:

- black conductor wire connected to the -48 Vdc (negative terminal)
- red conductor wire to the 0V battery return (positive terminal)

Electrical and mechanical shock hazards are present throughout the system; be aware of this possibility when power is applied to the chassis. Only qualified personnel should service the system.

Do not connect the AV8000 chassis battery wires to a live power source. Remove fuses from the CO equipment bay for each circuit you will use for a battery connection to the AV8000 chassis.

1 Remove the fuses from the CO equipment bay fuse panel for each circuit where you will terminate AV8000 chassis battery wires.

2 Using wire cutters with an insulated handle, strip 0.5 inch (12.7 mm) of insulation from both ends of each battery wire.

When required by local practice, add a lug to the end of each battery wire for ease of installation to the AV8000 chassis battery terminals.

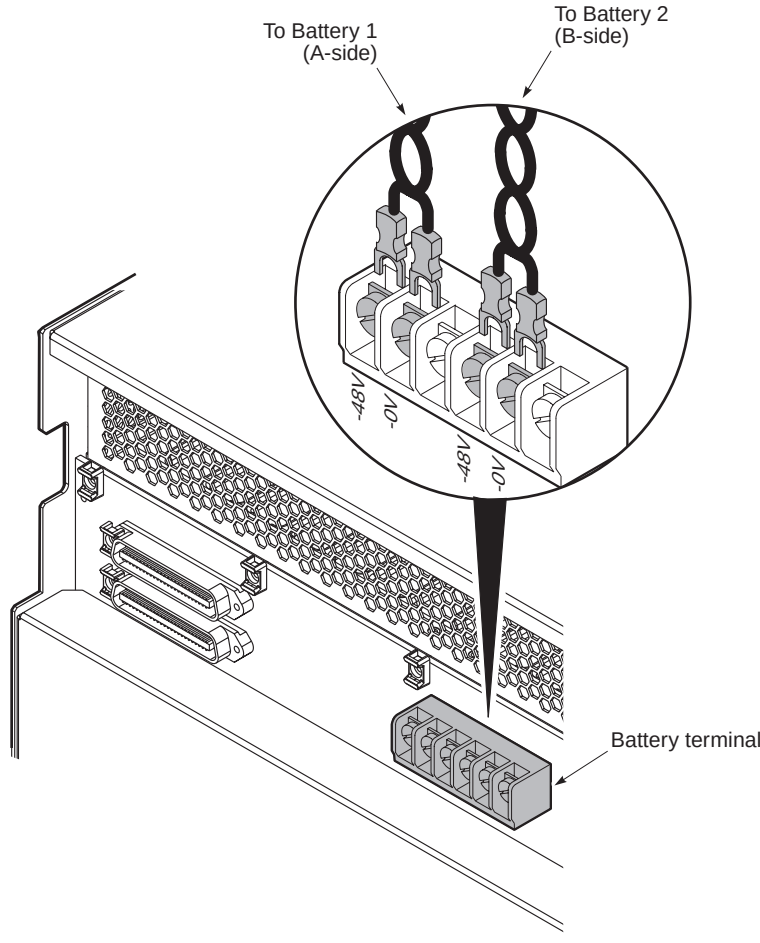
3 Attach battery wires to the AV8000 chassis backplane:

a Attach a wire to each A-side and B-side -48V terminal.

b Attach a wire to each A-side and B-side 0V terminal for battery return.

c Twist the A-side -48 Vdc and 0 Vdc wires to reduce magnetic interference. Use approximately 6 to 12 twists per foot, or follow local practice.

d Twist the B-side -48 Vdc and 0 Vdc wires to reduce magnetic interference. Use approximately 6 to 12 twists per foot, or follow local practice.


To Battery 1
(A-side)
To Battery 2
(B-side)
-48V
-48V
Battery terminal

4 Connect the battery wires, previously installed in Step 3 on page page 20, from the AV8000 chassis to the CO battery fuse panel:

a Connect the A-side 0V return wire from the chassis to the CO battery return (positive terminal) termination point.

b Connect the B-side 0V return wire from the chassis to the CO battery return (positive terminal) termination point.

c Connect the A-side -48V wire from the chassis to the equipment bay fuse panel (negative terminal) termination point.

d Connect the B-side -48V wire from the chassis to the equipment bay fuse panel (negative terminal) termination point.

Do not install the fuses in the equipment bay fuse panel at this time. Also, do not install cards at this time. You will install the fuses when you "Power Up the System" in Chapter 5. You will install cards into the AV8000 chassis in Chapter 6.

Connect Alarms

The AV8000 monitors alarm conditions, including alarms that occur at the remote end. Connect alarm pins to the CO alarm system to provide audible alarms, visual alarms, or power relay alarms according to local practice (see procedures below). Also, connect an Alarm Cut Off (ACO) pushbutton to remotely disable audible alarm output (page 26).

Connecting Audible and Visual Remote Alarms

Recommendation: A 22 to 24 AWG (0.32 to 0.2 square mm) solid copper wire. Relay contacts positions are: NO is normally open, COM is common, NC is normally closed

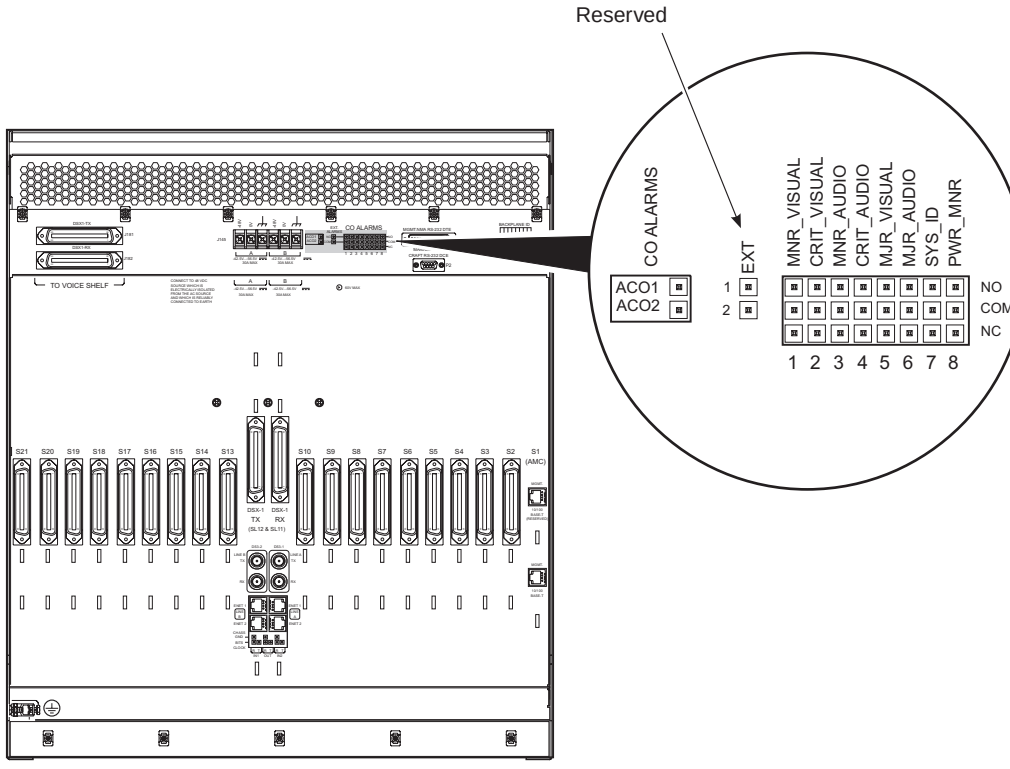
1 Using wire cutters with an insulated handle, strip 1.5 inches (38 mm) of insulation from the end of all required wires.

2 Locate the appropriate pins, described in the table below, for the alarm connection shown in the figure on page 25.

Alarm Condition	Pin Column	Description
MNR_VISUAL	1	Indicates a minor visual alarm. Connect this alarm to the minor alarm visual indicator of the CO alarm system. You cannot disable this alarm from the AV8000.
CRITICAL_VISUAL	2	Indicates a critical visual alarm. Connect this alarm to the critical alarm visual indicator of the CO alarm system. You cannot disable this alarm from the AV8000.
MNR _AUDIO	3	Indicates a minor audible alarm. Connect this alarm to the minor alarm audible indicator of the CO alarm system. Disable this alarm by pressing the ACO pushbutton on the management card front panel or by using the remote ACO.
CRITICAL_AUDIO	4	Indicates a critical audible alarm. Connect this alarm to the critical alarm audible indicator of the CO alarm system. You can disable this alarm by pressing the ACO pushbutton on the management card front panel or by using the remote ACO.
MAJ_VISUAL	5	Indicates a major visual alarm. Connect this alarm to the major alarm visual indicator of the CO alarm system. You cannot disable this alarm from the AV8000.
MAJ_AUDIO	6	Indicates a major audible alarm. Connect this alarm to the major alarm audible indicator of the CO alarm system. Disable this alarm by pressing the ACO pushbutton on the management card front panel or by using the remote ACO.
SYS_ID	7	Indicates that a critical, major, or minor alarm is active for the system.
POWER_MNR	8	Indicates loss of power and fuse alarms. This alarm condition clears only when the cause of the alarm is eliminated or repaired.

3 Using the wire-wrap tool, attach the stripped end of the wire to the appropriate CO ALARM chassis pin as described in the table on page 24.

4 Attach the other end of the wire to the appropriate indicator in the CO alarm system.


Reserved
CO ALARMS
ACO1
ACO2
EXT
1
2
MNR_VISUAL
CRIT_VISUAL
MNR_AUDIO
CRIT_AUDIO
MJR_VISUAL
MJR_AUDIO
SYS_ID
PWR_MNR
NO
COM
NC
1 2 3 4 5 6 7 8
TO VOICE SHELF
S21 S20 S19 S18 S17 S16 S15 S14 S13 S10 S9 S8 S7 S6 S5 S4 S3 S2 S1
(AMC)
DSX-1
TX
RX
(SL12 & SL11)

Connecting a Remote Alarm Cutoff

Two ways to silence audible alarms are:

- using the ACO pushbutton on the Avidia management card front panel
- connecting to a remote alarm cutoff function (as described in the following procedure)

> **Recommendation:** A 22 to 24 AWG (0.32 to 0.2 square mm) solid copper wire.
>
> Connect the ACO1 and ACO2 pins through a normally open (NO) contact switch. External contact closure of at least 0.5 seconds between the two pins indicates alarm input. Wire the relay contacts according to your local practice.

To connect a remote alarm, do the following:

1 Locate the ACO1 and ACO2 pins (page 25).

2 Using wire cutters with insulated handles, strip 1.5 inches (38 mm) of insulation from the end of both wires.

3 Using the wire-wrap tool, attach the stripped end of each wire to the appropriate ACO pin.

4 Attach the other end of each wire to the CO alarm system.

Connect an External BITS Clock

The AV8000 accepts external BITS clock input to manage device timing. See "Clocking Requirements" on page 7 for a list of valid BITS clock sources you can use for an AV8000 system. See the *Avidia System Configuration and Management User Manual* for more information about selecting and configuring clocking sources for an Avidia system.

You can connect both a primary and a secondary BITS clocking source to the chassis backplane using the BITS CLOCK IN1 (input 1) and BITS CLOCK IN2 (input 2) pins. You can cascade the BITS clock to other Avidia chassis using the BITS CLOCK OUT pins.

Recommendation: A 24 to 26 AWG (0.205 to 0.128 square mm) solid, shielded, twisted-pair copper wire

1 Locate the pins, described in the table below, for connecting the BITS CLOCK.

Function	Pin Numbers	Description
Primary BITS CLOCK IN1	Tip - T IN1 Ring - R IN1	Provides primary BITS clock source from a master clock source in the CO to the AV8000.
Secondary BITS CLOCK IN2	Tip - T IN2 Ring - R IN2	Provides secondary BITS clock source from a master clock source in the CO to the AV8000.
Secondary BITS CLOCK OUT	Tip - T OUT Ring - R OUT	Cascades the BITS clock to another AV8000 chassis. When cascading the clocking signal, do not terminate the BITS OUT pins on the last chassis in the cascade.

2 Using insulated handled wire cutters, strip 1.5 inches (38 mm) of insulation from both ends of each clock wire.

3 Using a wire-wrap tool, connect the primary BITS CLOCK (page 28):

a On the AV8000 chassis, attach a wire to the IN1 T pin for Tip and a wire to the IN1 R pin for Ring.

b Attach the IN1 Tip and the IN1 Ring wires to Tip and Ring at the CO secondary master clock source and ground the cable shield.

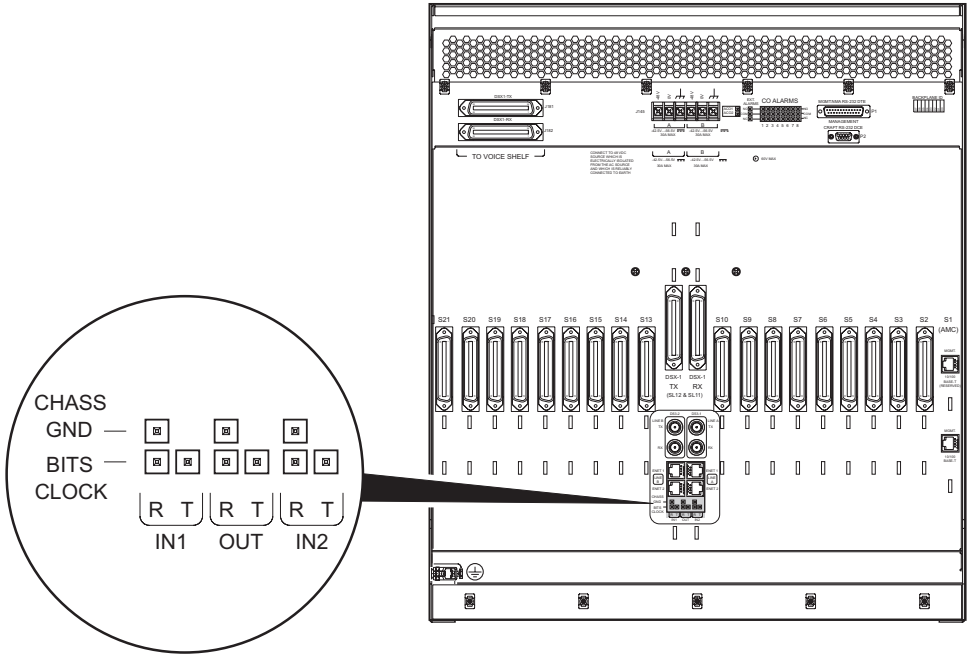
c On the AV8000 chassis, attach the shielding of the BITS CLOCK IN2 wire to the IN2 CHASSIS GND pin.

4 Using a wire-wrap tool, connect the secondary BITS CLOCK (page 28):

a On the AV8000 chassis, attach a wire to the IN2 T pin for Tip and a wire to the IN2 R pin for Ring.

b Attach the IN2 Tip and the IN2 Ring wires to Tip and Ring at the CO primary master clock source and ground the cable shield.

c On the AV8000 chassis, attach the shielding of the BITS CLOCK wire to the IN1CHASSIS GND pin.



5 Using a wire-wrap tool, cascade the IBITS CLOCK to other AV8000 chassis if applicable:

a Attach a wire from the OUT T pin for Tip to the BITS CLOCK IN1 T pin for Tip on the next chassis in the cascade.

b Attach a wire from OUT R pin for Ring to the BITS CLOCK IN1 R pin for Ring on the next chassis in the cascade.

c On both AV8000 chassis, attach the shielding of the BITS CLOCK wire to the OUT CHASSIS GND pin the IN1 CHASSIS GND pin, respectively.

6 Do not terminate the BITS OUT pins on the last chassis in the cascade. Repeat Step 5 if there is a third chassis in the cascade.

WHAT TO DO NEXT

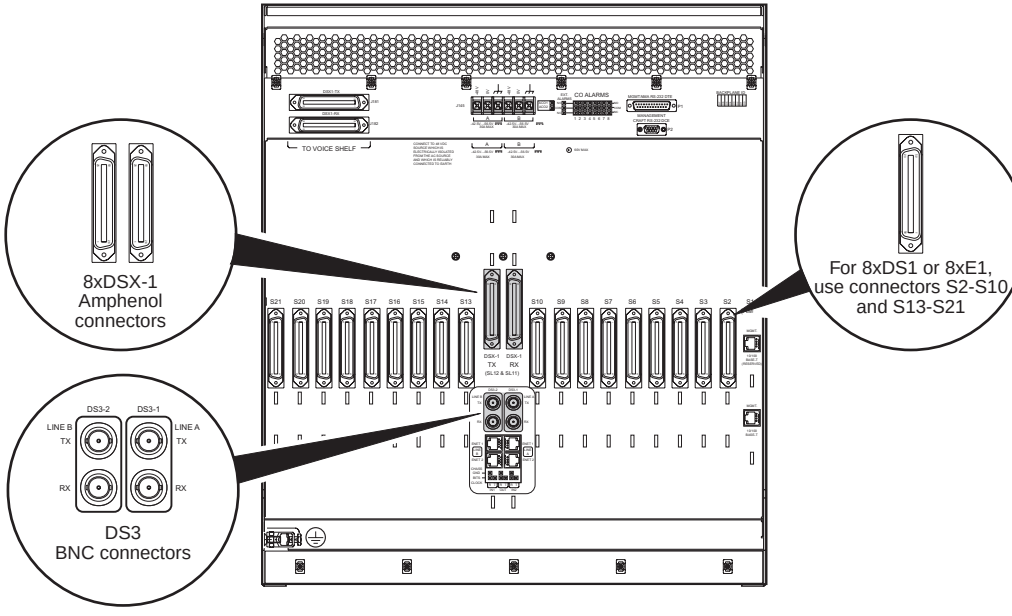
Go to Chapter 3, "Install the Network Interface" to cable the chassis for an uplink network connection.

INSTALL THE NETWORK INTERFACE 3

Connect the AV8000 system, through a network card interface, to an ATM backbone network, WAN, or LAN for a network uplink. Also, connect network card interfaces for applications such as subtending, redundancy, or dual homing where these cards may provide a subscriber-side function. See Chapter 8, "System Configuration for Special Applications" on page 73 for more information about card selection and set up for these applications. Refer to one of the following sections to install cables for the network card you have selected:

See"Avidia Network Cards" on page 151 in Appendix A for more information about each network card you can use in an Avidia system.

The figure below shows the location of the network interface connectors for DS3, 8xDSX-1, 8xDS1, and 8xE1on the chassis. The connector for the OC3 interface is located on the front panel of the OC3 card.



You must wear an antistatic wrist strap connected to the ESD jack on the AV8000 chassis to perform the cabling procedures for the network card. You must also observe normal ESD precautions when handling electronic equipment. Do not hold electronic plugs by their edge. Do not touch components or circuitry.

DS3 INTERFACE CABLES

The DS3 network card provides an interface between the AV8000 system and an ATM backbone network. The interface to a DS3 network card in slot 11 or 12 is made to a pair of BNC connectors on the AV8000 backplane (page 32). Use the BNC connector pair as follows:

- DS3-1 for the network card in slot 12
- DS3-2 for the network card in slot 11

Either DS3 network card can be configured to connect to either set of DS3 BNC connectors on the AV8000 back plane. During initialization however, the software assigns the DS3-1 connector to slot 12 and the DS3-2 connector to slot 11.

For each BNC connector pair, the connectors are labeled:

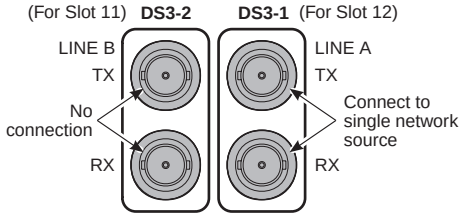
- TX BNC for the transmit signal from the Avidia network card to the network
- RX BNC for the receive signal from the network to the Avidia network card

Recommendation: Use a 75 Ω coaxial cable with 75 Ω BNC connectors and a maximum length of 450 feet (137.16 m). Ground the cable shield at one end only.

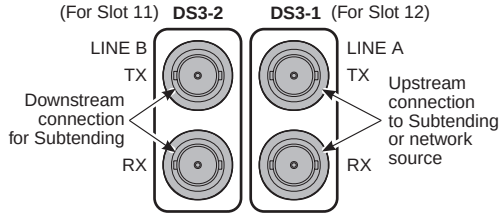
When you use two DS3 cards in an AV8000 system, connect the cables (steps on page 35) for one of the following modes (shown in the figure below):

- single physical link mode (one network connection)
- dual physical link mode (two network connections)
- subtending (one network upstream connection, one network downstream connection)

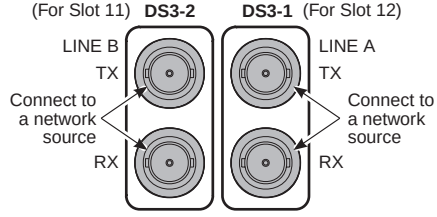
Single physical link mode



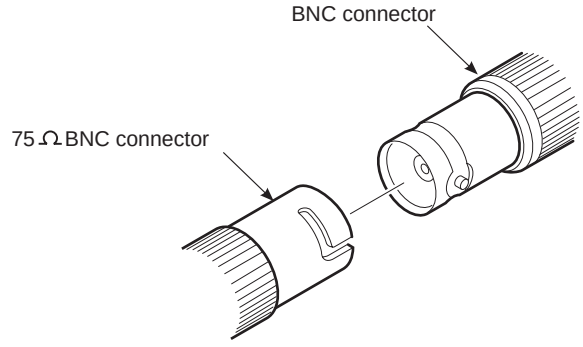
Subtending



Dual physical link mode



1 Install the cable for the DS3 network card in slot 12 using the BNC connectors marked DS3-1:



a For the transmit signal, install the coaxial cable connector on the TX BNC connector.

b For the receive signal, install the coaxial cable connector on the RX BNC connector.

2 Use tie wraps to secure the cables to the tie points located below the connectors.

3 Connect the uplink (network) end of the transmit and receive connectors to the appropriate ATM backbone interface connectors at the network source.

4 Repeat Step 1 through Step 3 for a network card in slot 11, using the BNC connectors marked DS3-2.

8xDSX-1 Interface Cables

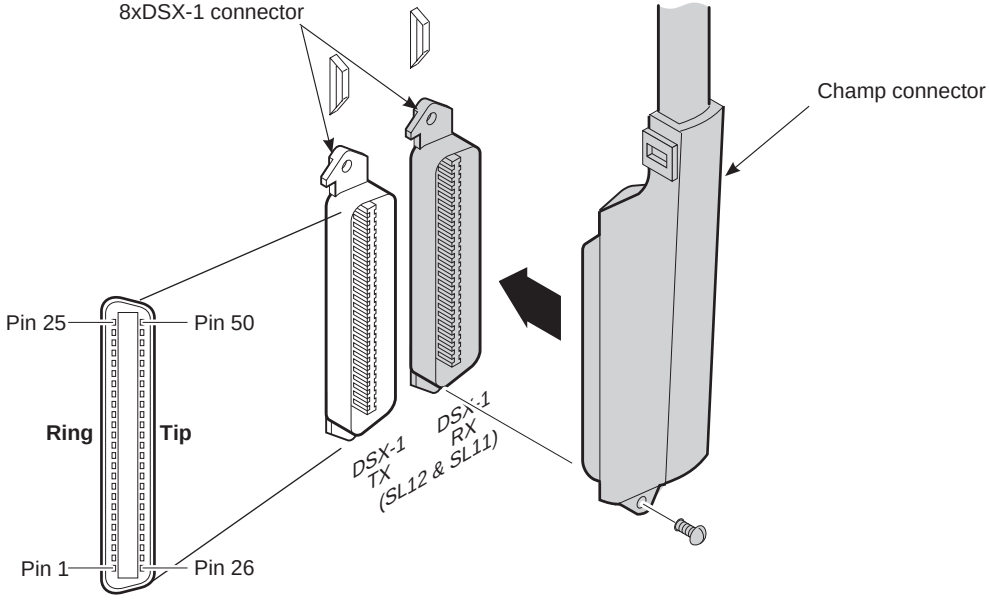
The 8xDSX-1 network card provides a connection for a short-haul DSX-1 interface. The interface to each 8xDSX-1 network card is made using two 25-pair champ connectors (page 32) as follows:

- DSX-1 RX connector: receives the transmitted signal from the network to the network card and provides eight Tip and Ring receive pin pairs for each network card in slots 11 and 12
- DSX-1 TX connector: sends the transmitted signal from the network card to the network and provides eight Tip and Ring transmit pin pairs for the network card in slot 11 or 12

Recommendation: A 24 AWG twisted-pair copper wire with a 25-pair champ connector(s). The cable maximum length is 6 kilofeet (1,829 m).

1 Install a 25-pair champ connector into the port marked DSX-1 RX (see figure below) for the receive signals either to one or both network cards in slots 11 or 12. See the table on page 37 for connector pinouts and wire colors.

2 Install a 25-pair champ connector into the port marked DSX-1 TX (see figure below) for the transmit signals either to one or both network cards in slots 11 or 12. See the table on page 37 for connector pinouts and wire colors.



The table below shows the 8xDSX-1 network card Tip and Ring pinouts for both the DSX-1 RX and DSX-1 TX connectors and the associated wire colors for the champ connectors.

Card Slot and Port Number [(a)]	Champ Connector Tip Pin Number and Wire Color	Champ Connector Ring Pin Number and Wire Color
Slot 11, Port 1	26 (WH/BL)	1 (BL/WH)
Slot 11, Port 2	27 (WH/OR)	2 (OR/WH)
Slot 11, Port 3	28 (WH/GN)	3 (GN/WH)
Slot 11, Port 4	29 (WH/BN)	4 (BN/WH)
Slot 11, Port 5	30 (WH/SL)	5 (SL/WH)
Slot 11, Port 6	31 (RD/BL)	6 (BL/RD)
Slot 11, Port 7	32 (RD/OR)	7 (OR/RD)
Slot 11, Port 8	33 (RD/GN)	8 (GN/RD)
Slot 12, Port 1	34 (RD/BN)	9 (BN/RD)
Slot 12, Port 2	35 (RD/SL)	10 (SL/RD)
Slot 12, Port 3	36 (BK/BL)	11 (BL/BK)
Slot 12, Port 4	37 (BK/OR)	12 (OR/BK)
Slot 12, Port 5	38 (BK/GN)	13 (GN/BK)
Slot 12, Port 6	39 (BK/BN)	14 (BN/BK)
Slot 12, Port 7	40 (BK/SL)	15 (SL/BK)
Slot 12, Port 8	41 (YL/BL)	16 (BL/YL)
No connection	42 (YL/OR)	17 (OR/YL)
No connection	43 (YL/GN)	18 (GN/YL)
No connection	44 (YL/BN)	19 (BN/YL)
No connection	45 (YL/SL)	20 (SL/YL)
No connection	46 (VI/BL)	21 (BL/VI)
No connection	47 (VI/OR)	22 (OR/VI)
No connection	48 (VI/GN)	23 (GN/VI)
No connection	49 (VI/BN)	24 (BN/VI)
ground	50	25

(a) These pinouts are for both connectors DSX-1 RX and DSX-1 TX.

3 Use tie wraps to secure the cables to the tie points located above the connectors, using tie wraps.

4 Connect the uplink (network) end of the transmit and receive connectors to the appropriate DSX-1 interface connectors on the network source.

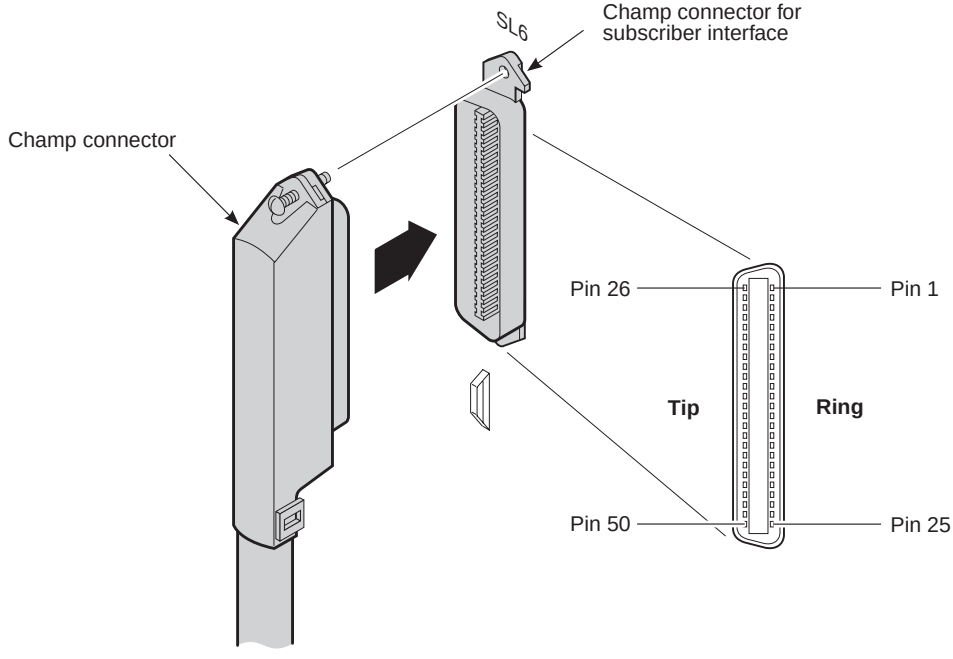
8xDS1 Interface Cables

The 8xDS1 network card provides a connection for a long-haul DS1 interface. The interface to each 8xDS1 network card is made using one 25-pair champ connector (page 32) as follows:

- slots labeled S2 through S10 or S13 through S21, support both transmit and receive signals for the 8xDS1 card in the corresponding card slot
- transmit signal is from the 8xDS1 network card to the network, and the receive signal is from the network to the 8xDS1 network card

Recommendation: A 24 AWG twisted-pair copper wire with a 25-pair champ connector(s). The cable maximum length is 6 kilofeet (1,829 m).

1 Install a 25-pair champ connector into the appropriate connector marked S2 through S10 or S13 through S21 (see figure below) for transmit and receive signals to the 8xDS1 card installed in the corresponding card slot. See the table on page 39 for connector pinouts and wire colors.



The table below shows the 8xDS1 network card Tip and Ring pinouts for the DS1 receive and transmit signals and the associated wire colors for the champ connectors.

Tip Signal and Port	Champ Connector Tip Pin Number and Wire Color	Champ Connector Ring Pin Number and Wire Color	Ring Signal and Port
T1_RX_TIP1	26 (WH/BL)	1 (BL/WH)	T1_RX_RING1
T1_RX_TIP2	27 (WH/OR)	2 (OR/WH)	T1_RX_RING2
T1_RX_TIP3	28 (WH/GN)	3 (GN/WH)	T1_RX_RING3
T1_RX_TIP4	29 (WH/BN)	4 (BN/WH)	T1_RX_RING4
T1_RX_TIP5	30 (WH/SL)	5 (SL/WH)	T1_RX_RING5
T1_RX_TIP6	31 (RD/BL)	6 (BL/RD)	T1_RX_RING6
T1_RX_TIP7	32 (RD/OR)	7 (OR/RD)	T1_RX_RING7
T1_RX_TIP8	33 (RD/GN)	8 (GN/RD)	T1_RX_RING8
No connection	34 (RD/BN)	9 (BN/RD)	No connection
No connection	35 (RD/SL)	10 (SL/RD)	No connection
No connection	36 (BK/BL)	11 (BL/BK)	No connection
No connection	37 (BK/OR)	12 (OR/BK)	No connection
No connection	38 (BK/GN)	13 (GN/BK)	No connection
No connection	39 (BK/BN)	14 (BN/BK)	No connection
No connection	40 (BK/SL)	15 (SL/BK)	No connection
No connection	41 (YL/BL)	16 (BL/YL)	No connection
T1_TX_TIP1	42 (YL/OR)	17 (OR/YL)	T1_TX_RING1
T1_TX_TIP2	43 (YL/GN)	18 (GN/YL)	T1_TX_RING2
T1_TX_TIP3	44 (YL/BN)	19 (BN/YL)	T1_TX_RING3
T1_TX_TIP4	45 (YL/SL)	20 (SL/YL)	T1_TX_RING4
T1_TX_TIP5	46 (VI/BL)	21 (BL/VI)	T1_TX_RING5
T1_TX_TIP6	47 (VI/OR)	22 (OR/VI)	T1_TX_RING6
T1_TX_TIP7	48 (VI/GN)	23 (GN/VI)	T1_TX_RING7
T1_TX_TIP8	49 (VI/BN)	24 (BN/VI)	T1_TX_RING8
ground	50	25	ground

2 Secure the cables to the tie points located below the connectors, using tie wraps.

3 Connect the uplink (network) end of the connectors to the appropriate DS1 interface connectors on the network source.

4 Pins 25 and 50 of the Champ connector are connected to chassis ground and can be used to terminate the cable shields if required by local wiring practice.

8xE1 INTERFACE CABLES

The 8xE1 network card provides a connection for a long-haul E1 interface. The interface to each 8xE1 network card is made using one 25-pair champ connector (page 32) as follows:

- slots labeled S2 through S10 or S13 through S21, supports both transmit and receive signals for the 8xE1 card in the corresponding card slot
- transmit signal is from the 8xE1 network card to the network, and the receive signal is from the network to the 8xE1 network card

Recommendation: A 24 AWG twisted-pair copper wire with a 25-pair champ connector(s). The cable maximum length is 4.8 kilofeet (1463 m).

1 For connection to the 8xE1 network card(s), install a 25-pair champ connector into the appropriate connector marked S2 through S10 or S13 through S21 (figure on page 38). See the table on page 39 for connector pinouts and wire colors.

2 Use tie wraps to secure the cables to the tie points located below the connectors.

3 Connect the uplink (network) end of the connectors to the appropriate 8xE1 interface connectors on the network source.

OC3 FIBER-OPTIC CABLE ROUTING

The OC3 network card provides a connection from the AV8000 to the ATM backbone network as a SONET-based fiber-optic User Network Interface (UNI). The OC3 network card has two physical SONET interfaces on the front. The first interface provides the network connection. The second interface provides Automatic Protection Switching (APS), which is a redundant connection for the primary.

Route the fiber-optic cable:

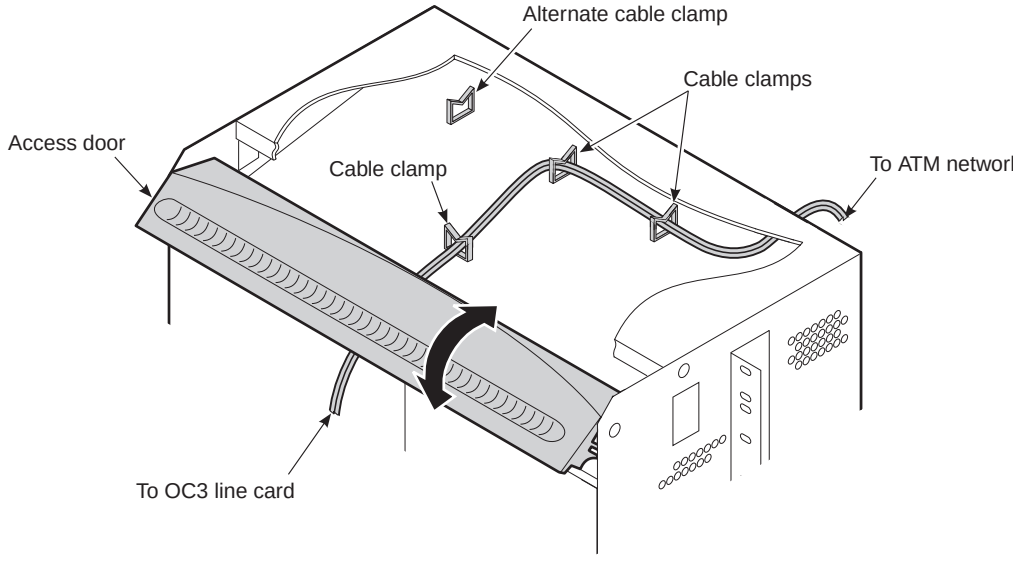
1 Open the front access door to the cable tray as shown in the figure on page 43.

Do not look directly at the fiber-optic ports on the front of the OC3 network card or into the end of any fiber-optic cable.

The minimum bend radius for a fiber-optic cable is 1.5 inches (38.10 mm). Do not use a bend radius of less than 1.5 inches when looping the fiber-optic cable in the cable tray.

2 Route the fiber-optic cable through the back of the AV8000 chassis and the open front access door. Leave enough cable in the front to connect to the front panel connectors of the OC3 network card.

3 If you implement APS, route a second fiber-optic cable through the back of the AV8000 chassis and the open front access door. Leave enough cable in the front to connect to the front panel connectors of the OC3 network card.



4 Secure the cable into the front and rear cable clamps as required (see figure above).

You will connect the fiber-optic cable(s) to the OC3 network card when you "Install Cards" on page 53 in a later chapter

WHAT TO DO NEXT

Go to Chapter 4, "Connect Subscriber Lines" to set up the interface between the AV8000 chassis and the MDF to connect subscribers.

CONNECT SUBSCRIBER LINES 4

Avidia subscriber cards connect, through the CO Main Distribution Frame (MDF), to Customer Premises Equipment (CPE) such as modems. Refer to the following sections to install cables for the subscriber interface:

For these subscriber card transmission types, use these procedures:

- IDSL, frame SDSL, cell SDSL, and ADSL where POTS is not supplied to the customer with the xDSL transmission, use "Connect AV8000 xDSL to the MDF (No POTS)"
- ADSL where POTS is supplied to the customer with the xDSL transmission, use "Connect ADSL For Data and POTS"

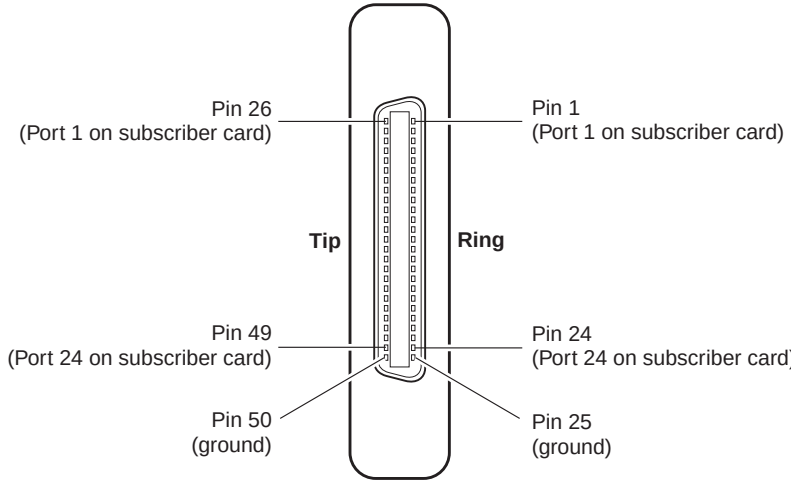
See "Avidia Subscriber Cards" on page 175 in Appendix A for more information about each subscriber card you can use in an Avidia system.

SUBSCRIBER CONNECTOR PINOUT

Use champ connectors S2 through S10 and S13 through S21 on the AV8000 backplane for interface with the xDSL subscriber cards. Each champ connector corresponds to one subscriber card slot in the AV8000 chassis (for example, S2 is slot 2 in the chassis).

Each pin pair on the champ connector provides a Tip and Ring connection for one subscriber line and corresponds to one port and LED on an xDSL subscriber card. For example a:

- 12-port subscriber card uses the first 12 pin pairs on the champ connector and the remaining pin pairs are unused.
- 24-port subscriber card uses 24 pin pairs on the champ connector and the pin pair 25 and 50 are unused (as shown in the figure below).

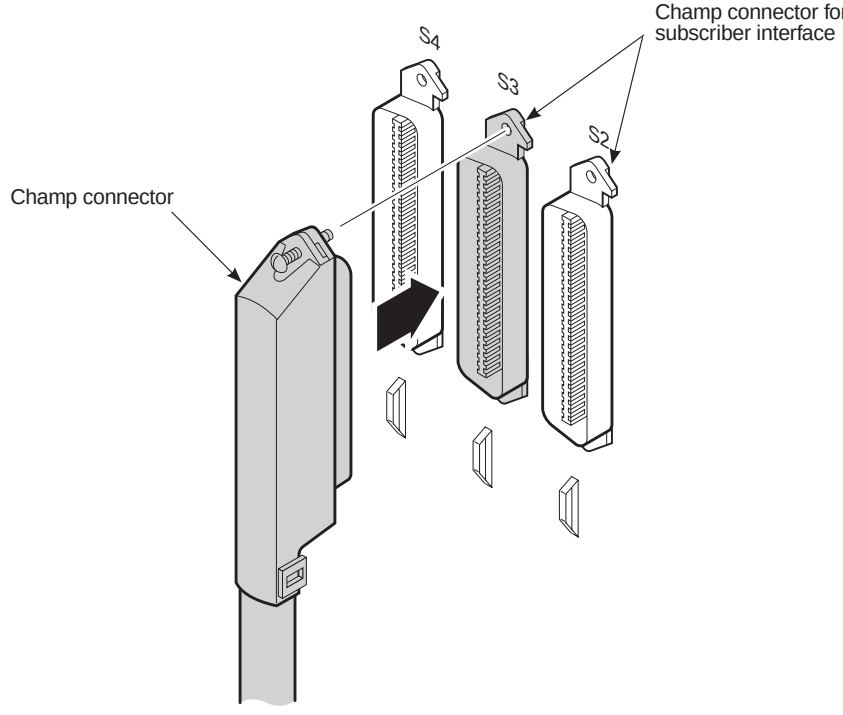


CONNECT AV8000 XDSL TO THE MDF (NO POTS)

To interface xDSL subscriber cards to the CO MDF, use the champ connectors S2 through S10 and S13 through S21 on the AV8000 chassis backplane. If selecting an ADSL subscriber card, use the AV541-LP (ADSL card with line protection) to connect directly to an MDF.

Recommendation: A category 3 or category 5 cable. Use a 25-pair Amp PN 229913-1 champ connector (or equivalent) on the interface cable for connection to the AV8000.

1 Attach the champ connector to an xDSL subscriber card connector (S2 through S10 and S13 through S21) on the AV8000 backplane as shown below.



2 Use a tie wrap to secure the cable for each champ connector to the tie points located below the connectors.

3 Connect the other end of each cable to the facility MDF using a standard punch panel, another champ connector, or other suitable means according to your local practice. See the figure on page 46 and the table below for connector pinouts.

xDSL Port Number	Champ Connector Pin Number for Tip	Champ Connector Pin Number for Ring	MDF Tip	MDF Ring
1	26	1	WH/BL	BL/WH
2	27	2	WH/OR	OR/WH
3	28	3	WH/GN	GN/WH
4	29	4	WH/BN	BN/WH
5	30	5	WH/SL	SL/WH
6	31	6	RD/BL	BL/RD
7	32	7	RD/OR	OR/RD
8	33	8	RD/GN	GN/RD
9	34	9	RD/BN	BN/RD
10	35	10	RD/SL	SL/RD
11	36	11	BK/BL	BL/BK
12	37	12	BK/OR	OR/BK
13	38	13	BK/GN	GN/BK
14	39	14	BK/BN	BN/BK
15	40	15	BK/SL	SL/BK
16	41	16	YL/BL	BL/YL
17	42	17	YL/OR	OR/YL
18	43	18	YL/GN	GN/YL
19	44	19	YL/BN	BN/YL
20	45	20	YL/SL	SL/YL
21	46	21	VI/BL	BL/VI
22	47	22	VI/OR	OR/VI
23	48	23	VI/GN	GN/VI
24	49	24	VI/BN	BN/VI
ground	50	25	-	-

Pins 25 and 50 of the Champ connector are connected to chassis ground and can be used to terminate the cable shields if required by local wiring practice.

WHAT TO DO NEXT

Go to Chapter 5, "Power Up the System" to install fuses into the CO equipment bay where the AV8000 battery wires are terminated and to verify voltages.

POWER UP THE SYSTEM 5

Power up the AV8000 chassis and verify system voltage as described in the following section. Complete this verification prior to installing cards in the AV8000 chassis.

Electrical and mechanical shock hazards are present throughout the system; be aware of this possibility when power is applied to the chassis. Only qualified personnel should service the system.

Connect to a -48 Vdc source that is electrically isolated from the AC source and reliably connected to earth ground.

SELECT A FUSE SIZE AND POWER UP AV8000

Use a 30 amp slo-blo fuse for each circuit where you previously terminated AV8000 battery wires.

Verify system voltage:

1. Install the appropriately sized fuse in the equipment bay fuse panel for each circuit where you previously terminated AV8000 battery wires.
2. Verify that a voltage ranging between -42.5 Vdc and -56.5 Vdc exists between the A-side -48V terminal and the A-side 0V battery return terminal.
3. Verify that a voltage ranging between -42.5 Vdc -56.5 Vdc exists between the B-side -48V terminal and the B-side 0V battery return terminal.
4. Verify that all backplane cabling is securely terminated.
5. Verify that LEDs for all four fans are not illuminated, indicating that the four fans are receiving power and are fully operational. When a fan LED lights red, at least one fan is not operational.

WHAT TO DO NEXT

Go to Chapter 6, “Install Cards”to place cards into the AV8000 chassis.

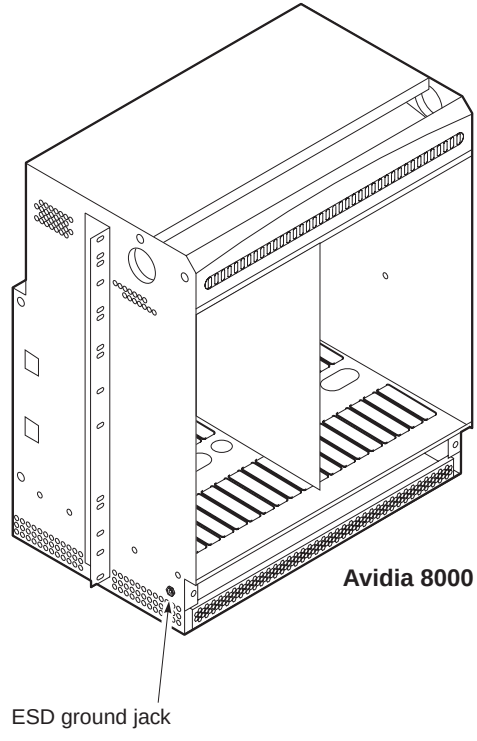
6 INSTALL CARDS

Install cards into the AV8000 chassis You applied voltage to the AV8000 chassis in Chapter 5, so each card will begin its boot-up sequence when installed.

ATTACHING ESD WRIST STRAP TO CHASSIS

Observe the following caution for all paragraphs marked with the ESD symbol. Attach your antistatic wrist strap to the ESD ground jack on the AV8000 as shown in the figure below.

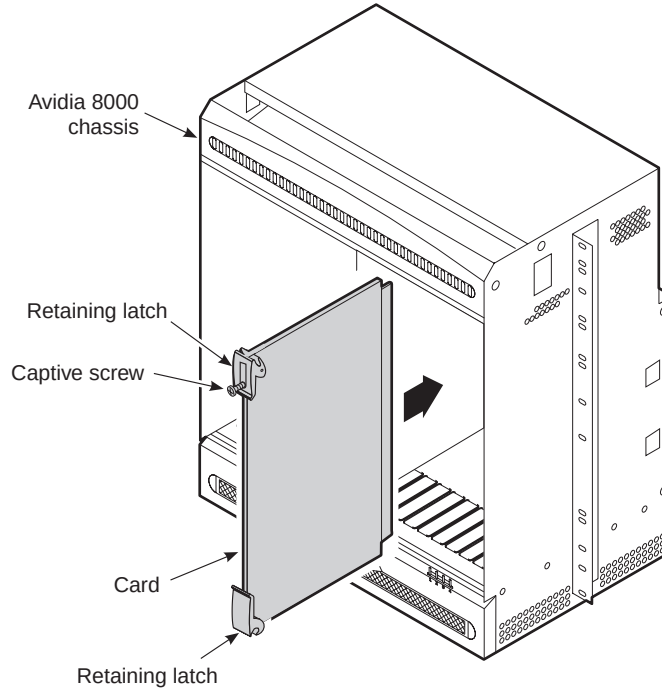
You must wear an antistatic wrist strap connected to the ESD jack on the AV8000 chassis to perform the installation procedures. You must also observe normal ESD precautions when handling electronic equipment. Do not hold electronic plugs by their edge. Do not touch components or circuitry.



INSTALLING CARDS INTO THE AV8000

Ensure that you received the cards you ordered, with the minimum being one management card, one network card, and one subscriber card. The figure below shows the proper way to install any card into the AV8000 chassis. Procedures to install specific types of cards are on the following pages:

- management card on page 56
- network cards on page 56
- subscriber cards on page 60



If you have slots where cards are not installed, you must install blank faceplates using the procedures on page 62.

Install Management Card

Install the management card (page 55) into the chassis:

1. Ensure that the retaining latches are lifted open, and then slide the management card into slot 1, using the guide rails.
2. Push the card in until the retaining latches touch the AV8000 chassis.
3. Gently close the retaining latches until they snap in place.
4. Tighten the captive screw on the top retaining latch.

The startup 10/100BASE-T LED indication will light green.

Install Network Cards

Network cards provide an uplink interface to an ATM network. They supply both ATM traffic management and physical layer functionality. Only one network card is required to provide a link between the subscriber and the ATM backbone, but you can install a second network card for redundancy or for dual homing. See “” on page 76 for more information about redundancy and dual homing configurations. Network cards are typically placed in network card slots 11 and 12; however, 8xDS1 and 8xE1 cards must be placed in subscriber card slots 2-10 or 13-21.

Network cards can also provide a subscriber-side connection when used for subtending. Subscriber-side means that the cards do not provide an uplink network connection, but provide a connection downstream to another Avidia chassis that is being subtended. See “Subtending Multiple Systems” on page 86 for more information about how to select and place network cards for this application. For this type of application, the OC3 card can be placed in subscriber card slots 2-10 or 13-21

The table below lists network cards that are available for use in the AV8000 chassis and the page where they are described in this section.

Type	Avidia Model	Transmission Format	Transmission Speed (Mbps)	Interface
OC3-c				
Multimode	AV311	ATM	155.520	dual-PHY SONET
Single Mode intermediate range	AV312	ATM	155.520	dual-PHY SONET
Single Mode long range	AV313	ATM	155.520	dual-PHY SONET
DS3 ATM	AV323	ATM	44.736	WAN
8xDS1 CSU/DSU Management	AV351	ATM	8 x 1.544	DS1
8xE1 CSU/DSU Management	AV352	ATM	8 x 2.048	E1
8xDSX-1 DSU Management	AV353	ATM	8 x 1.544	DSX-1

The DS3, 8xDSX-1, and OC3 network cards function in slots 11 and 12. You must install at least one network card in the AV8000 chassis in slot 12 to derive a system clock. The 8xDS1 network card functions in any subscriber card slot. You can install the OC3 card in a subscriber card slot for some special applications (see Chapter 8, "System Configuration for Special Applications" on page 73).

Use the following procedure to install your network cards:

1 Slide the network card (page 55) into slot 12 using the guide rails. Ensure the retaining latches are lifted open.

2 Push the card in until the retaining latches touch the AV8000 chassis.

3 Gently close the retaining latches until they snap in place.

4 Tighten the captive screw on the top retaining latch.

5 When installing an OC3 network card:

a Loosen the OC3 network card safety cover captive screw and remove the safety cover (see figure on page 58).

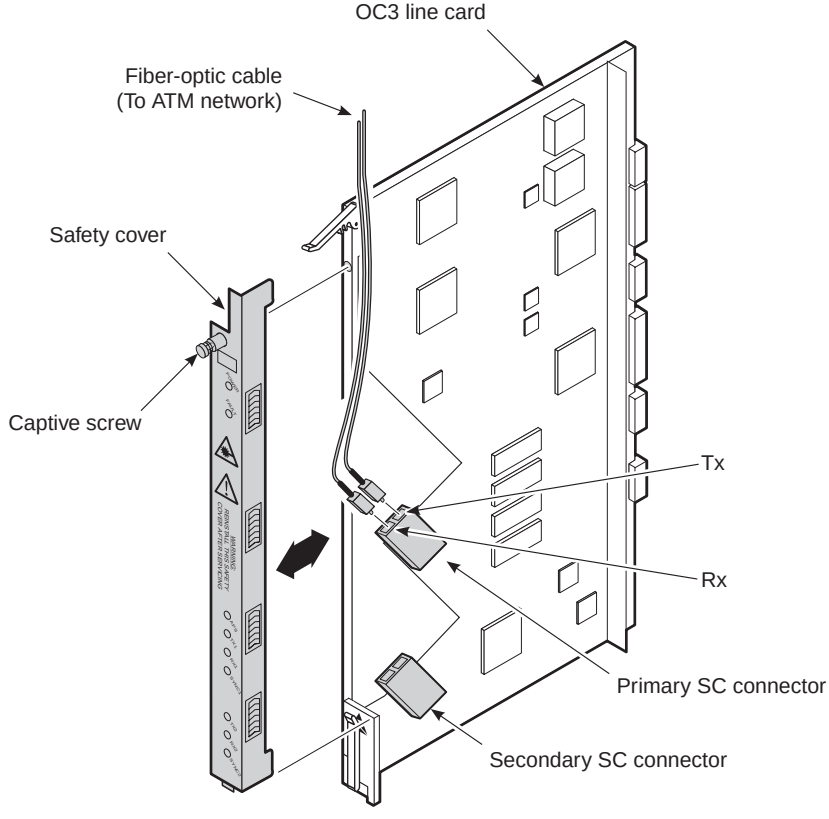
Do not look directly at the fiber-optic ports on the front of the OC3 network card or into the end of any fiber-optic cable. Ensure that you selected the appropriate fiber-optic cable for either a multimode or single mode transceiver.

b Install the fiber-optic cable connectors into the primary SC fiber connector as shown below. On each SC connector, the top port is for the transmit (Tx) signal and the bottom port is for the receive (Rx) signal. The secondary SC fiber connector is reserved for future use.

c When implementing APS (Automatic Protection Switching), install the fiber-optic cable into the secondary SC fiber connectors.

d Route the cable along the side of the card.

e Reinstall the OC3 network card safety cover, and tighten the captive screw.



The front panel LED indicator status corresponding to a successful boot-up for each network card is shown in Appendix A on page 139 for the following network cards

- OC3 on page 154
- DS3 on page 158
- 8xDS1 on page 162
- 8xDSX-1 on page 171
- 8xE1 on page 167

Install Subscriber Cards

Avidia subscriber cards provide two-way data communication with the subscribers. Subscriber cards are currently available in several transmission technologies: ADSL, cell SDSL, frame SDSL, and IDSL. You must select subscriber cards for the AV8000 that are compatible with the subscriber-end equipment:

- Select cell DMT ADSL subscriber cards to connect to cell-based DMT ADSL modems.
- Select frame SDSL subscriber cards to connect to frame SDSL modems.

Cell subscriber cards operate with a data stream of fixed length. The advantage of this format is that the network does not have to handle different sizes of packets or frames. This broadband technology transmits data quickly and efficiently. There are three cell subscriber cards: AV541, AV541-LP, and AV522.

Frame-based cards operate with a data stream of variable length. By using only a few bytes of overhead, the frame format makes efficient use of each frame. This means that more of the frame bandwidth is used for sending user data and less for overhead. Two Avidia cards are available for frame-based data: AV421 and AV412.

The table below lists all the subscriber cards available for the AV8000 system.

Avidia Model	xDSL Format	Type	Number of Ports
Cell Subscriber Cards			
AV541	ADSL	Rate-adaptive and rate-selective DMT cell-based	12
AV541-LP	ADSL	Identical to AV541 but with line protection	12
AV522	SDSL	Rate-selective, cell-based	24
Frame Subscriber Cards			
AV421	SDSL	Rate-selective, frame-based	24
AV412	IDSL	Rate-selective, frame-based	24

You can install up to 18 xDSL subscriber cards, 8xDS1 network card(s), and 8xE1 network cards in chassis slots S2 through S10 and S13 through S21. Install the subscriber cards (page 55) into the chassis:

How your Avidia system is configured determines which ADSL subscriber card to use in the AV8000. Use the Avidia Model 541 (AV541) to connect to the Avidia 8100. Use the Avidia Model 541-LP (AV541-LP) with network protection to connect directly to an MDF.

1. Slide the card into a subscriber card slot (2 through 10 or 13 through 21). Ensure that the retaining latches are lifted open.
2. Push the card in until the retaining latches touch the AV8000 chassis.
3. Gently close the retaining latches until they snap in place.
4. Tighten the captive screw on the top retaining latch.
5. Repeat Step 1 through Step 4 to install additional subscriber cards. Use any of the remaining slots (2 through 10 and 13 through 21) for other cards.

The front panel LED indicator status corresponding to a successful boot-up for each subscriber card is shown in Appendix A on page 139 for the following network cards

- ADSL on page 177
- cell SDSL on page 180
- frame SDSL on page 183
- IDSL on page 186

Install Blank Faceplates in Unused AV8000 Card Slots

Install blank faceplates in the AV8000 to cover unused slots. Unused slots must be covered to prevent personnel contact with backplane connectors under power and to maintain proper airflow within the chassis.

Select blank faceplates:

- For a one-slot blank faceplate, use PN AVX121.
- For a two-slot blank faceplate, use PN AVX122.
- For a five-slot blank faceplate, use PN AVX125.

To install the required faceplates in your chassis, follow the procedure below:

1 Slide the blank faceplate into empty slot. Ensure the retaining latches are lifted.

2 Push the blank faceplate in until the retaining latches touch the AV8000 chassis.

3 Gently close the retaining latches until they snap in place

4 Tighten the captive screw on the top retaining latch.

WHAT TO DO NEXT

Go to Chapter 7, "Connect a Management Interface" to connect the AV8000 to an ASCII terminal or a PC for configuration and SNMP management.

CONNECT A MANAGEMENT INTERFACE 7

Connect an ASCII terminal or a PC (running terminal emulation software) to the craft port on the management card in the AV8000 chassis (slot 1). Through this RS-232 serial interface, you can manage the AV8000 system using the command-line interface. You can also execute install scripts to other cards in the AV8000 chassis through this craft port.

For remote system management, connect a PC or workstation through a LAN or Ethernet hub to the management Ethernet port (labeled MGMT 10/100BASE-T) on the chassis backplane. Through this Ethernet interface, you can configure and manage the AV8000 system using Telnet, the Avidia Web-based interface software, or StarGazer network management software. You can download software to additional cards in the AV8000 system through the Ethernet port.

Connect to the craft port and to the Ethernet port by using the following procedures:

CONNECTING TO THE CRAFT PORT

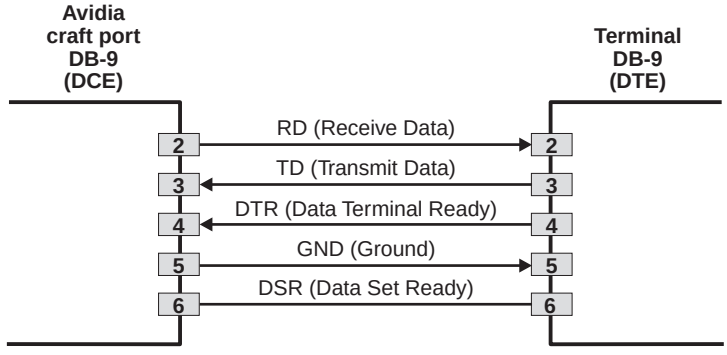
The craft port is a DCE, DB-9 (9-pin) female connector. This connector provides an RS-232 interface with an ASCII terminal or PC (running terminal emulation software) for full-duplex serial communication. The interface has a standard ASCII character set. Refer to "Select the Craft Port Interface and Cable" on page 64 before connecting the craft port.

Select the Craft Port Interface and Cable

The following illustrations show pinouts for both the management card and backplane Avidia craft ports. The craft port craft port connects to either a DTE device such as a terminal or a PC or to another DCE device such as a modem.

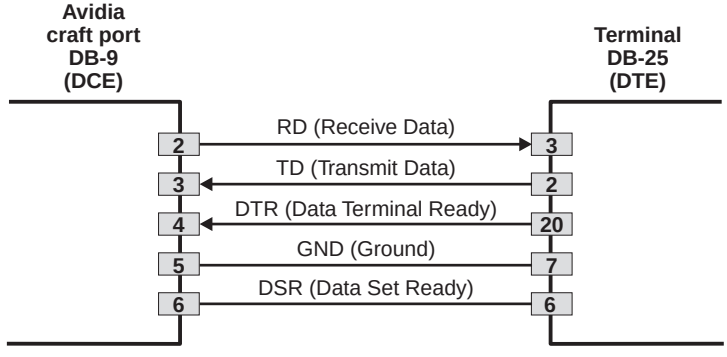
- When connecting the DCE craft port to a DTE device, use a straight-through cable as shown in the two figures on this page.
- When connecting the DCE craft port to another DCE device, use a cross-over cable as shown in the two figures on page 65.

DB-9 (DCE) to a DB-9 (DTE)



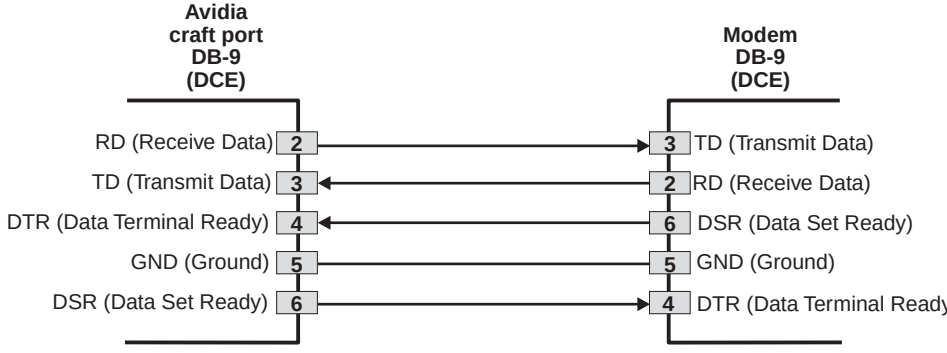
Requires a straight-through cable

DB-9 (DCE) to a DB-25 (DTE)



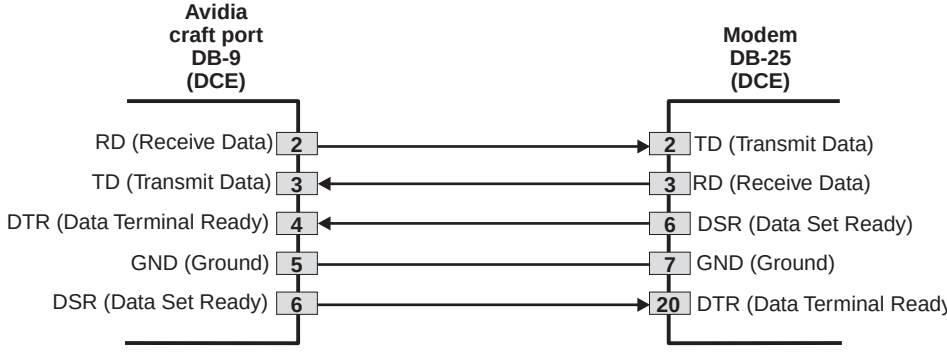
Requires a straight-through cable

DB-9 (DCE) to a DB-9 (DCE)



Requires a cross-over cable

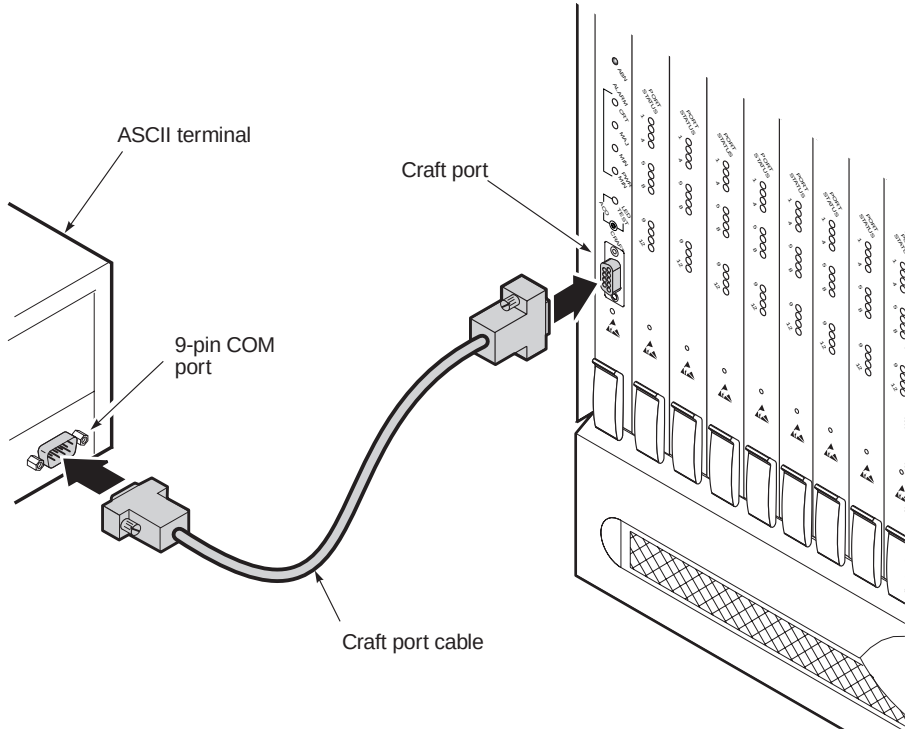
DB-9 (DCE) to a DB-25 (DCE)



Requires a cross-over cable

Connect to the Craft Port

1 Connect a standard 9-pin serial terminal cable to the craft port on the management card front panel.



2 Connect the other end of the cable to the craft port on an ASCII terminal, PC, modem, or other device. (As an example, the figure above shows a 9-pin COM port on an ASCII terminal.)

3 Configure the terminal for the following communication settings:

- ANSI terminal emulation
- Bits per second: 9600 bps
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

See the *Avidia System Configuration and Management User Manual* for instructions on how to configure the AV8000 system using the command-line interface. You must configure the management card IP address using the command-line interface before using the Web-based Interface or the command-line interface to complete any other configuration.

CONNECTING TO THE ETHERNET PORT

The AV8000 system backplane has one RJ-45 jack for Ethernet management interface. The port is an autosensing 10/100BASE-T. Use the management Ethernet port labeled MGMT. 10/100BASE-T for:

- LAN connections
- higher speed Ethernet connections such as an Ethernet hub
- connection to a device such as a modem for remote management

System requirements to connect to the MGMT. 10/100BASE-T port on the AV8000 chassis include:

- To connect a PC directly to the MGMT. 10/100BASE-T port, you must have a PC with an Ethernet card installed and configured correctly. Additionally, you must have a TCP/IP protocol stack configured correctly for communication.
- To perform AV8000 system configuration using Telnet, the Avidia Web-based Interface, or StarGazer network management software, the PC must also have a Web browser installed. Use version 4.0 or later of Netscape or Windows Explorer Web browsers.

Go to the following sections to connect to the MGMT. 10/100BASE-T port:

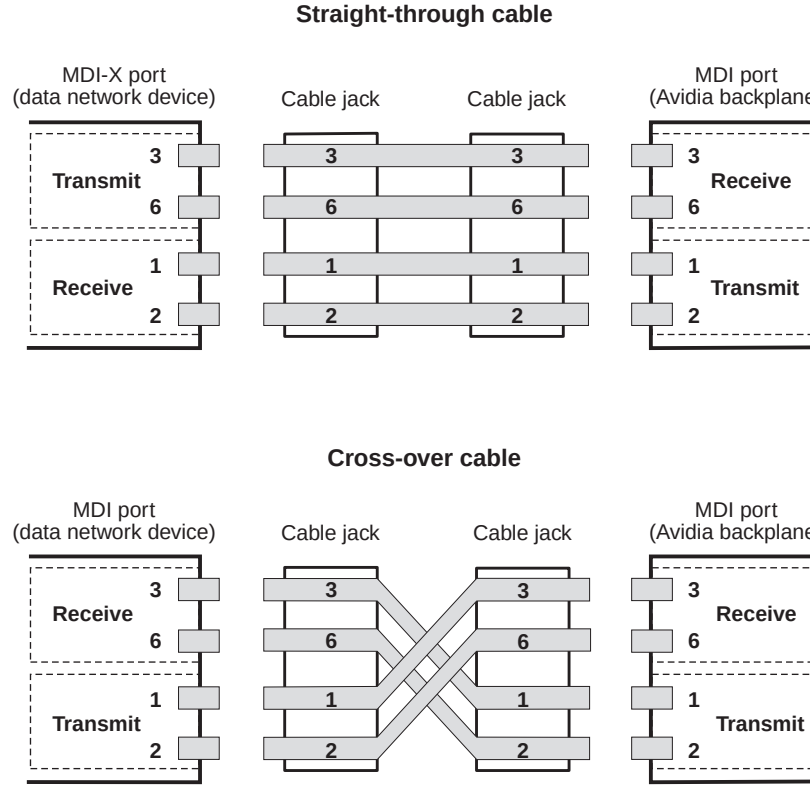
- Select the cable dependent on the device you will connect to the MGMT. 10/100BASE-T port in “Select the Ethernet Interface Cable” on page 69.
- Connect the device to the MGMT. 10/100BASE-T port in “Connect to the Ethernet Port” on page 71.

Select the Ethernet Interface Cable

Use a shielded 10/100BASE-T cable in which the cable's shield will make a reliable electrical connection to the shell of the 10/100BASE-T connector on the AV8000 chassis and in which the shield at the other end of the cable is reliably connected to earth ground.

The AV8000 backplane MGMT. 10/100BASE-T port is MDI. Use one of the following cables (see the figure below and the table on page 70):

- straight-through cable to connect to a device with an MDI-X port such as a hub, repeater, bridge, or router
- cross-over cable to connect to a device that also has an MDI port such as a PC with an Ethernet Network Interface Card (NIC)



The table below lists 10/100BASE-T Ethernet interface control signals for both an MDI and an MDI-X port.

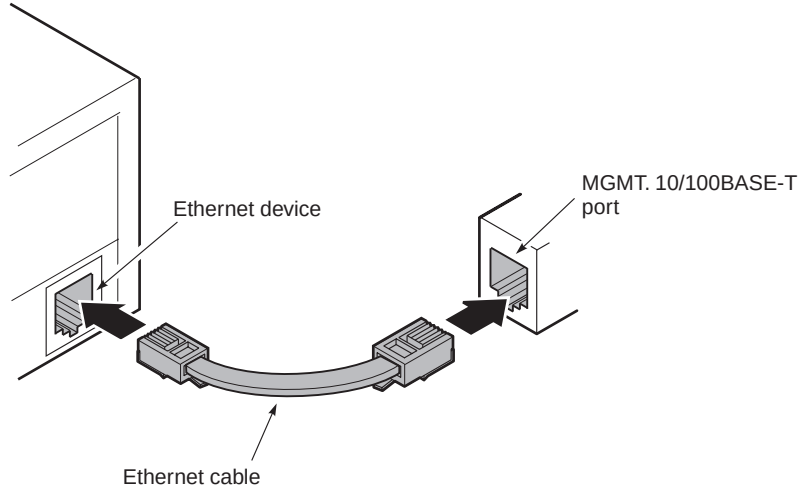
MDI	MDI-X	Signal	Description
1	3	TX+	Transmit Data (+)
2	6	TX-	Transmit Data (-)
3	1	RX+	Receive Data (+)
4	4	-	No connection
5	5	-	No connection
6	2	RX-	Receive Data (-)
7	7	-	No connection
8	8	-	No connection

The MDI column shows pinouts for the AV8000 MDI Ethernet ports.

Connect to the Ethernet Port

Use a shielded 10/100BASE-T cable in which the cable's shield will make a reliable electrical connection to the shell of the 10/100BASE-T connector on the AV8000 chassis and in which the shield at the other end of the cable is reliably connected to earthed ground.

1. Plug the RJ-45 connector of the Ethernet cable into the MGMT. 10/100BASE-T port on the chassis backplane.
2. Connect the other end of the cable into the Ethernet port on the PC or hub (or other Ethernet device).
3. Verify that a link indicator illuminates on either the PC Ethernet adapter or the Ethernet hub. This occurs if the Ethernet cable is properly connected. See the appropriate user documentation for the Ethernet adapter or hub.



WHAT TO DO NEXT

Once you verify that you have a management connection to the AV8000 chassis, use the *Avidia System Management and Configuration User Manual* to perform system configuration and maintenance.

SYSTEM CONFIGURATION FOR SPECIAL APPLICATIONS

8

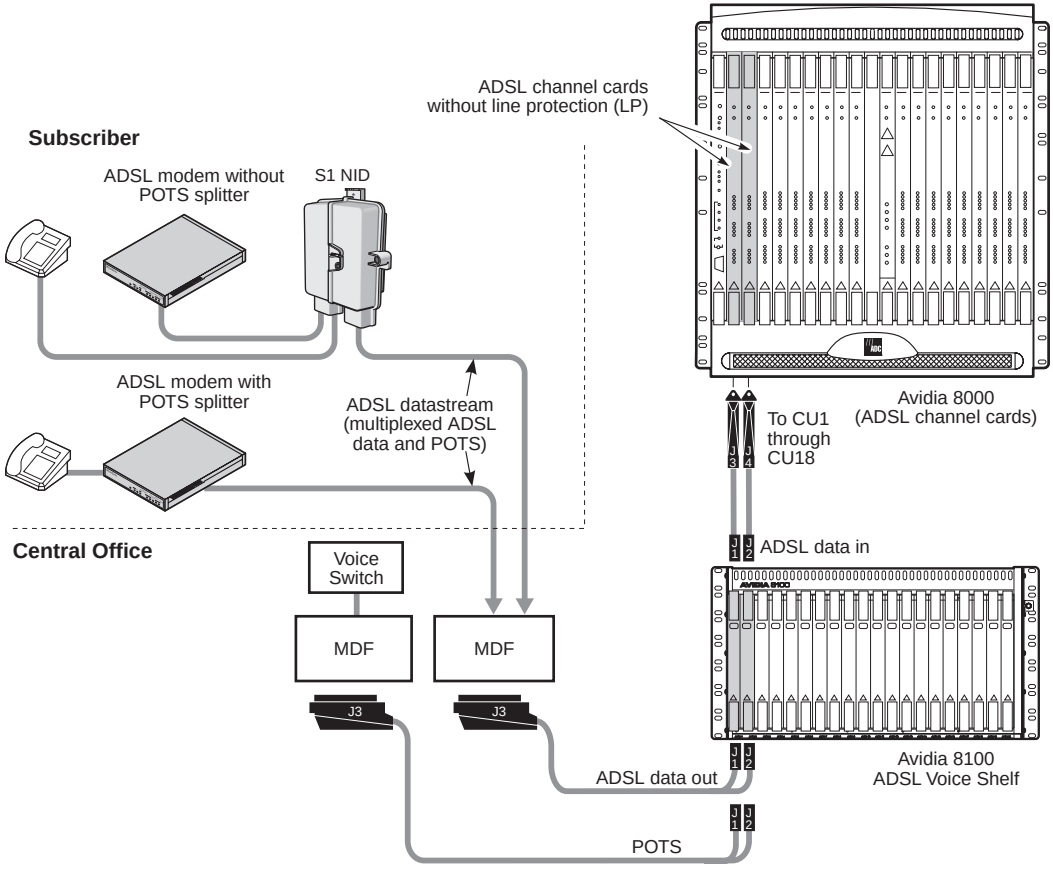
This chapter describes applications for systems with two network cards installed.

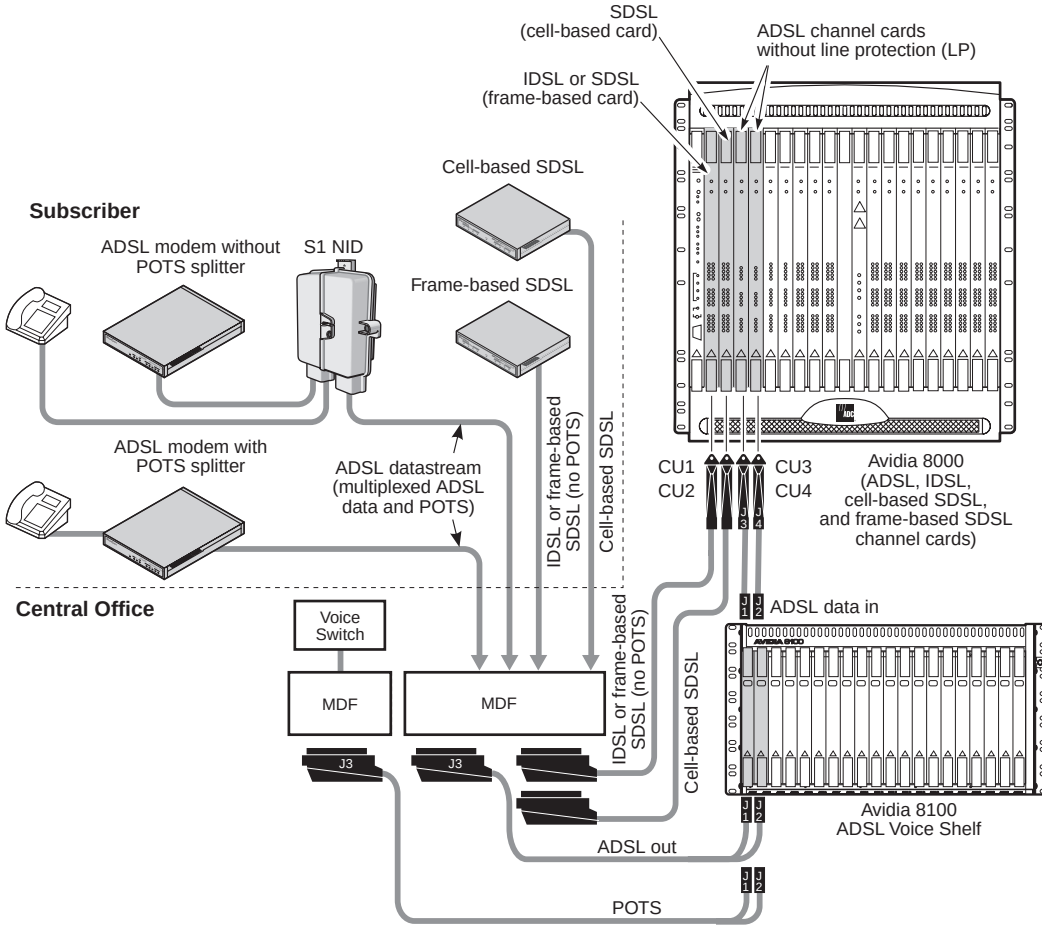
SYSTEM CONFIGURATION EXAMPLES

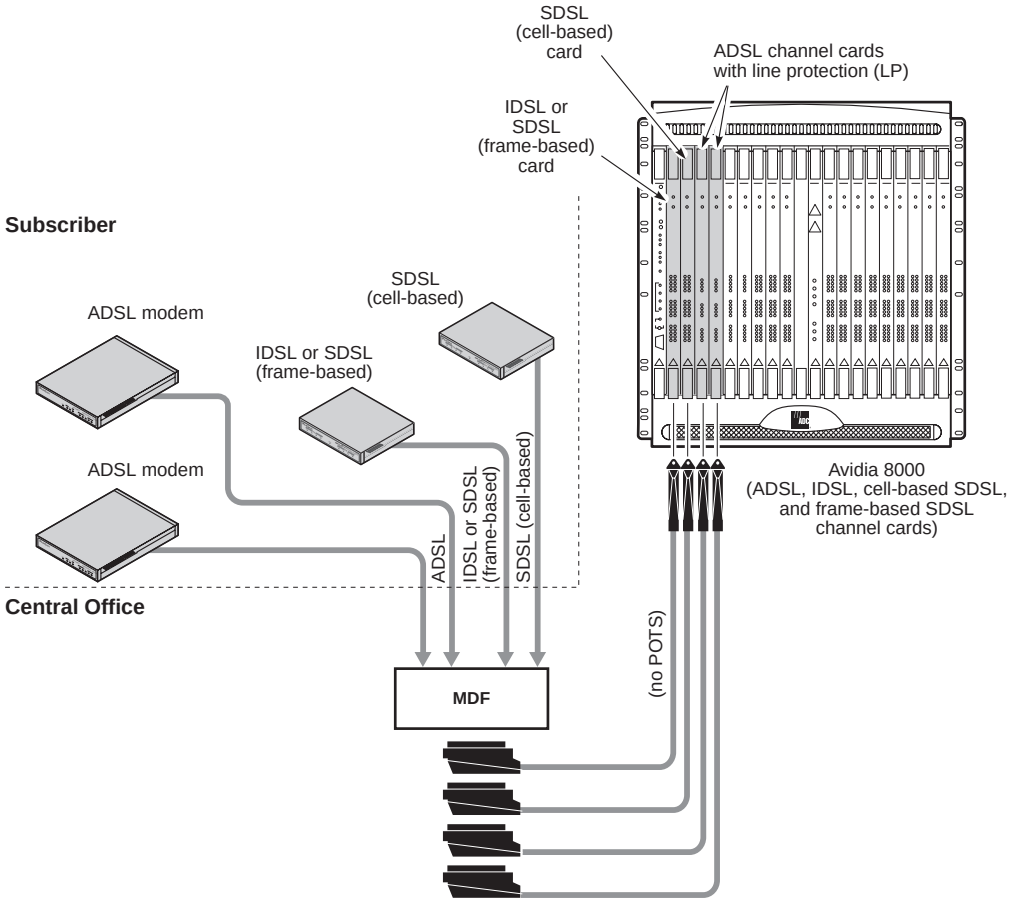
You can configure your Avidia system with or without POTS. See the figures on the pages listed below for a system view of these types of connections:

- When deploying transmission that include POTS and ADSL only, see the figure below.
- When deploying transmission that includes POTS and xDSL, see the figure on page 75.
- When deploying only xDSL transmission without POTS, see the figure on page 75.

For information about selecting the appropriate ADSL subscriber card, see "Compatibility" on page 3.




SDSL
(cell-based card)
ADSL channel cards
without line protection (LP)
IDSL or SDSL
(frame-based card)
Cell-based SDSL
Subscriber
ADSL modem without
POTS splitter
S1 NID
Frame-based SDSL
ADSL modem with
POTS splitter
ADSL datastream
(multiplexed ADSL
data and POTS)
IDSL or frame-based
SDSL (no POTS)
Cell-based SDSL
CU1
CU2
CU3
CU4
Avidia 8000
(ADSL, IDSL,
cell-based SDSL,
and frame-based SDSL
channel cards)
Central Office
Voice
Switch
MDF
MDF
J3
J3
IDSL or frame-based
SDSL (no POTS)
Cell-based SDSL
ADSL data in
Avidia 8100
ADSL Voice Shelf
ADSL out
POTS


SDSL
(cell-based)
card
ADSL channel cards
with line protection (LP)
IDSL or
SDSL
(frame-based)
card
Subscriber
SDSL
(cell-based)
ADSL modem
IDSL or SDSL
(frame-based)
ADSL modem
Avidia 8000
(ADSL, IDSL, cell-based SDSL,
and frame-based SDSL
channel cards)
ADSL
IDSL or SDSL
(frame-based)
SDSL (cell-based)
Central Office
(no POTS)
MDF

REDUNDANCY

Redundancy is a feature of the Avidia system. Redundancy includes:

- dual homing, which provides redundancy at a VPC or VCC level (dual homing also provides static load sharing) as described on page 78.
- card redundancy, where a primary network card can switch to a secondary network card if the primary card were to fail as described on page 79.
- automatic protection switching (APS) for the OC3 network card with dual-PHY connectors, where the primary physical port switches to the secondary physical port if the primary port were to fail as described on page 80.
- DS3 dual port redundancy, which provides both single and dual physical link port redundancy, as described on page 81

Dual Homing

Through dual homing, a second network interface (DS3 or OC3 network card) is used in the Avidia system and provides support that includes:

- backup or redundant PVCs with the same destination.
- static load sharing where traffic is directed separately to a primary and to a secondary network card, increasing the amount of traffic that you can send through the system (see page 79).

See the *Avidia System Configuration and Management User Manual* for information about applying Quality of Service (QoS) to traffic that is assigned to dual homing configurations.

When setting up a system for dual homing, one network card is a primary network card and the second network card is a secondary or backup network card. In an AV8000 system, you can install the network cards into slot 11 and slot 12. The two network card slots are essentially symmetric. At any point, only one of the two network cards will provide cell-bus clocking. Configure ATM VPCs and VCCs to the network card that you choose as primary and configure the backup VPCs and VCCs to the second network card.

In an Avidia 3000 system, you can install the network cards into slot 2 and slot 3. The network card in slot 2 provides cell-bus clocking and must be in the slot when an Avidia 3000 system is initialized (booted). When there is a failure of the network card in slot two, cell-bus clocking switches to slot 1. Configure ATM PVPCs and PVCCs to the network card that you choose as primary and configure the backup PVPCs and PVCCs to the second network card.

Redundancy is another feature of Avidia systems that uses two network cards. Redundancy provides backup at a card level where dual homing provides backup at a PVC level (PVPCs and PVCCs). See page 79 for more information about redundancy. You can implement both redundancy and dual homing concurrently in an Avidia system. You must, however, carefully plan traffic management and QoS to efficiently run the network. See the *Avidia System Configuration and Management User Manual* for information about traffic management.

Backup ATM Connections

ATM service requires the configuration of ATM connections which comprise PVPCs and PVCCs. PVPCs and PVCCs are the logical connections over which ATM cells are transmitted; these are referred to as the primary PVPCs and PVCCs. You can create backup PVPCs and PVCCs to which the system can automatically switch in the event that primary PVPCs or PVCCs fail. These are referred to as secondary PVPCs and PVCCs. The secondary PVPCs and PVCCs are configured to the second (redundant) network card in the Avidia system.

Static Load Sharing

The dual homing feature of static load sharing allows you to increase the amount of traffic that you can send through the system by allowing you to direct traffic to two separate network cards. The uplink for both network cards (DS3 and OC3) is from the same ATM source, but the information that is transmitted may be directed either to the same or to different destination devices. The network cards can be of the same type (both OC3, for example) or they can be of different types (an OC3 and a DS3, for example).

Through StarGazer or the Avidia command-line or Web interfaces, you can direct some Avidia system ATM cross-connections to one of the network cards and then direct other ATM cross-connections to the second network card. If you also implement card-level redundancy and backup or secondary PVCCs and PVPCs, you need to carefully balance loads and manage traffic and QoS to efficiently use the network and the bandwidth available for each network card.

If one network card fails, the second network card takes over the functionality of the failed network card, and re-establishes all the connections. This can result in too heavy a traffic load on the second network card. To handle this, you can configure the recovery priority by traffic type (for example, CBR first, rt-VBR second).

Network Card Redundancy

The Avidia system network cards provide two types of ATM connection redundancy:

- connection redundancy between the network card and the destination ATM end system
- network card redundancy, should a network card fail

Connection Redundancy—Network Card to ATM End System

When a connection goes down between the network card and the destination ATM end system, the network card detects the failure and attempts to re-establish the connection by automatically retrying or re-routing it, using signaling. This requires that the network card and the destination ATM end system both support signaling.

To enable connection redundancy between the network card and the destination ATM end system, you configure an end-to-end connection using SPVCs.

SPVCs comprise:

- a cross-connect (PVCC or PVPC) from a cell-based subscriber card to a network card
- an SPVC from the Avidia network card across the ATM network to an ATM end system

Network Card Redundancy

If a network card fails, and you have a second network card installed, the second network card detects the failure, takes over all of the functionality of the failed network card, and re-establishes all of the connections. This requires two ATM network cards to be installed in the Avidia system, and at least two uplinks from the Avidia system to the ATM network.

Network card redundancy requires configuring static routes in the ATM Routing Table. When a network card fails, the system uses the ATM Routing Table information to re-route SPVCs to a specified slot and port on the secondary network card, based on the destination ATM address. See the *Avidia System Configuration and Management User Manual* for information about configuring static routes.

Managing Traffic for Redundancy

You can configure the Avidia system for static load sharing, using two installed network cards. However, if one network card fails, the second network card takes over the functionality of the failed network card, and re-establishes all the connections. This can result in too heavy a traffic load on the second network card. To handle this, you can configure the recovery priority by traffic type (for example, CBR first, rt-VBR second). If you do not configure recovery priorities, the connections are recovered sequentially until no further resources are available. After that point, the remaining connections are dropped. See “Static Load Sharing” on page 79 for more information about static load sharing and traffic management.

When an initial call request is unsuccessful, or an existing connection fails, and the call has been retried the maximum configured number of times, the call request is re-routed using the other network card.

OC3 Automatic Protection Switching

OC3 network cards have two physical SONET interfaces, each with a transmit and receive port. Under normal operation, all traffic is carried through the first interface; the second is not used. Automatic Protection Switching (APS) uses the second interface to provide a backup to the first.

Avidia uses 1+1 unidirectional APS. In this version of APS, the primary interface is defined as the working channel. The second interface is defined as the protection channel. Transmitted data is sent over both channels. Data is normally received through the working channel. However, if the working channel fails, received data automatically switches to the protection channel.

By default, APS is disabled on Avidia systems. You must enable APS for automatic switching to occur. See the *Avidia System Configuration and Management User Manual* to enable and configure APS.

DS3 Dual Port Redundancy

When you use two DS3 cards in an AV8000 system, connect the cables as described in the section "DS3 Interface Cables" on page 33 for one of the following modes:

- single physical link mode (see figure on page 84)
- dual physical link mode (dual homing) (see figure on page 82)

Dual Physical Link Network Card Redundancy

If a network card fails, and you have a second network card installed, the second network card detects the failure, takes over all of the functionality of the failed network card, and re-establishes all of the connections. This requires two ATM network cards to be installed in the Avidia system, and at least two uplinks from the Avidia system to the ATM network.This redundancy method is known as Dual Physical Link Port redundancy and is the default redundancy mode.

Network card redundancy requires configuring static routes in the ATM Routing Table. When a network card fails, the system uses the ATM Routing Table information to re-route SPVCs to a specified slot and port on the secondary network card, based on the destination ATM address.

Implementing DS3 Port Redundancy

StarGazer allows network port redundancy to be implemented in either a Dual Physical Link mode or a Single Physical Link mode.

Dual Physical Link Mode. In the Dual Physical Link mode, a DS3 card positioned in slot 11 of the AV8000 default to port 2 as the primary active link and a DS3 card placed in slot 12 of the AV8000 defaults to port 1 as the primary active link. This default configuration allows both cards to be activated simultaneously and carry network traffic over separate physical networks links. In this mode, however, different active port numbers must be used for each DS3 network card and both port 1 and port 2, on either card, must not be activated simultaneously.

If both DS3 cards and network links are active, then redundancy is provided by switching xDSL traffic from the failed DS3 card or network link, to the remaining active DS3 card and its associated network link. If only one DS3 card and link is active and the other DS3 card and network link are idle, reserved for backup, then redundancy is provided by activating the idle DS3 card and link and switching xDSL traffic from the failed DS3 card to the now active backup DS3 card and its associated network link. In Dual Physical Link mode, the two network cards are not required to be of the same media type—a DS3 card may be mixed with an OC3 card with no reduction in functionality.

Dual Physical Link mode is the default port redundancy configuration, and is automatically selected if Single Physical Link mode redundancy is turned-off during configuration of the DS3 cards. Redundancy of either type is a chassis-wide system configuration parameter involving all of the installed network cards in a chassis.

Single Physical Link Mode. In the Single Physical Link mode, port redundancy requires two DS3 cards—a DS3 card may ***not*** be mixed with an OC3 card, nor can two OC3 cards be utilized in place of DS3 cards. However, if mixed OC3/DS3 cards must be used, then port redundancy may only be configured for Dual Physical Link mode. As in earlier versions, use of a single DS3 network card is allowed, although no port redundancy is possible under this configuration.

Whereas the Dual Physical Link mode automatically activates port 2 for slot 11 and port 1 for slot 12, by default, Single Physical Link mode selects the active port and slot through an internal algorithm, that is in part, based on the user designation of either port 1 or port 2 as the ***redundancy port*** during configuration.

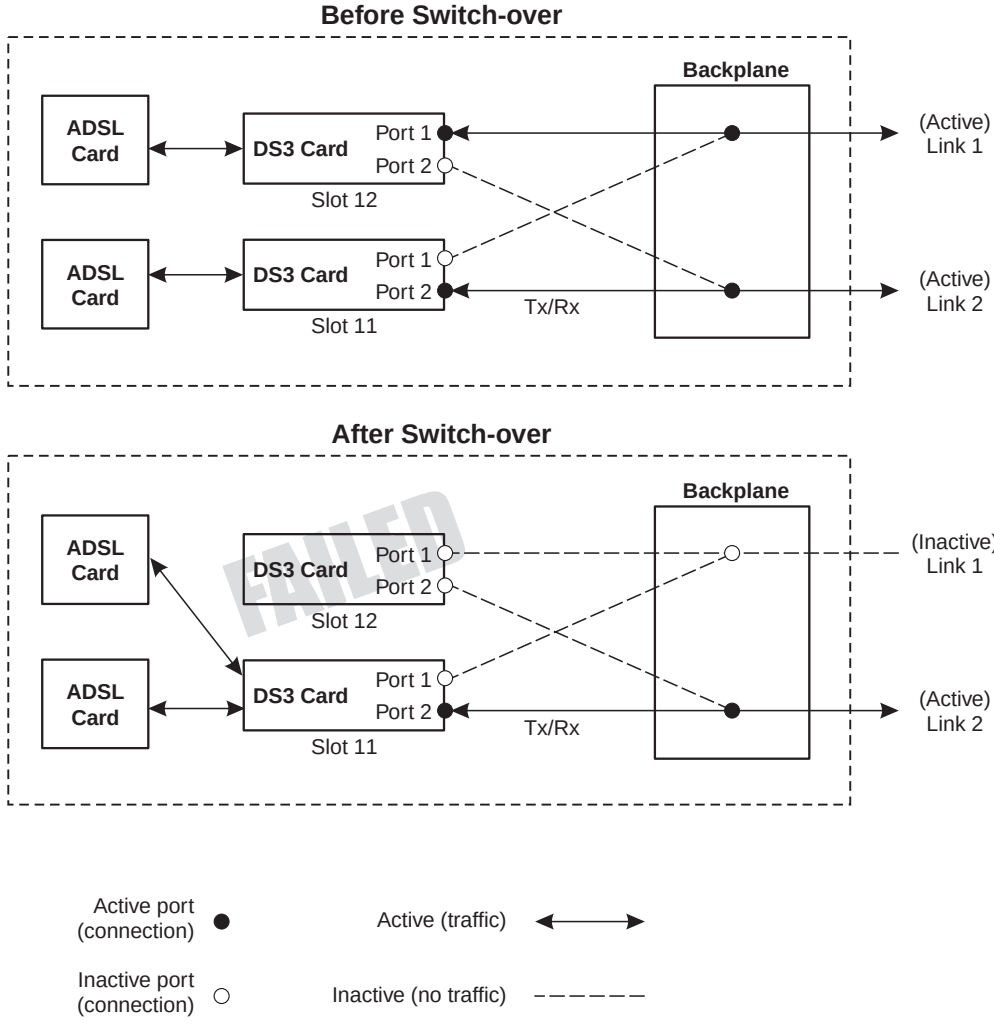
The DS3 network card is configured for Single Physical Link mode redundancy through the Web, command line or StarGazer interface. If Single Physical Link mode is turned-off, then Dual Physical Link mode is assumed. Configuration procedures for setting up port redundancy can be found in the DS3 Configuration sections of the Avidia software manuals.

The remainder of this section will describe the operation of dual port redundancy under both the Dual Physical Link mode and the Single Physical Link mode configurations. The network configuration will be examined both before and after a failure-induced automatic switch-over of network traffic. If you decide to employ port redundancy in your system, you must pay careful attention to your configuration and cabling.

DS3 Card Switch-Over—Dual Physical Link Mode

In Dual Physical Link mode, failure of one of the DS3 network cards (primary), or its associated network link, will cause all xDSL traffic through that interface to be automatically switched to the remaining DS3 network card (secondary) and routed over the alternate physical network link. If the secondary physical network link is currently active, the traffic diverted from the failed primary network card will be ***combined with*** the original traffic through the secondary network card and its overall traffic load will be increased. This load increase is an important consideration when selecting this port redundancy mode.

The following figure shows the before and after configuration of the network interface following a failure in the DS3 card in slot 12 (primary) or a failure in the network link associated with this card, where both the primary and secondary physical network links are active. Initially, traffic is flowing through port 1 of the DS3 card in slot 12 (primary) to network link 1 and through port 2 of the DS3 card in slot 11 (secondary) to network link 2. This is the initial default configuration when operating in Dual Physical Link mode.



After switch-over has occurred, all ADSL traffic is diverted from the DS3 network card in slot 12, port 1 to the DS3 network card in slot 11, port 2. Traffic originally directed through network link 1, is now be diverted and added to the network traffic through link 2.

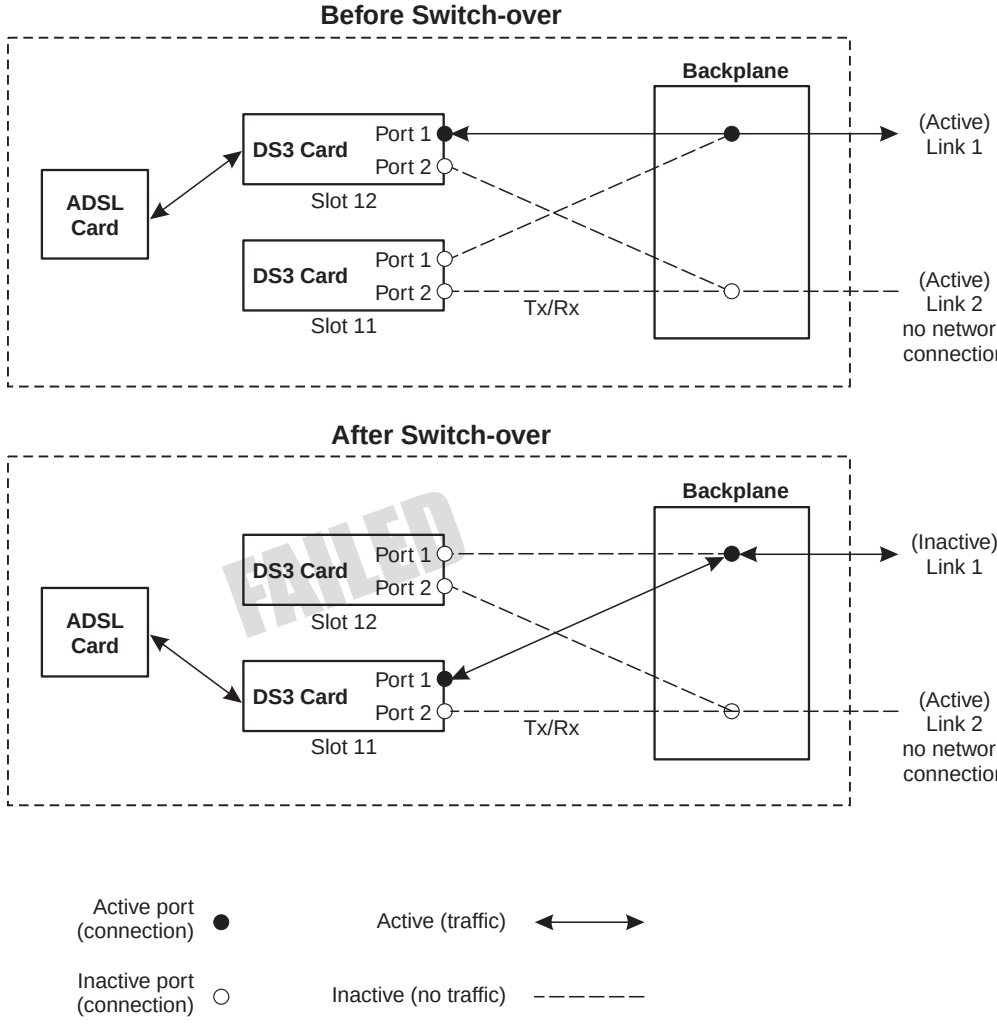
As mentioned earlier, although the secondary physical network link may be active, it may also be maintained in standby mode and reserved strictly for backup purposes. In this case there will be no increase in traffic load to the network after switch-over.

Although two DS3 network cards are shown in the preceding figure, Dual Physical Link mode allows a configuration based on an OC3/DS3 network card combination. This is not the case with Single Physical Link mode.

DS3 Card Switch-Over—Single Physical Link Mode

In Single Physical Link mode, failure of one of the DS3 network cards (primary) will cause all xDSL traffic through that interface to be automatically switched to the backup DS3 network card (secondary) and routed over the ***same*** physical network link. Since traffic diverted from the failed primary network card will continue to be directed through the same physical network link, any failure at the network level can not be corrected by using the Single Physical Link mode—only DS3 card-level failures can be addressed and corrected by this method.

The figure below shows the before and after configuration of the network interface following a failure in the DS3 card in slot 12 (primary). Initially, traffic is flowing through port 1 of the DS3 card in slot 12 to network link 1 and there is no traffic through port 2 of the DS3 card in slot 11 (secondary). Notice that in this case, the DS3 card in slot 11 is idle and that network link 2 connected to port 2 is not active. This is the normal dual network card configuration when operating in Single Physical Link mode with port 1 selected for port redundancy. The software port selection algorithm will reverse this active/idle card configuration if port 2 instead of port 1 is designated as the redundancy port.



After switch-over has occurred, all ADSL traffic is diverted from the DS3 network card in slot 12, port 1, to the DS3 network card in slot 11, port 1. Traffic originally directed through network link 1 is still directed through this same network link and there is no increase in network traffic load.

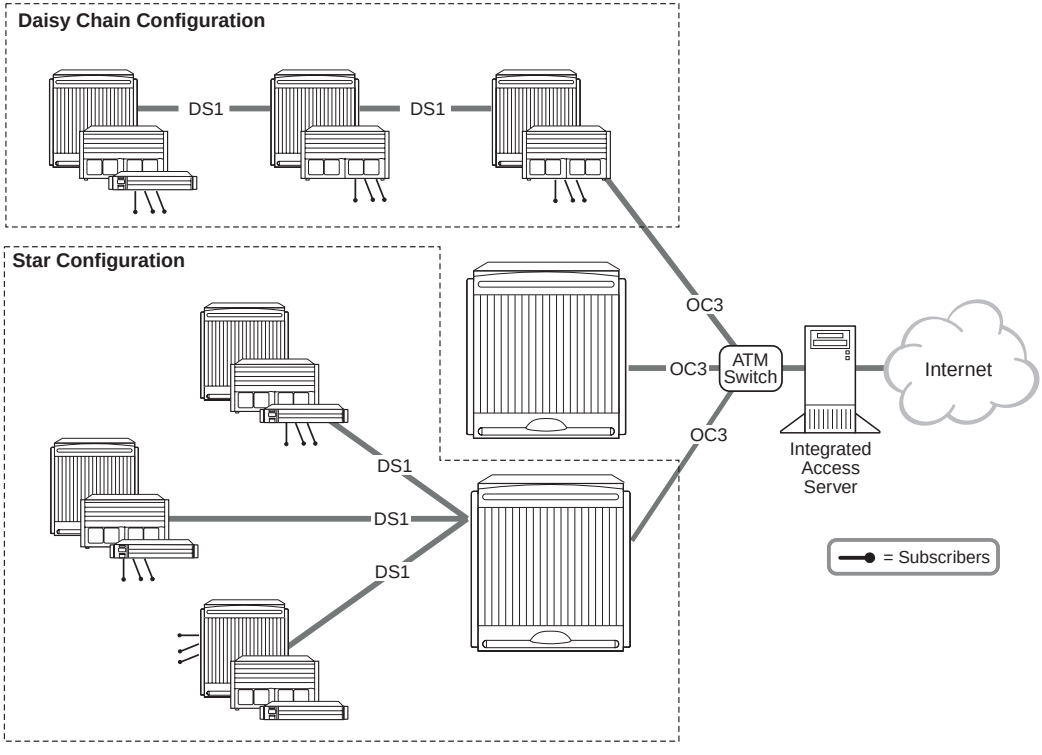
Two DS3 network cards are shown in the figure above—this is the only configuration possible. Single Physical Link mode requires that two DS3 cards be used in the network interface configuration and does not permit an OC3/DS3 network card combination. If an OC3/DS3 network card combination is required, then the network interface must be configured as a Dual Physical Link.

SUBTENDING MULTIPLE SYSTEMS

Multiple systems can be implemented, viewed, and managed as if they were one system. This type of management is known as subtending. To subtend, connect and configure Avidia systems in one of two ways: a star configuration or a daisy chain configuration.

In either implementation, multiple systems connect to one system that aggregates the transmission of all the attached systems and provides one network uplink. The aggregating system is known as the *subtending* or *source* system and each of the systems connected to it are known as the *subtended* or *destination* systems.

See the figure below for a representation of both daisy chained and star configured systems. In the figure, the subtending systems in each configuration aggregate the transmissions of the subtended systems and provide a network uplink via OC3 to the ATM Switch.



In the deployment of xDSL services, subtending helps the service provider satisfy the customer's demand for bandwidth against the WAN trunk capacities. Subtending helps to expand the availability of service more cost effectively and expand to the more remote subscribers. Subtending services, offered by Avidia, are complemented by its ATM features and provide benefits such as:

- optimizing the use of the more expensive WAN transmissions, such as DS1, DS3, and OC3, by using only as much of the bandwidth as required
- incrementally adding bandwidth without changing the hardware (for example, 8xDS1 and 8xDSX-1 cards have eight separately configurable DS1 ports)
- using an Avidia system at the edge of the network (aggregates and provides uplink) rather than using a third party switch
- concentrating data efficiently
- organizing the network through the use of VPCs and VCCs
- selecting ATM QoS classes to effectively groom traffic within the network

Set up subtending using AV8000, AV3000 and AV2200 systems. AV8000 and AV3000 systems can both subtend and be subtended while the AV2200 is typically a subtended system and does not subtend other systems. Then, within these Avidia systems, use the cards listed in the following table to set up the appropriate subtending or subtended interfaces. To subtend, connect a subscriber-side interface of the subtending system to the network-side interface of the subtended system. A network-side interface must be in slot 11 or 12 of an AV8000, in slot 2 or 3 of an AV3000 or in slot 1 of an AV2200 to provide a cell bus clock and cell bus arbiter clock for the Avidia system. The network-side interface also provides either the network uplink interface to the subtending system or the network interface from the subtended to the subtending system.

Interface card	Use interface cards in these Avidia systems:				Maximum number for subtending
	AV8000	AV6000	AV3000	AV2200	
OC3 (AV311, AV312, AV313)	Slot 11 or 12 as a network interface Slots 2 - 10, 11 or 12 (slot that was not used for the network interface), or 13 - 21 as a subscriber interface	Slot 9 or 10 as a network interface Slots 2 - 8, 9 or 10 (slot that was not used for the network interface), or 11-17 as a subscriber interface	Slot 2 as a network interface Slots 3 - 5 as a subscriber interface	N/A	3
DS3 (AV323)	Slot 11 or 12 as a network interface Slot 11 or 12 (slot that was not used for the network interface) as a subscriber interface	Slot 9 or 10 as a network interface Slot 9 or 10 (slot that was not used for the network interface) as a subscriber interface	Slot 2 as a network interface Slot 3 as a subscriber interface	N/A	1
DS1 (AV351)	Slots 2 - 10 or 13 - 21 as a subscriber interface only	Slots 2 - 8 or 11-17as a subscriber interface only	Slot 2 as a network interface Slots 3 - 5 as a subscriber interface	N/A	18 (AV8000) 3 AV3000) 14 (AV6000)
DSX-1 (AV353)	Slot 11 or 12 as a network interface Slot 11 or 12 (whichever was not the network interface) as a subscriber interface	N/A	N/A	N/A	1
DS1 network management card (AV351)	N/A	N/A	N/A	Slot 1 as a network interface	1
E1	Slots 2-9 and 13-21 Subscriber slots only	Slots 2-8 and 11-17 as a subscriber card Slots 9 or 10 as a network interface	Slot 2 as a network interface Slots 3-5 as a subscriber interface	N/A	18 (AV8000) 4 AV3000) 16 (AV6000)

It is important to note that you cannot use the same card to subtend and be subtended. For example, a DS1 card has eight ports; you cannot use one port to subtend another port on the same card.

The implementation of subtending is described in these sections:

- "Star Management" on page 89
- "Daisy Chain Management" on page 93

Each section provides both the features of and the limitations for implementing each subtending approach. You can also combine the star and daisy chain approaches to effectively implement subtending.

Star Management

In a star configuration, you can attach up to three systems (subtended systems) directly to the one system that connects on the edge of the network (subtending system). The subtending system aggregates the traffic from the subtended systems, switches all the traffic (its own and that of the subtended systems), and provides the network uplink. Features of this management approach include:

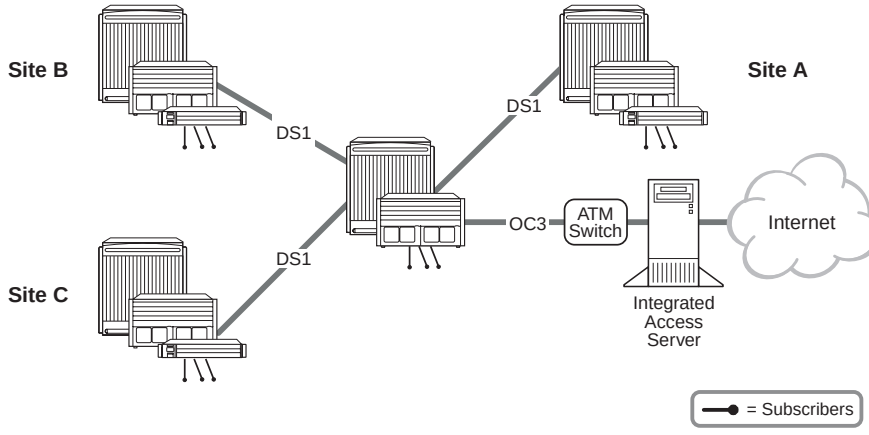
- shorter segment costs rather than the longer length cost of a daisy chain
- more cost effective than running fiber optic cable to new areas or to areas with a small number of subscribers

Each system, whether subtending or subtended, can connect to and manage subscriber traffic (modems).

"Star Physical Implementation" on page 89 shows how to set up a star configuration using Avidia systems. "Star Configuration" on page 92 shows how to configure the system to implement the appropriate connections.

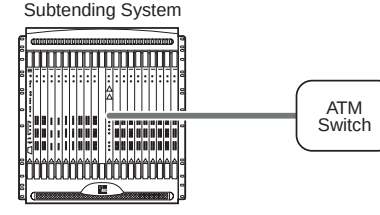
Star Physical Implementation

The relationship of subtending in a star configuration is shown in the following figure. The example shows an OC3 interface as the network uplink for the entire subtended system. An AV8000 or AV3000 is the subtending system. Three chassis are subtended and are at three separate physical locations (sites). The subtending connection is through a DS1 link.



The following sections describe how to select cards for the various subtending connections. The figures use the sample system shown above as an example.

Select the uplink card. Install one card for the network uplink, such as the ATM switch shown to the right, in the *subtending* system. The card must reside in slot 11 or 12 for an AV8000 or slot 2 for an AV3000. Select either a DS3, an OC3, or a DS1/DSX-1 for an AV3000 or AV8000 system.

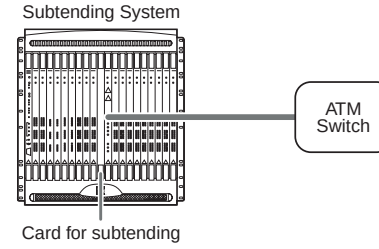


Network Uplink Connection

Select a card that accommodates the required network uplink bandwidth for all the systems that are aggregated by the subtending system. Ensure the subtending system's network uplink card is not a bottleneck for traffic. For example, use an OC3 or DS3 card for larger systems since these cards provide greater bandwidth. Use a DS1/DSX-1 card for an initial implementation where Avidia systems have only a few cards with the intention of expanding service in the future.

Select the subtending subscriber cards.

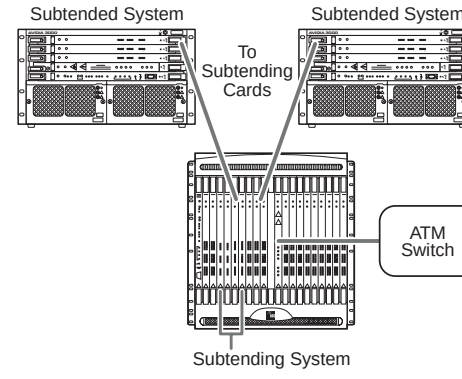
Install a card in the subscriber-side of the *subtending* system for each system that will be subtended, up to the maximum allowed number of cards (see the table on page 88):



- DS1 that can be installed in any subscriber card slot
- DSX-1 that can be installed in the second network card slot
- DS3 that can be installed in the second network card slot
- OC3 that can be installed in the second network card slot and in any two subscriber cards slots

Select the subtended network cards.

Install a card in the network-side of the *subtended* system (see the table on page 88) that is compatible with the card you selected in "Select the subtending subscriber cards" above. For example, if you select a DS1 card for subtending, then use one of the following:



- 8xDS1 card in slot 2 of a subtended AV3000 system
- DSX-1 card in slot 11 or 12 of a subtended AV8000 system
- 8xDS1 network/management card in slot 1 of a 2200

The network-side interface provides the network interface to the subtending system.

Star Configuration

The following steps provide an overview of the required software configuration. See the *Avidia System Configuration and Management User Manual* for configuration instructions.

1 Create ATM profiles, if required, for the service you will supply.

2 Configure service for each card that is subtending or subtended.

3 Configure the required ATM connections.

4 Configure UPC policing.

5 If you are subtending systems using DS1/DSX-1 cards, set up the subtending relationships using the command-line interface.

Daisy Chain Management

A daisy chain is a serial link (or cascaded link) of up to three systems that has one network uplink connection and is viewed as one integrated system. A daisy chain is an approach for managing systems to support subscribers who are physically separated by distance. The daisy chain comprises:

- one system functioning on the edge of the network to aggregate and switch ATM transmissions and provide the network uplink
- up to two systems functioning as access devices

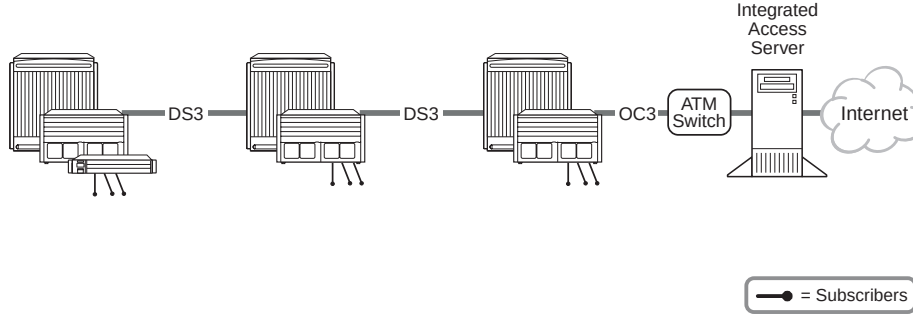
Each system, whether subtending or subtended, can connect to and manage subscriber traffic (modems).

"Daisy Chain Physical Implementation" on page 93 shows how to set up the daisy chain using Avidia systems. "Daisy Chain Configuration" on page 95, shows how to configure the system to implement the appropriate connections.

Daisy Chain Physical Implementation

The relationship of subtending in a daisy chain configuration is shown in the following figure. Use two cards per system to connect a daisy chain. One card, used as a network-side interface, connects to the next system upstream in the chain. Upstream connects toward the network interface. The second card, used as a subscriber-side interface, connects to the next system downstream in the chain.

The example shows an OC3 interface as the network uplink for the entire subtended system. An AV8000 or AV3000 is the subtending system. The two chassis are subtended and are at two separate physical locations (sites). The subtending connection is through a DS3 link.

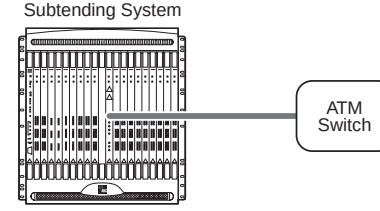


Plan your daisy chain system considering these factors:

- Plan an alternate or second path (such as a SONET ring) to re-route traffic in the event of a failure of any link in the daisy chain.
- Connect a maximum of three systems in the daisy chain, considering the maximum distance allowed between system based on type of transmission.

The following sections describe how to select cards for the various subtending connections. The figures show selection examples using the same system shown on page 93.

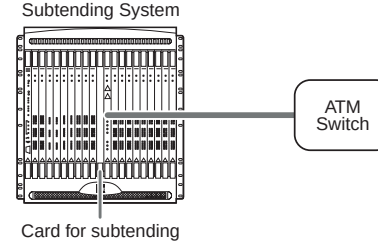
Select the uplink card. Install one card for the network uplink in the *subtending* system. The card must reside in slot 11 or 12 for an AV8000 or slot 2 for an AV3000. Select either a DS3, an OC3, or a DS1/DSX-1 for an AV3000 or AV8000 system.



Network Uplink Connection

Select a card that accommodates the required network uplink bandwidth for all the systems that are aggregated by the subtending system. Ensure that the subtending system's network uplink card is not a bottleneck for traffic. For example, use an OC3 or DS3 card for larger systems since these cards provide greater bandwidth. Use a DS1/DSX-1 card for an initial implementation where Avidia systems have only a few cards with the intention of expanding service in the future.

Select the subtending subscriber card. Install a card in the subscriber-side of each of the first two systems that are *subtending* the downstream system, up to the maximum allowed number of cards (see the table on page 88):

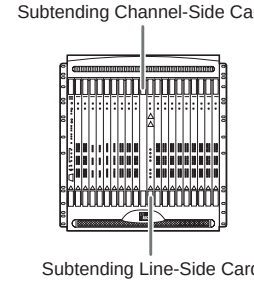


- DS1 that can be installed in any subscriber card slot
- DSX-1 that can be installed in the second network card slot
- DS3 that can be installed in the second network card slot
- OC3 that can be installed in the second network card slot and in any two subscriber cards slots

Select the subtended network cards.

Install a card in the network-side of the two *subtended* systems (see the table on page 88) that is compatible with the card you selected in "Select the subtending subscriber card" on page 94. For example, if you select a DS1 card for subtending, then use one of the following:

- 8xDS1 card in slot 3 of a subtended AV3000 system
- DSX-1 card in slot 11 or 12 of a subtended AV8000 system
- 8xDS1 network/management card in slot 1 of a subtended 2200.



The network-side interface provides the network interface to the subtending system.

Daisy Chain Configuration

The following steps provide an overview of the required software configuration. See the *Avidia System Configuration and Management User Manual* for configuration instructions.

1 Create ATM profiles, if required, for the service you will supply.

2 Configure service for each card that is subtending or subtended.

3 Configure the required ATM connections.

4 Configure UPC policing.

5 If you are subtending systems using DS1/DSX-1 cards, set up the subtending relationships using the command-line interface.

9 MAINTENANCE

This chapter provides maintenance procedures for removing and replacing system components. You can remove and replace any card, the fan tray, and the air filter on the AV8000 system while the system is under power (hot swap). This means that the AV8000 is still in service when you remove and replace any of these modules.

Never attempt to repair parts or modules yourself. Return all defective modules to ADC for repair. See "Technical Assistance" on page 195

Always wear an antistatic wrist strap when removing and replacing components in the AV8000. Refer to the section "Attaching an ESD Wrist Strap to Chassis" on page 16.

NEVER power-up a fully loaded chassis. In all cases, remove all cards, power-up the chassis, and then insert the cards one at a time.

See these sections for maintenance procedures:

- removing and replacing cards, as described on page 98
- removing and replacing the fan tray, as described on page 103
- removing and replacing the air filter, as described on page 105

REMOVING AND REPLACING A CARD

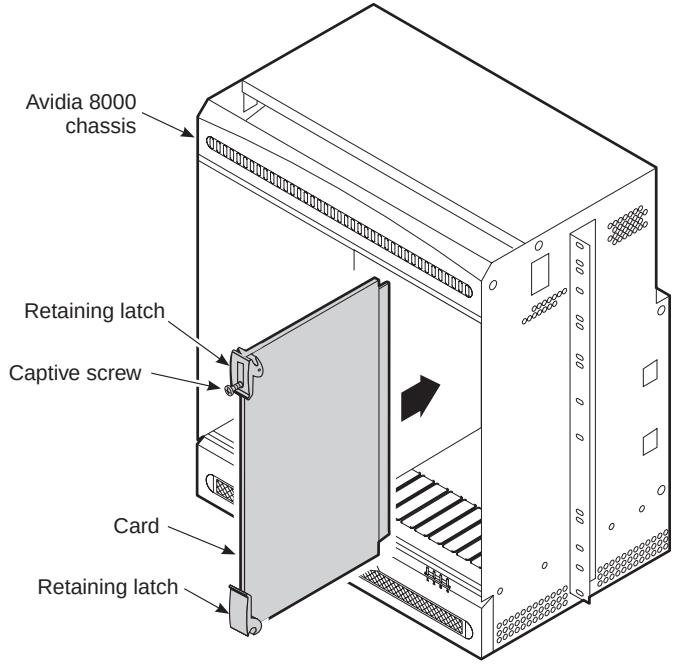
You must wear an antistatic wrist strap connected to the ESD jack on the AV8000 chassis to perform the installation procedures. You must also observe normal ESD precautions when handling electronic equipment. Do not hold electronic plugs by their edge. Do not touch components or circuitry.

Use the following procedures to remove and replace the following:

- management or subscriber card (page 99)
- network card (page 99)

After installing the new card, refer to the *Avidia System Configuration and Management User Manual*. If you are replacing the card with an identical card, see information on system maintenance and administration for downloading the appropriate image file to the new card. If you are replacing the card with a different card, see information on how to configure the new card by using either the Command-Line Interface or the Web Interface. You can also perform these functions using the StarGazer EMS software.

The figure below shows an example of removal and replacement of any card.



Remove and Replace a Management or a Subscriber Card

The management card resides in slot 1 of the AV8000 chassis. The xDSL subscriber cards reside in slots 2 through 10 and 13 through 21 of the AV8000 chassis.

Remove a management or subscriber card:

1 Loosen the captive screw on the top retaining latch.

2 Lift open the top and bottom retaining latches.

3 Grasp the card by the front panel.

4 Carefully slide the card out of the slot.

Replace a management or subscriber card:

1 Slide the card into the appropriate slot, using the guide rails. (See Chapter 6 on page 53 for slot assignments.) Ensure the retaining latches are lifted open.

2 Push the card into the slot until the retaining latches touch the AV8000 chassis.

3 Gently close the retaining latches until they snap in place.

4 Tighten the captive screw on the top retaining latch.

Remove and Replace a Network Card

Network cards reside in slots 11 and 12. The 8xDS1 network cards function only in subscriber card slots.

Network Cards Except OC3 Network Cards

Remove a network card that is not an OC3 card:

1 Loosen the captive screw on the top retaining latch.

2 Lift open the top and bottom retaining latches.

3 Grasp the card by the front panel, and carefully slide the card out of the slot.

Replace a network card that is not an OC3 card:

1 Slide the card into the appropriate slot, using the guide rails. (See Chapter 6 on page 53 for slot assignments.) Ensure the retaining latches are lifted open.

2 Push the card in until the retaining latches touch the AV8000 chassis.

3 Gently close the retaining latches until they snap in place.

4 Tighten the captive screw on the top retaining latch.

OC3 Network Cards

Remove an OC3 network card:

1 Disconnect the fiber-optic cable:

a Loosen the OC3 network card safety cover captive screw and remove the safety cover.

Do not look directly at the fiber-optic ports on the front of the OC3 network card or into the end of any fiber-optic cable. Ensure you select the appropriate fiber-optic cable for either a multimode or single mode transceiver.

b Remove the fiber-optic cable connectors from the primary SC fiber connector as shown in the figure on page 102.

c Lift the cable(s) away from components on the side of the card.

d Reinstall the OC3 network card safety cover, and tighten the captive screw.

2 Loosen the captive screw on the top retaining latch.

3 Lift open the top and bottom retaining latches.

4 Grasp the card by the safety cover.

5 Slide the card out of the slot carefully.

Install an OC3 network card:

1 Slide the network card into the slot (11 or12), using the guide rails. Ensure that the retaining latches are lifted open.

2 Push the card in until the retaining latches touch the AV8000 chassis.

3 Gently close the retaining latches until they snap in place.

4 Tighten the captive screw on the top retaining latch.

5 Install fiber-optic cable:

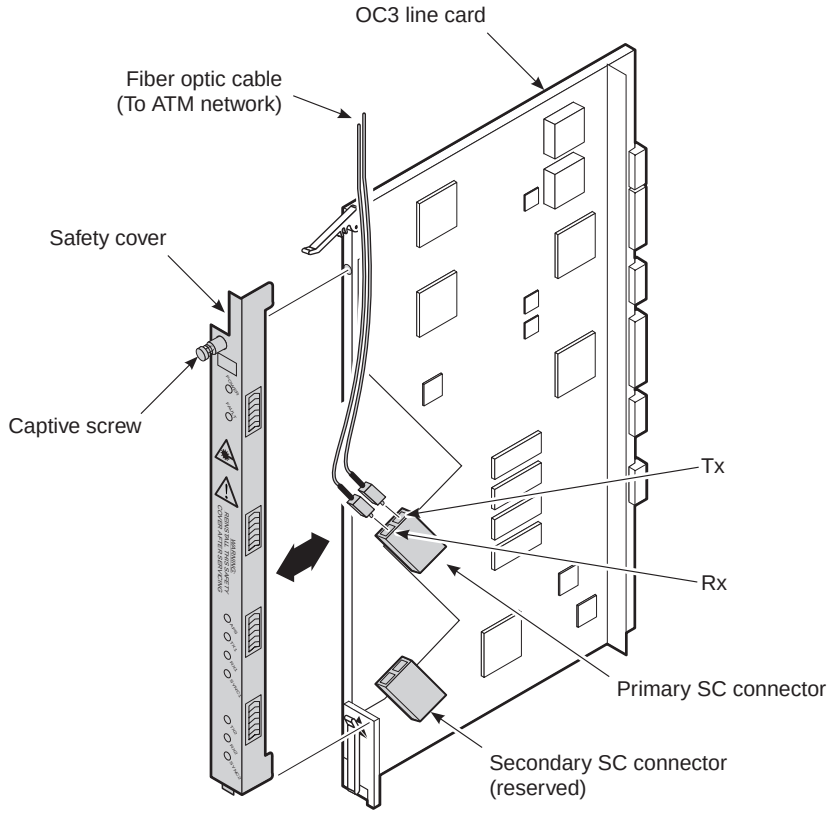
a Loosen the OC3 network card safety cover captive screw, and remove the safety cover.

Do not look directly at the fiber-optic ports on the front of the OC3 network card or into the end of any fiber-optic cable. Ensure that you select the appropriate fiber-optic cable for either a multimode or single mode transceiver.

b Install the fiber-optic cable connectors into the primary SC fiber connector as shown below. On each SC connector, the top port is for the transmit (Tx) signal and the bottom port is for the receive (Rx) signal.

c Route the cable(s) along the side of the card.

d Reinstall the OC3 network card safety cover and tighten the captive screw.


OC3 line card
Fiber optic cable
(To ATM network)
Safety cover
Captive screw
Tx
Rx
Primary SC connector
Secondary SC connector
(reserved)

REMOVING AND REPLACING THE FAN TRAY

You can replace the fan tray with a spare fan tray (PN 150-1999-*xx*) while the AV8000 chassis is under power. The unit can operate for short periods of time without the fan tray.

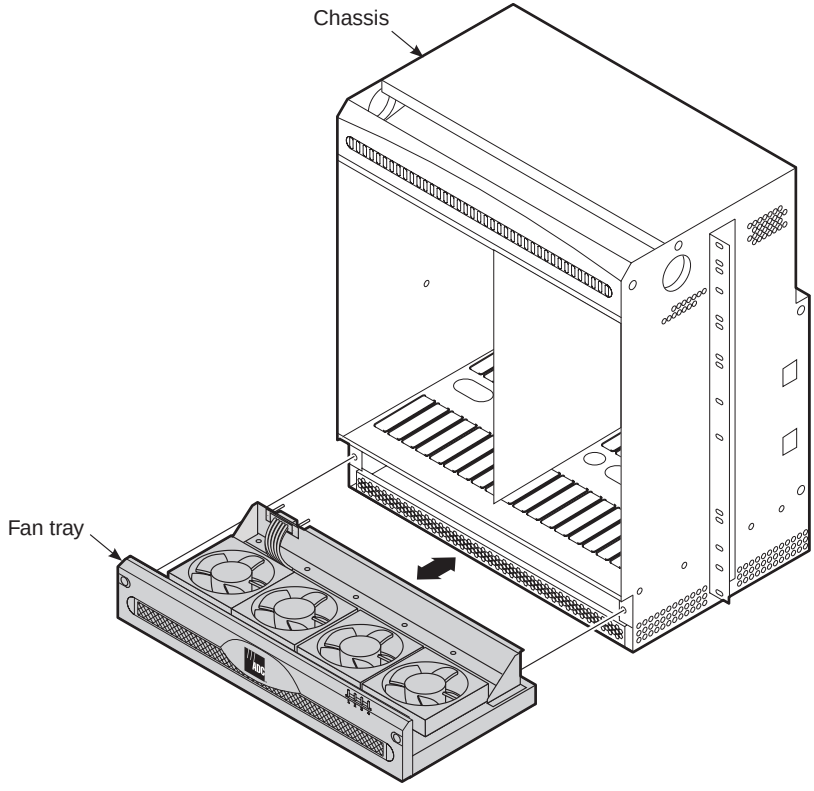
Remove the defective fan tray. If you remove a defective fan tray, you should insert a replacement fan tray immediately. Otherwise the AV8000 could overheat.

Remove the fan tray:

1 Use a Phillips screwdriver to loosen the two captive screws on the right and left edges of the fan tray front bezel.

Do not place your fingers near the fan blades when removing the fan tray.

2 Grasp the edges of the front bezel, and pull the fan tray from the chassis. This disconnects the power connector for the fan tray from the backplane.



Replace the fan tray:

1 Push the fan tray front bezel toward the chassis to install the fan tray. This connects the power connector for the fan tray to the backplane.

2 Use a Phillips screwdriver to tighten the two captive screws on the right and left edges of the front bezel.

REMOVING AND REPLACING THE AIR FILTER

The air filter should be periodically changed to maintain proper air flow in the AV8000 chassis. It is recommended that you change the air filter every six months or more often if necessary. Access the filter through the fan tray.

Replace the air filter and reinstall the fan tray immediately after removing them.

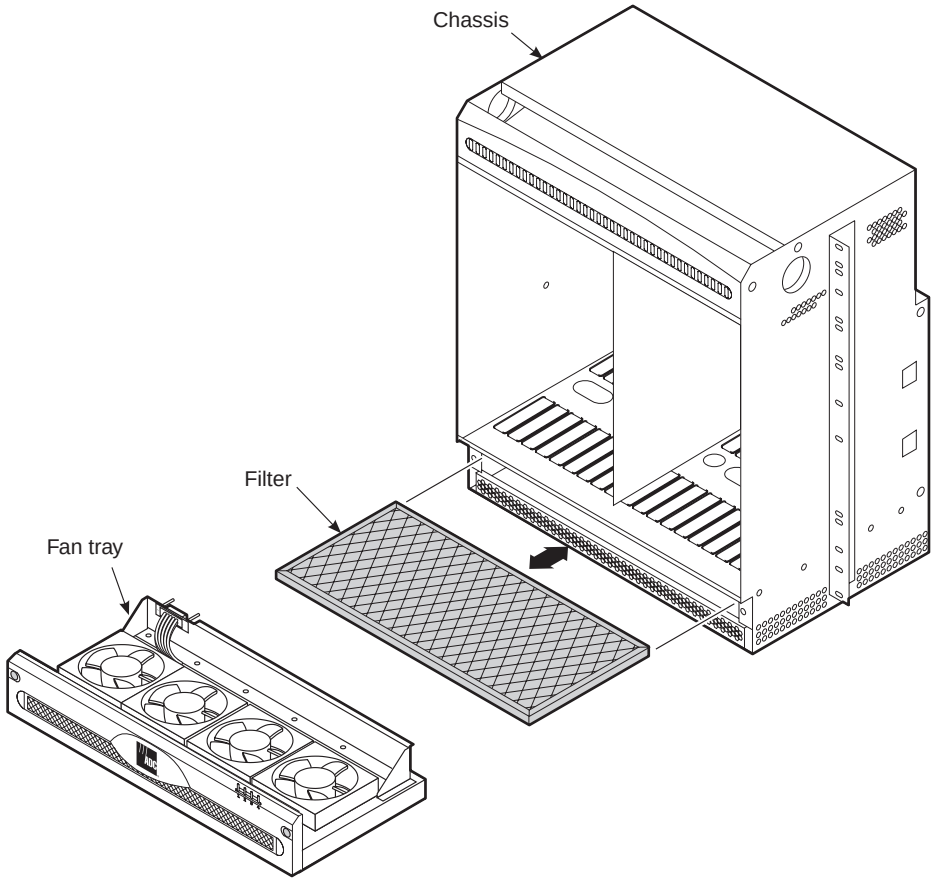
Remove the air filter:

1 Use a Phillips screwdriver to loosen the two captive screws on the right and left edges of the fan tray front bezel.

Do not place your fingers near the fan blades when removing the fan tray.

2 Grasp the edges of the front bezel, and pull the fan tray from the chassis. This disconnects the power connector for the fan tray from the backplane.

3 Grasp the edge of the air filter and pull it from the chassis.



Replace the air filter:

1 Insert the air filter into the chassis using the guide rails.

2 Push the fan tray front bezel toward the chassis to install the fan tray. This connects the power connector for the fan tray to the backplane.

3 Use a Phillips screwdriver to tighten the two captive screws on the right and left edges of the fan tray front bezel.

ADSL VOICE SHELVES AND POTS SPLITTERS 10

ADDING VOICE SHELF CAPABILITY TO THE AV8000

ADSL Voice Shelf capabilities may be added to the AV8000 chassis. Although the AV8100 is described in detail in the following sections, ADC also manufactures a number of other voice shelves and POTS splitter cards which may also be connected to the AV8000 to provide voice capabilities.

ADC BROADWIRE ADSL VOICE SHELF PRODUCTS

ADC manufactures a number of ADSL Voice Shelves for use in North America and throughout the world. Please contact ADC for detailed information regarding any of these products.

Effective ADSL deployment challenges service providers to maximize valuable floor space and maintain network integrity. High circuit density and sound cable management is vital, as is the ability to accommodate varying voice and data frequency specifications. A patent-pending cable management design and high circuit density allows the BroadWire line of splitters to fully satisfy these requirements, preparing service providers for equipment co-location and line sharing mandated by industry deregulation.

Worldwide	North America
• BroadWire 240 Chassis	• BroadWire 528 Chassis
• BroadWire 120 Chassis	• BroadWire 288 Chassis
• BroadWire 24 MDU Chassis	• BroadWire 24 MDU Chassis
•	• Avidia AV8100 Chassis

The BroadWire120 ADSL Splitter

The BroadWire120 ADSL splitter is a high-density splitter platform designed for 300 mm.ETSI cabinets, supporting up to 120 circuits in a compact footprint. The BroadWire 120 splitter enables service providers to broaden the use of existing copper infrastructure, providing high-speed ADSL and telephony services over a single twisted pair of copper wires. The BroadWire120 also supports ADSL over ISDN splitting with custom filter designs for 2B1Q and 4B3T line encoding techniques.

Features:

- High-density splitter platform manages up to 120 circuits per chassis
- Front-facing platform integrates in standard 300 mm ETSI equipment cabinets
- Holds CE Mark and UL1950 certification, optimized for international deployment
- POTS (T1.413) or ADSL over ISDN (2B1Q) and custom billing tone/network impedance filter designs available

The BroadWire 240 ADSL Splitter

The BroadWire240 ADSL splitter is a high density ETSI-compatible splitter platform, supporting up to 240 circuits in a compact footprint. The BroadWire 240 splitter enables service providers to broaden the use of existing copper infrastructure, providing high-speed ADSL and telephony services over a single twisted pair of copper wires. The BroadWire 240 also supports ADSL over ISDN splitting with a custom filter design for 2B1Qand 4B3T line encoding.

Features:

- High-density splitter platform manages 240 circuits per chassis
- Front-facing platform integrates in standard ETSI equipment racks
- Holds CE Mark and UL1950 certification, optimized for international deployment
- POTS (1.413) or ADSL over ISDN (2B1Q) and custom billing tone/network impedance filter designs available

The BroadWire 528 ADSL Splitter

The BroadWire 528 ADSL splitter is a high density splitter platform, supporting 528 circuits in a compact footprint. The BroadWire 528 splitter enables service providers to broaden the use of existing copper infrastructure, providing high-speed ADSL and telephony services over a single twisted pair of copper wires. The BroadWire 528 also supports ADSL over ISDN with a custom 2B1Q filter design.

Features:

- High-density splitter platform manages up to 528 circuits per chassis
- Rear-cabled platform integrates in standard 23" EIA/WECO equipment racks
- NEBS Level 3, Type 1 and UL 1950 certified and optimized for North American deployment
- POTS (T1.413) or ADSL over ISDN (2B1Q) filter designs available

The BroadWire 288 ADSL Splitter

The BroadWire 288 ADSL splitter is a high density splitter platform, supporting 288 circuits in a compact footprint. The BroadWire 288 splitter enables service providers to broaden use of existing copper infrastructure, providing high-speed ADSL and telephony services over a single twisted pair of copper wires. The BroadWire 288 also supports ISDN splitting, with custom filter designs for 2B1Q and 4B3T line encoding techniques.

Features:

- High density splitter platform manages up to 288 lines per chassis
- Front-facing platform integrates in standard 23" EIA/WECO equipment racks
- NEBS certified and optimized for domestic deployment
- T1.413, 2B1Q or 4B3T ISDN filter designs available

THE AVIDIA AV8100 VOICE SHELF

The Avidia AV8100 Voice Shelf is described in detail in the sections that follow. Although a full installation procedure is provided, this should ne be construed to indicate that this is the only voice shelf that may be used with the AV8000. Any of the ADC voice shelves described above may be used with this product. Please contact your ADC representative for more information regarding these products.

The POTS splitter card in the AV8100 voice shelf combines the incoming ADSL data from the AV8000 integrated access concentrator with the analog voice signal (POTS) from a voice switch. This multiplexed ADSL data stream is sent to the subscriber.

From the subscriber, the POTS splitter card receives multiplexed ADSL data from the subscriber. This data stream is split into two signals: ADSL digital data and POTS voice signals. The POTS splitter card sends the voice signal to the voice switch and the ADSL data to the AV8000 integrated access concentrator

Some features of the AV8100 voice shelf are:

- 20 card slots
- protection ground
- interfaces for ADSL data in, POTS, and ADSL data stream out
- 12 ADSL ports per POTS splitter card—240 ports total

The AV8100 voice shelf mounts in a 23-inch, 7-foot Telco rack. You can install up to seven POTS splitter shelves in a Telco rack. Allow adequate space for cabling

Unpacking and Inspecting the Avidia AV8100 ADSL Voice Shelf

Each Avidia 8100 ADSL voice shelf ships in a protective carton. The voice Network Cards ship separately from the chassis. Upon receipt of the system components, verify the contents and the condition:

1 Open each carton and remove all enclosed packing materials. Save the packing materials in case you need to repack the card later.

2 Visually inspect the chassis for signs of damage. If the equipment has been damaged in transit, immediately report the extent of the damage to the transportation company and to your sales representative. Order replacement equipment if necessary.

3 Check the contents of each shipping carton against the packing list. Ensure a complete and accurate shipment. If the shipment is short or irregular, contact your sales representative. If you must store the equipment for a prolonged period, store the equipment in its original protective shipping carton.

The shipping carton contains six panhead mounting screws (12-24 x $^{1}/_{2}$ inch) for installing the voice shelf into a 23-inch Telco rack using a Phillips screwdriver.

Installing the Avidia 8100 ADSL Voice Shelf

When you install a voice shelf in the same 7-foot Telco rack with an AV8000 shelf, ensure that you provide 0.5-inch (12.70-mm) required minimum clearance between the bottom of the AV8000 chassis and the AV8100 ADSL voice shelf.

The AV8100 ADSL voice shelf mounts in a 23-inch, 7-foot Telco rack. You can install up to seven voice shelves in a Telco rack. Or, you can install the AV8100 ADSL voice shelf in the same rack as the AV8000 chassis. Allow adequate space for cabling. The table below shows chassis dimensions and minimum clearances when installing multiple AV8100 ADSL voice shelves.

Weight	21 lbs (9.53 kg)
Height	10.60 inches (269.24 mm) (requires 7U space)
Depth	11.75 inches (298.45 mm)
Width	23.00 inches (584.2 mm)
Clearance between chassis	None required (zero clearance)

Two versions of the AV8100 ADSL voice shelf backplane are available:

- the 150-1912-01 version of the backplane has FutureBus interface connectors
- the 150-1912-02 version of the backplane has wire-wrap pins.

Install the Avidia 8100 ADSL voice shelf following the procedures in the order given.

- Install the ADSL voice shelf as described on this page.
- Connect the Frame Ground to the ADSL voice shelf, as described on page 115.

Installation Kit

The AV8100 installation kit contains six 12-24 x $^1/_2$ inch panhead Phillips screws for installing the voice shelf into a 23-inch Telco rack.

Install the ADSL voice shelf Into the Rack

Install the shelf into a standard 23-inch, 7-foot Telco rack. You can install up to seven voice shelves in a 7-foot Telco rack, or you can install the voice shelf in the same rack as the AV8000 chassis. The ADSL voice shelf has the rack adapters attached to the shelf for a mid-mount in the rack (where the front of the chassis extends in front of the rack). You can change the position of the rack adapters to front-mount the chassis in the rack (where the front of the chassis is flush with the rack).

Install the AV8100 voice shelf into the Telco rack:

1 If you choose to move the rack adapter for a front-mount of the AV8100 voice shelf:

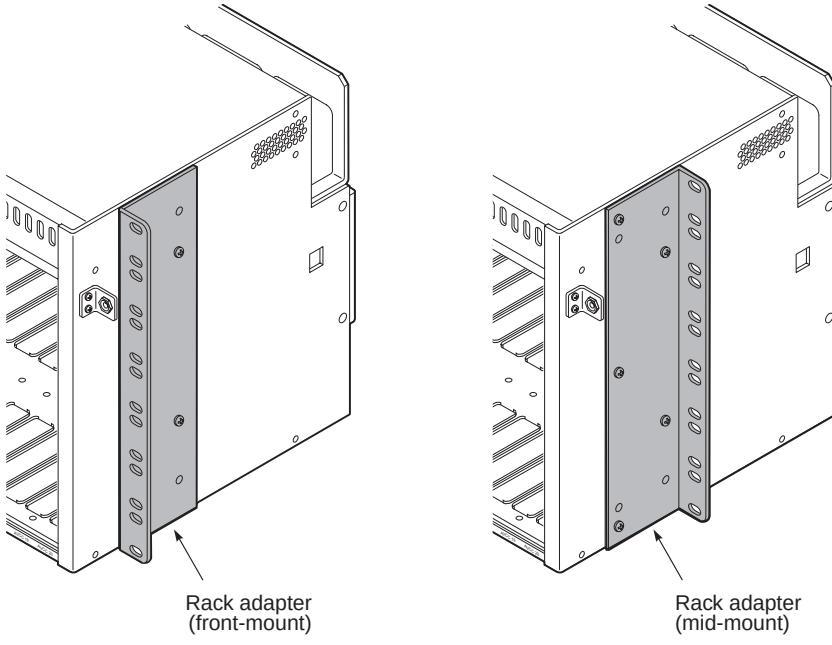
a Remove the rack adapter from the voice shelf.

b Rotate the rack adapter 180 degrees, so that the mounting tab is in the position shown on page 114 for a front mount.

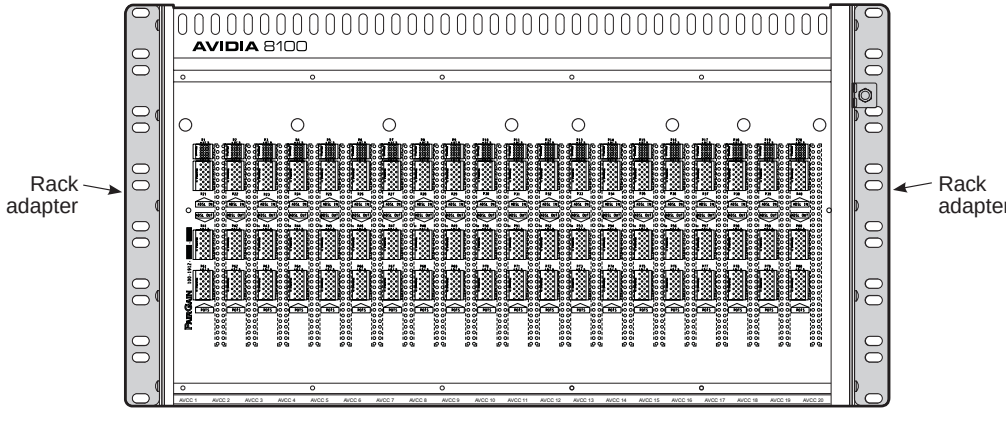
c Install five 8-32 x $^1/_4$ inch panhead SEMS screws and tighten, using a Phillips screwdriver.

d Repeat Step a through Step c for the second rack adapter.

Avidia 8100 (side view)



2 Ensure that the rack adapters are securely attached to each side of the voice shelf.



3 Position the voice shelf in the rack.

4 Align the voice shelf rack adapter holes with the Telco rack vertical mounting holes.

5 Secure the rack adapter by inserting six 12-24 x $^{1}/_{2}$ inch panhead screws and tighten by using a Phillips screwdriver.

Connect the Frame Ground

Follow local grounding practice to ensure a good frame ground connection to the AV8100 voice shelf. The frame ground is required for secondary voltage protection.

Recommendation: A minimum 6 AWG (4.75 mm in diameter) stranded copper wire with a maximum wire length of 5 feet (1.52 m).

Connect the voice shelf frame ground:

1 Using wire cutters with insulated handle, strip 0.5 inch (13 mm) of insulation from both ends of the ground wire.

2 Insert one end of the frame ground wire into the voice shelf frame GND lug, and tighten the screw. Ensure that the ground wire has a secure connection.

3 Connect the other end of the frame ground wire to the CO ground termination point or building frame ground. Ensure that the ground wire has a secure connection.

Electrical and mechanical shock hazards are present throughout the system. Only qualified personnel should service the system.

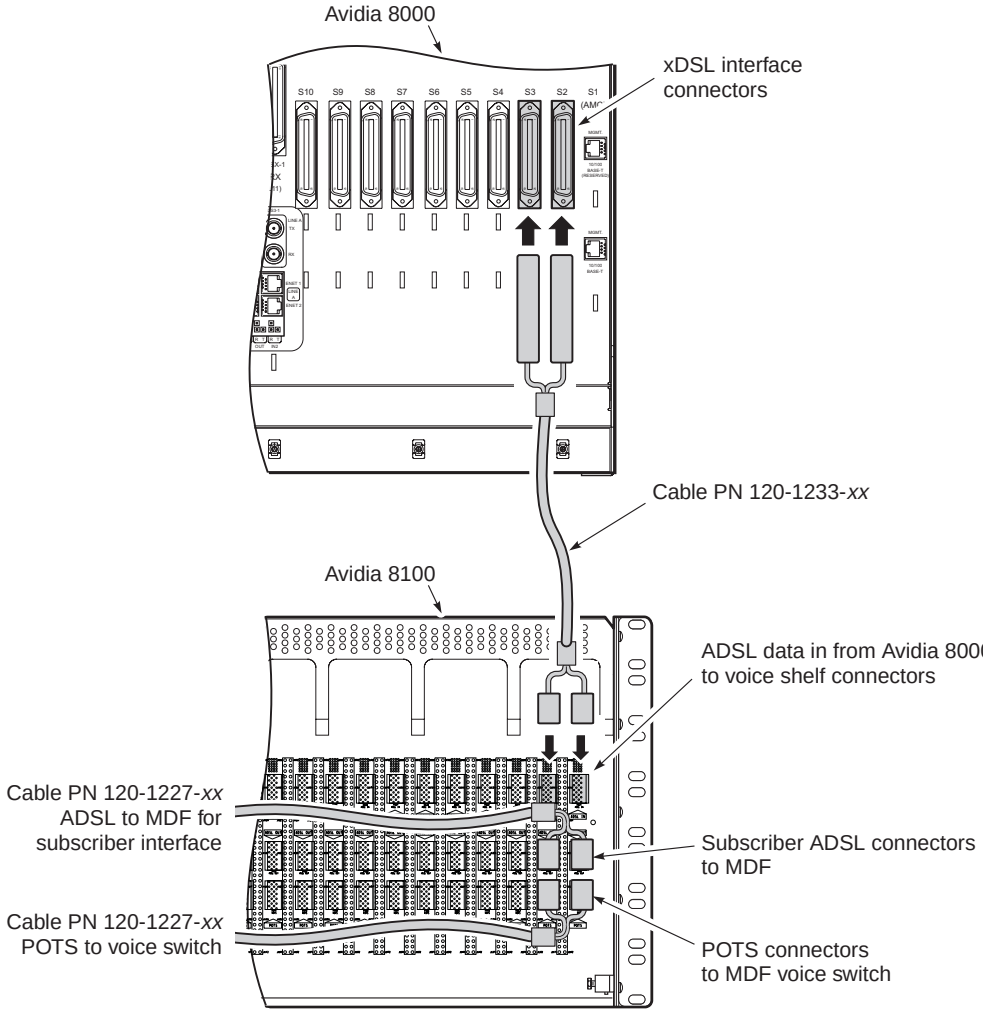
Do not install cards in the AV8100 voice shelf at this time. You will install cards into the voice shelf in Chapter 6.

Connect ADSL For Data and POTS

The table below describes the interchassis connection cables used for connecting the AV8000 chassis to the AV8100 ADSL voice shelf. See "AV8100 Subscriber Interface Cables" on page 135 in Appendix B for more information.

Item	Description	Used For
Cable assembly (ADC PN 120-1233-*xx*)	Cable assembly, with two 25-pair champ connectors on one end and two 48-position FutureBus connectors on the other end	Connects two Network Card 25-pair champ connectors on the AV8000 chassis backplane to two voice Network Card FutureBus connectors (ADSL_IN) on the voice shelf backplane.
Cable assembly (ADC PN 120-1227-*xx*)	Cable assembly, with one 25-pair champ connector on one end and two 48-position FutureBus connectors on the other end	Connects two ADSL voice shelf Network Cards using the FutureBus connectors to the CO MDF using the 25-pair champ connector for ADSL_OUT. Also, connects two ADSL voice shelf Network Cards using the FutureBus connectors to a voice switch using the 25-pair champ connector for POTS.

The figure below shows an overview of how to connect ADSL subscriber lines that carry both data and POTS. To accomplish this, connect the ADSL subscriber card (AV541 without line protection) interface on the AV8000 to the AV8100 voice shelf. Connect the AV8100 voice shelf to a voice switch. The data from the AV8000 ADSL card and POTS from the voice switch are multiplexed by the POTS splitter card. Finally, connect the AV8100 voice shelf to the MDF for a combined transmission of data and POTS to the customer.


Avidia 8000
xDSL interface connectors
Cable PN 120-1233-*xx*
Avidia 8100
ADSL data in from Avidia 8000 to voice shelf connectors
Cable PN 120-1227-*xx* ADSL to MDF for subscriber interface
Subscriber ADSL connectors to MDF
Cable PN 120-1227-*xx* POTS to voice switch
POTS connectors to MDF voice switch

Connect AV8000 to the AV8100 Voice Shelf

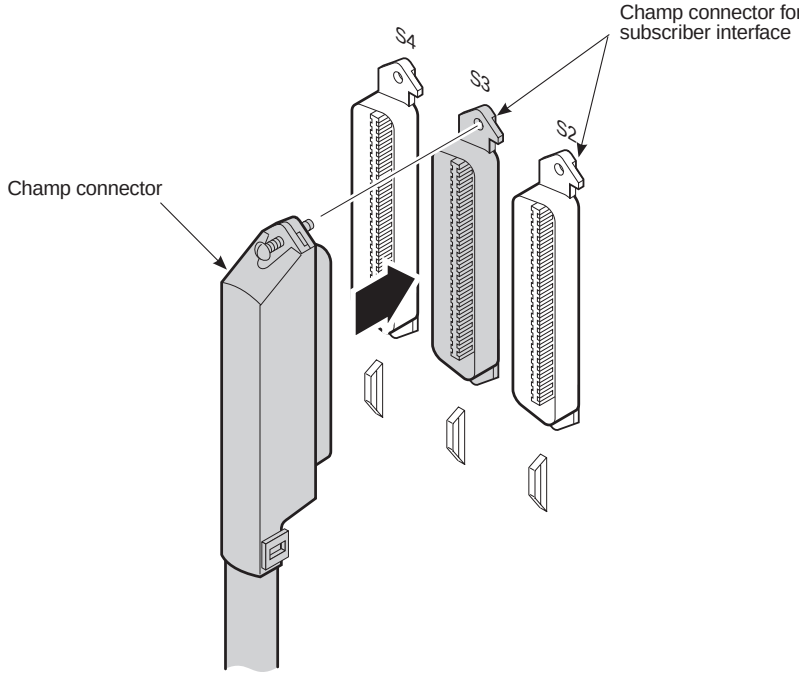
Connect the ADSL subscriber card (AV541 without line protection) in the AV8000 chassis to the AV8100 voice shelf using the following procedure and your local practice.

Recommendation:

- For an AV8100 with FutureBus connectors (PN 150-1912-01), use ADC PN 120-1233-*xx* cable (or equivalent) to connect an AV8000 ADSL interface (champ connector) to the AV8100 (FutureBus connector). See page 136 for cable details.
- For an AV8100 with wire-wrap pins (PN 150-1912-02), use a category 3 or 5 interface cable with a 25-pair Amp PN 229913-1 champ connector (or equivalent) for connection to the AV8000 and wire with insulation stripped 1.5 inches (38 mm) for connection to the AV8100.

1 Connect the 25-pair champ connector on the cable to the appropriate ADSL subscriber card interface (S2 through S10 and S13 through S21) on the AV8000 backplane.

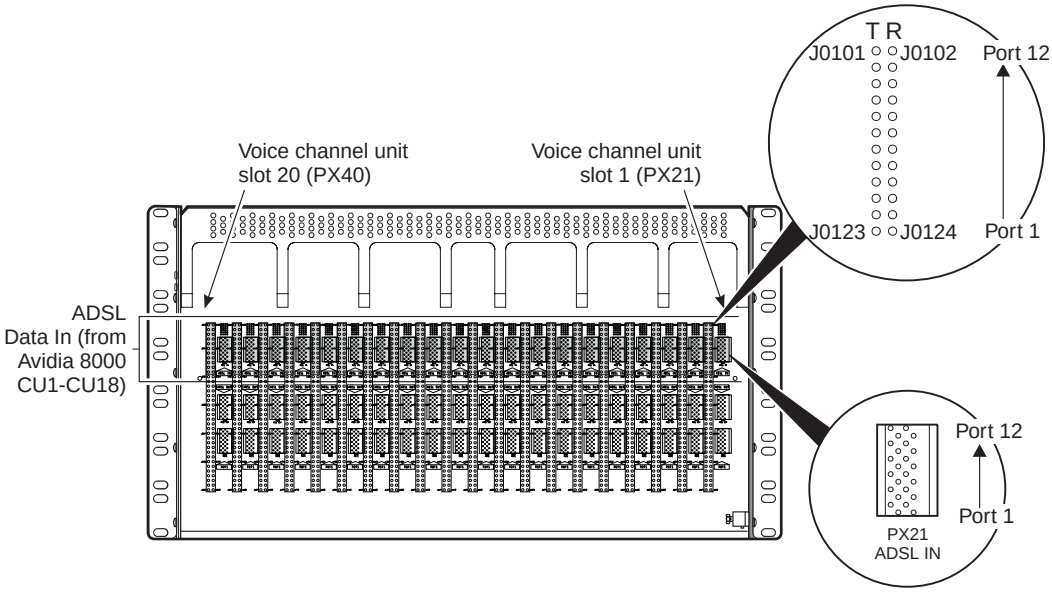
2 Use a tie wrap to secure the cable for each champ connector to the tie points located below the connectors.



See "AV8100 Connector Pinouts" on page 128 for a detailed list of pinouts. Also, see the diagram and table on page 136 for details of the PN 120-1233-xx cable.

3 Connect the other end of the cable (either FutureBus connector or stripped wire) to ADSL_IN on the AV8100 ADSL voice shelf backplane, as shown in the figure below and the table on page 121.

4 Repeat Step 1 through Step 3 to connect all other ADSL subscriber cards in the AV8000 chassis to corresponding ADSL_IN interfaces for ADSL POTS splitter cards in the voice shelf.


T R
J0101
J0102
Port 12
J0123
J0124
Port 1
Voice channel unit
slot 20 (PX40)
Voice channel unit
slot 1 (PX21)
ADSL
Data In (from
Avidia 8000
CU1-CU18)
Port 12
Port 1
PX21
ADSL IN

ADSL_IN from AV8000	**AV8100 Voice shelf slot**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
FutureBus connector	PX21	PX22	PX23	PX24	PX25	PX26	PX27	PX28	PX29	PX30
Wire-wrap pins										
Tip (left pin)	J0101 to J0123	J0201 to J0223	J0301 to J0323	J0401 to J0423	J0501 to J0523	J0601 to J0623	J0701 to J0723	J0801 to J0823	J0901 to J0923	J1001 to J1023
Ring (right pin)	J0102 to J0124	J0202 to J0224	J0302 to J0324	J0402 to J0424	J0502 to J0524	J0602 to J0624	J0702 to J0724	J0802 to J0824	J0902 to J0924	J1002 to J1024

	11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
FutureBus connector	PX31	PX32	PX33	PX34	PX35	PX36	PX37	PX38	PX39	PX40
Wire-wrap pins										
Tip (left pin)	J1101 to J1123	J1201 to J1223	J1301 to J1323	J1401 to J1423	J1501 to J1523	J1601 to J1623	J1701 to J1723	J1801 to J1823	J1901 to J1923	J2001 to J2023
Ring (right pin)	J1102 to J1124	J1202 to J1224	J1302 to J1324	J1402 to J1424	J1502 to J1524	J1602 to J1624	J1702 to J1724	J1802 to J1824	J1902 to J1924	J2002 to J2024

Connect AV8100 Voice Shelf to Voice Switch

Connect the AV8100 voice shelf to the MDF for voice switching using the following procedure and your local practice.

Recommendation:

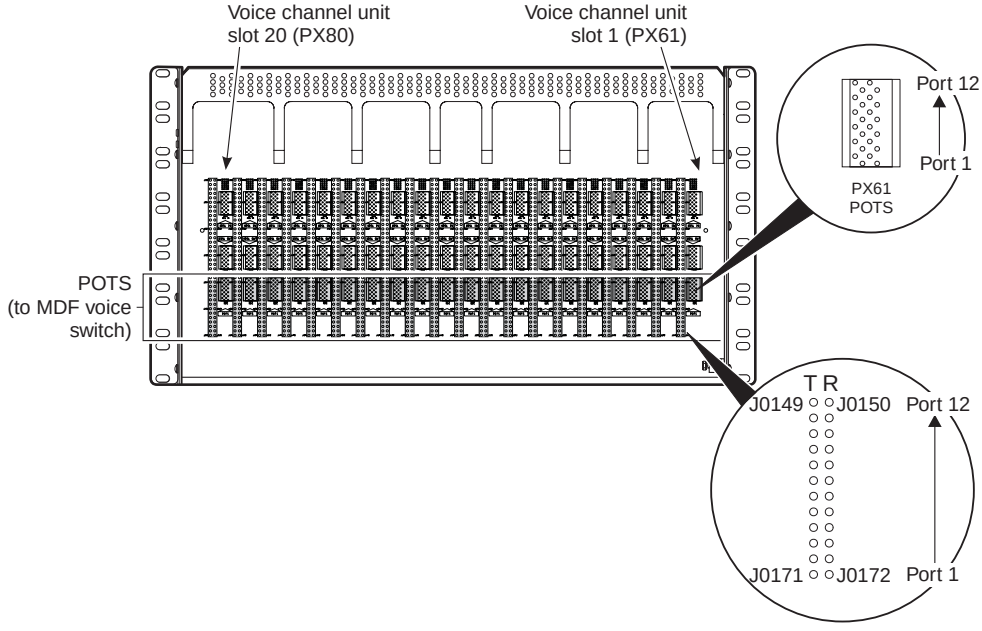
- For an AV8100 with FutureBus connectors (PN 150-1912-01), use ADC PN 120-1227-*xx* cable (or equivalent) to connect an AV8100 (FutureBus connector) the voice switch (champ connector). See page 136 for cable details.
- For an AV8100 with wire-wrap pins (PN 150-1912-02), use a category 3 or 5 interface cable with a 25-pair Amp PN 229913-1 champ connector (r equivalent connector, wire, or other local practice) for connection to the voice switch and wire with insulation stripped 1.5 inches (38 mm) for connection to the AV8100.

1 Connect either the FutureBus connector or stripped wire on the cable to the AV8100 ADSL voice shelf backplane POTS connectors (see the figure and table on page 123).

See "AV8100 Connector Pinouts" on page 128 for a detailed list of pinouts and the diagram and table on page 136 for details of the PN 120-1227-xx cable.

2 Connect the other end of each cable to the CO MDF for voice switching using a standard punch panel, a champ connector, or other suitable means.

3 Repeat **Step 1** and **Step 2** to connect all other ADSL POTS splitter cards in the AV8100 voice shelf to the CO MDF.



ADSL POTS to voice switch	AV8100 Voice shelf slot									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
FutureBus connector	PX61	PX62	PX63	PX64	PX65	PX66	PX67	PX68	PX69	PX70
Wire-wrap pins										
Tip (left pin)	J0149 to J0171	J0249 to J0271	J0349 to J0371	J0449 to J0471	J0549 to J0571	J0649 to J0671	J0749 to J0771	J0849 to J0871	J0949 to J0971	J1049 to J1071
Ring (right pin)	J0150 to J0172	J0250 to J0272	J0350 to J0372	J0450 to J0472	J0550 to J0572	J0650 to J0672	J0750 to J0772	J0850 to J0872	J0950 to J0972	J1050 to J1072

	11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
FutureBus connector	PX71	PX72	PX73	PX74	PX75	PX76	PX77	PX78	PX79	PX80
Wire-wrap pins										
Tip (left pin)	J1149 to J1171	J1249 to J1271	J1349 to J1371	J1449 to J1471	J1549 to J1571	J1649 to J1671	J1749 to J1771	J1849 to J1871	J1949 to J1971	J2049 to J2071
Ring (right pin)	J1150 to J1172	J1250 to J1272	J1350 to J1372	J1450 to J1472	J1550 to J1572	J1650 to J1672	J1750 to J1772	J1850 to J1872	J1950 to J1972	J2050 to J2072

Connect AV8100 Voice Shelf to the MDF (POTS and Data)

Connect the AV8100 voice shelf to the MDF for transmitting combined data and POTS to the customer using the following procedure and your local practice.

Recommendation:

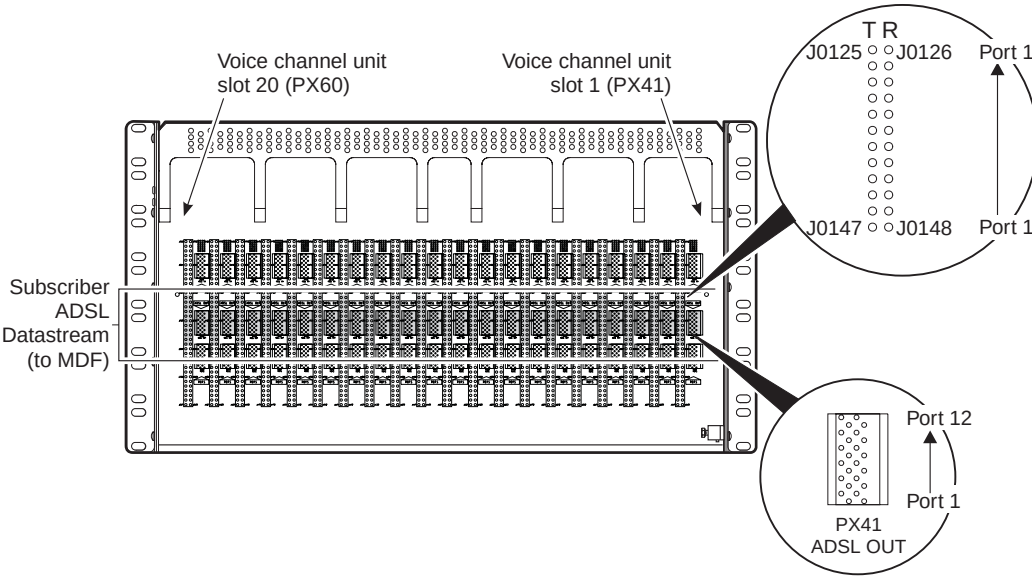
- For an AV8100 with FutureBus connectors (PN 150-1912-01), use ADC PN 120-1227-*xx* cable (or equivalent) to connect an AV8100 (FutureBus connector to MDF (champ connector). See page 136 for cable details.
- For an AV8100 with wire-wrap pins (PN 150-1912-02), use a category 3 or 5 interface cable with a 25-pair Amp PN 229913-1 champ connector (equivalent connector, wire, other local practice) for connection to the MDF and wire with insulation stripped 1.5 inches (38 mm) for connection to the AV8100.

1 Connect either the FutureBus connector or stripped wire on the cable to the AV8100 ADSL voice shelf backplane ADSL_OUT connectors (see the figure and table on page 125).

2 Connect the other end of each cable to the CO MDF for ADSL using a standard punch panel, a champ connector, or other suitable means.

See "AV8100 Connector Pinouts" on page 128 for a detailed list of pinouts and the diagram and table on page 137 for details of the PN 120-1227-xx cable.

3 Repeat **Step 1** and **Step 2** to connect all other ADSL POTS splitter cards in the AV8100 voice shelf to the MDF.



ADSL_OUT to subscriber	AV8100 Voice shelf slot									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
FutureBus connector	PX41	PX42	PX43	PX44	PX45	PX46	PX47	PX48	PX49	PX50
Wire-wrap pins										
Tip (left pin)	J0125 to J0147	J0225 to J0247	J0325 to J0347	J0425 to J0447	J0525 to J0547	J0625 to J0647	J0725 to J0747	J0825 to J0847	J0925 to J0947	J1025 to J1047
Ring (right pin)	J0126 to J0148	J0226 to J0248	J0326 to J0348	J0426 to J0448	J0526 to J0548	J0626 to J0648	J0726 to J0748	J0826 to J0848	J0926 to J09482	J1026 to J1048

	11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
FutureBus connector	PX51	PX52	PX53	PX54	PX55	PX56	PX57	PX58	PX59	PX60
Wire-wrap pins										
Tip (left pin)	J1125 to J1147	J1225 to J1247	J1325 to J1347	J1425 to J1447	J1525 to J1547	J1625 to J1647	J1725 to J1747	J1825 to J1847	J1925 to J1947	J2025 to J2047
Ring (right pin)	J1126 to J1148	J1226 to J1248	J1326 to J1348	J1426 to J1448	J1526 to J1548	J1626 to J1648	J1726 to J1748	J1826 to J1848	J1926 to J1948	J2026 to J2048

Installing Cards into the AV8100

Install up to 20 ADSL POTS splitter cards in the AV8100 voice shelf, as described below in "Installing Cards into the AV8100."

Install the ADSL POTS splitter cards into any slot in the AV8100 voice shelf:

1 Slide the ADSLPOTS splitter card into a chassis slot. Ensure the retaining latches are lifted open.

2 Push the card in until the retaining latches touch the AV8100 voice shelf.

3 Gently close the retaining latches until they snap in place.

4 Tighten the captive screw on the top retaining latch.

5 Repeat Step 1 through Step 4 to install other ADSL POTS splitter cards.

AV8100 SYSTEM SPECIFICATIONS

The AV8100 voice shelf fits into a standard 23-inch Telco rack and comprises two parts:

- voice shelf chassis with:
  - 20 card slots
  - protection ground
  - interfaces for ADSL data in, POTS, and ADSL data stream out
- up to 20 ADSL POTS splitter cards

The POTS splitter card, in the AV8100 voice, combines the incoming ADSL data from the AV8000 integrated access concentrator with the analog voice signal (POTS) from a voice switch. This multiplexed ADSL data stream is sent to the subscriber.

From the subscriber, the POTS splitter card receives multiplexed ADSL data from the subscriber. This data stream is split into two signals: ADSL digital data and POTS voice signals. The POTS splitter card sends the voice signal to the voice switch and the ADSL data to the AV8000 integrated access concentrator.

ADSL data IN and POTS are intra-building lines and do not connect to outside metallic tip and ring lines.

ADSL VOICE SHELF SPECIFICATIONS

The AV8100 voice shelf mounts in a 23-inch, 7-foot Telco rack. You can install up to seven POTS splitter shelves in a Telco rack. Allow adequate space for cabling.

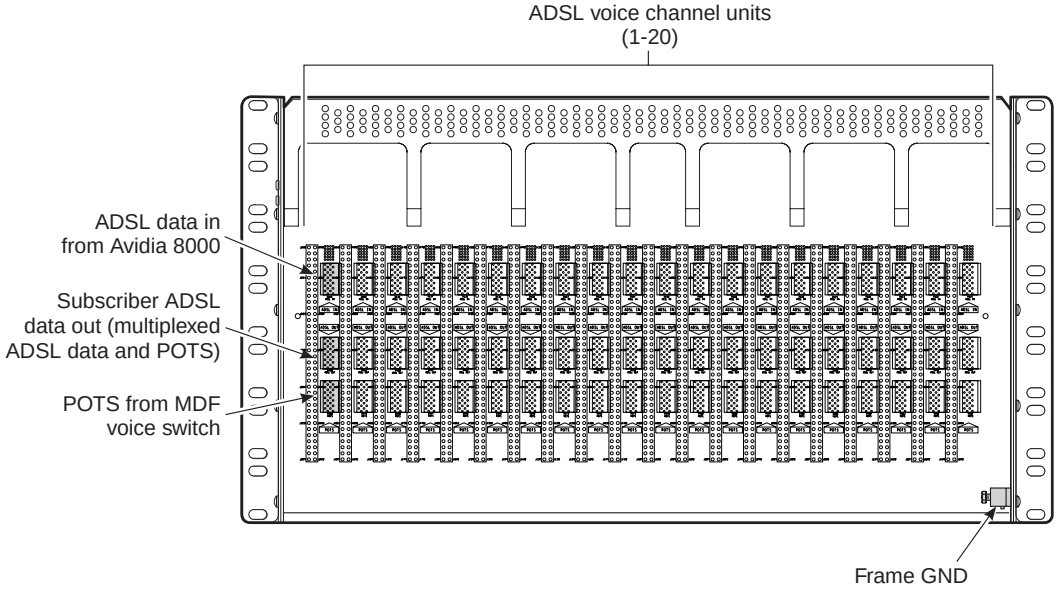
The following table shows chassis dimensions.

Power	None (Passive Device)
Size	
Height	12.22 inches (310.39 mm)
Width (with mounting brackets)	23.00 inches (584.20 mm)
Width (without mounting brackets)	21.03 inches (534.16 mm)
Depth	11.75 inches (298.45 mm)

Weight	21 lbs (9.53 kg)
Ambient Operating Temperature	+32 °F to +122 °F (0 °C to +50 °C)
Relative Humidity	10% to 85% (non-condensing) 5% to 90% (non-condensing) short term (period not exceeding 96 consecutive hours and a total of 15 days in one year)

An AV8100 voice shelf can accommodate up to 20 POTS splitter cards. A POTS delivery is provided through the AV8100 voice shelf. The figure below shows the interfaces on the voice shelf chassis backplane. Two versions of the AV8100 voice shelf are available:

- The 150-1912-01 version of the backplane has Future Bus interface connectors.
- The 150-1912-02 version of the backplane has wire-wrap pins.



AV8100 Connector Pinouts

The following tables show detailed pinouts for connection between:

- AV8000 and AV8100 (ADSL_IN), shown on this page
- AV8100 to MDF voice switch for POTS (ADSL_POTS), shown on page 131

- AV8100 to MDF for transmission to subscriber (ADSL_OUT), shown on page 133

ADSL_IN from AV8000	**AV8100 voice shelf slot**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
FutureBus connector	PX21	PX22	PX23	PX24	PX25	PX26	PX27	PX28	PX29	PX30
Wire-wrap pins										
Tip (left pin)	J0101	J0201	J0301	J0401	J0501	J0601	J0701	J0801	J0901	J1001
	J0103	J0203	J0303	J0403	J0503	J0603	J0703	J0803	J0903	J1003
	J0105	J0205	J0305	J0405	J0505	J0605	J0705	J0805	J0905	J1005
	J0107	J0207	J0307	J0407	J0507	J0607	J0707	J0807	J0907	J1007
	J0109	J0209	J0309	J0409	J0509	J0609	J0709	J0809	J0909	J1009
	J0111	J0211	J0311	J0411	J0511	J0611	J0711	J0811	J0911	J1011
	J0113	J0213	J0313	J0413	J0513	J0613	J0713	J0813	J0913	J1013
	J0115	J0215	J0315	J0415	J0515	J0615	J0715	J0815	J0915	J1015
	J0117	J0217	J0317	J0417	J0517	J0617	J0717	J0817	J0917	J1017
	J0119	J0219	J0319	J0419	J0519	J0619	J0719	J0819	J0919	J1019
	J0121	J0221	J0321	J0421	J0521	J0621	J0721	J0821	J0921	J1021
	J0123	J0223	J0323	J0423	J0523	J0623	J0723	J0823	J0923	J1023
Ring (right pin)	J0102	J0202	J0302	J0402	J0502	J0602	J0702	J0802	J0902	J1002
	J0104	J0204	J0304	J0404	J0504	J0604	J0704	J0804	J0904	J1004
	J0106	J0206	J0306	J0406	J0506	J0606	J0706	J0806	J0906	J1006
	J0108	J0208	J0308	J0408	J0508	J0608	J0708	J0808	J0508	J1008
	J0110	J0210	J0310	J0410	J0510	J0610	J0710	J0810	J0910	J1010
	J0112	J0212	J0312	J0412	J0512	J0612	J0712	J0812	J0912	J1012
	J0114	J0214	J0314	J0414	J0514	J0614	J0714	J0814	J0914	J1014
	J0116	J0216	J0316	J0416	J0516	J0616	J0716	J0816	J0916	J1016
	J0118	J0218	J0318	J0418	J0518	J0618	J0718	J0818	J0918	J1018
	J0120	J0220	J0320	J0420	J0520	J0620	J0720	J0820	J0920	J1020
	J0122	J0222	J0322	J0422	J0522	J0622	J0722	J0822	J0922	J1022
	J0124	J0224	J0324	J0424	J0524	J0624	J0724	J0824	J0924	J1024

ADSL_IN from AV8000	AV8100 voice shelf slot									
	11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
FutureBus connector	PX31	PX32	PX33	PX34	PX35	PX36	PX37	PX38	PX39	PX40
Wire-wrap pins										
Tip (left pin)	J1101	J1201	J1301	J1401	J1501	J1601	J1701	J1801	J1901	J2001
	J1103	J1203	J1303	J1403	J1503	J1603	J1703	J1803	J1903	J2003
	J1105	J1205	J1305	J1405	J1505	J1605	J1705	J1805	J1905	J2005
	J1107	J1207	J1307	J1407	J1507	J1607	J1707	J1807	J1907	J2007
	J1109	J1209	J1309	J1409	J1509	J1609	J1709	J1809	J1909	J2009
	J1111	J1211	J1311	J1411	J1511	J1611	J1711	J1811	J1911	J2011
	J1113	J1213	J1313	J1413	J1513	J1613	J1713	J1813	J1913	J2013
	J1115	J1215	J1315	J1415	J1515	J1615	J1715	J1815	J1915	J2015
	J1117	J1217	J1317	J1417	J1517	J1617	J1717	J1817	J1917	J2017
	J1119	J1219	J1319	J1419	J1519	J1619	J1719	J1819	J1919	J2019
	J1121	J1221	J1321	J1421	J1521	J1621	J1721	J1821	J1921	J2021
	J1123	J1223	J1323	J1423	J1523	J1623	J1723	J1823	J1923	J2023
Ring (right pin)	J1102	J1202	J1302	J1402	J1502	J1602	J1702	J1802	J1902	J2002
	J1104	J1204	J1304	J1404	J1504	J1604	J1704	J1804	J1904	J2004
	J1106	J1206	J1306	J1406	J1506	J1606	J1706	J1806	J1906	J2006
	J1108	J1208	J1308	J1408	J1508	J1608	J1708	J1808	J1908	J2008
	J1110	J1210	J1310	J1410	J1510	J1610	J1710	J1810	J1910	J2010
	J1112	J1212	J1312	J1412	J1512	J1612	J1712	J1812	J1912	J2012
	J1114	J1214	J1314	J1414	J1514	J1614	J1714	J1814	J1914	J2014
	J1116	J1216	J1316	J1416	J1516	J1616	J1716	J1816	J1916	J2016
	J1118	J1218	J1318	J1418	J1518	J1618	J1718	J1818	J1918	J2018
	J1120	J1220	J1320	J1420	J1520	J1620	J1720	J1820	J1920	J2020
	J1122	J1222	J1322	J1422	J1522	J1622	J1722	J1822	J1922	J2022
	J1124	J1224	J1324	J1424	J1524	J1624	J1724	J1824	J1924	J2024

ADSL POTS to voice switch	AV8100 voice shelf slot									
	1	2	3	4	5	6	7	8	9	10
FutureBus connector	PX61	PX62	PX63	PX64	PX65	PX66	PX67	PX68	PX69	PX70
Wire-wrap pins										
Tip (left pin)	J0149	J0249	J0349	J0449	J0549	J0649	J0749	J0849	J0949	J1049
	J0151	J0251	J0351	J0451	J0551	J0651	J0751	J0851	J0951	J1051
	J0153	J0253	J0353	J0453	J0553	J0653	J0753	J0853	J0953	J1053
	J0155	J0255	J0355	J0455	J0555	J0655	J0755	J0855	J0955	J1055
	J0157	J0257	J0357	J0457	J0557	J0657	J0757	J0857	J0957	J1057
	J0159	J0259	J0359	J0459	J0559	J0659	J0759	J0859	J0959	J1059
	J0161	J0261	J0361	J0461	J0561	J0661	J0761	J0861	J0961	J1061
	J0163	J0263	J0363	J0463	J0563	J0663	J0763	J0863	J0963	J1063
	J0165	J0265	J0365	J0465	J0565	J0665	J0765	J0865	J0965	J1065
	J0167	J0267	J0367	J0467	J0567	J0667	J0767	J0867	J0967	J1067
	J0169	J0269	J0369	J0469	J0569	J0669	J0769	J0869	J0969	J1069
	J0171	J0271	J0371	J0471	J0571	J0671	J0771	J0871	J0971	J1071
Ring (right pin)	J0150	J0250	J0350	J0450	J0550	J0650	J0750	J0850	J0950	J1050
	J0152	J0252	J0352	J0452	J0552	J0652	J0752	J0852	J0952	J1052
	J0154	J0254	J0354	J0454	J0554	J0654	J0754	J0854	J0954	J1054
	J0156	J0256	J0356	J0456	J0556	J0656	J0756	J0856	J0956	J1056
	J0158	J0258	J0358	J0458	J0558	J0658	J0758	J0858	J0958	J1058
	J0160	J0260	J0360	J0460	J0560	J0660	J0760	J0860	J0960	J1060
	J0162	J0262	J0362	J0462	J0562	J0662	J0762	J0862	J0962	J1062
	J0164	J0264	J0364	J0464	J0564	J0664	J0764	J0864	J0964	J1064
	J0166	J0266	J0366	J0466	J0566	J0666	J0766	J0866	J0966	J1066
	J0168	J0268	J0368	J0468	J0568	J0668	J0768	J0868	J0968	J1068
	J0170	J0270	J0370	J0470	J0570	J0670	J0770	J0870	J0970	J1070
	J0172	J0272	J0372	J0472	J0572	J0672	J0772	J0872	J0972	J1072

ADSL POTS to voice switch	AV8100 voice shelf slot									
	11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
FutureBus connector	PX71	PX72	PX73	PX74	PX75	PX76	PX77	PX78	PX79	PX80
Wire-wrap pins										
Tip (left pin)	J1149	J1249	J1349	J1449	J1549	J1649	J1749	J1849	J1949	J2049
	J1151	J1251	J1351	J1451	J1551	J1651	J1751	J1851	J1951	J2051
	J1153	J1253	J1353	J1453	J1553	J1653	J1753	J1853	J1953	J2053
	J1155	J1255	J1355	J1455	J1555	J1655	J1755	J1855	J1955	J2055
	J1157	J1257	J1357	J1457	J1557	J1657	J1757	J1857	J1957	J2057
	J1159	J1259	J1359	J1459	J1559	J1659	J1759	J1859	J1959	J2059
	J1161	J1261	J1361	J1461	J1561	J1661	J1761	J1861	J1961	J2061
	J1163	J1263	J1363	J1463	J1563	J1663	J1763	J1863	J1963	J2063
	J1165	J1265	J1365	J1465	J1565	J1665	J1765	J1865	J1965	J2065
	J1167	J1267	J1367	J1467	J1567	J1667	J1767	J1867	J1967	J2067
	J1169	J1269	J1369	J1469	J1569	J1669	J1769	J1869	J1969	J2069
	J1171	J1271	J1371	J1471	J1571	J1671	J1771	J1871	J1971	J2071
Ring (right pin)	J1150	J1250	J1350	J1450	J1550	J1650	J1750	J1850	J1950	J2050
	J1152	J1252	J1352	J1452	J1552	J1652	J1752	J1852	J1952	J2052
	J1154	J1254	J1354	J1454	J1554	J1654	J1754	J1854	J1954	J2054
	J1156	J1256	J1356	J1456	J1556	J1656	J1756	J1856	J1956	J2056
	J1158	J1258	J1358	J1458	J1558	J1658	J1758	J1858	J1958	J2058
	J1160	J1260	J1360	J1460	J1560	J1660	J1760	J1860	J1960	J2060
	J1162	J1262	J1362	J1462	J1562	J1662	J1762	J1862	J1962	J2062
	J1164	J1264	J1364	J1464	J1564	J1664	J1764	J1864	J1964	J2064
	J1166	J1266	J1366	J1466	J1566	J1666	J1766	J1866	J1966	J2066
	J1168	J1268	J1368	J1468	J1568	J1668	J1768	J1868	J1968	J2068
	J1170	J1270	J1370	J1470	J1570	J1670	J1770	J1870	J1970	J2070
	J1172	J1272	J1372	J1472	J1572	J1672	J1772	J1872	J1972	J2072

ADSL_OUT to subscriber	AV8100 voice shelf slot									
	1	2	3	4	5	6	7	8	9	10
FutureBus connector	PX41	PX42	PX43	PX44	PX45	PX46	PX47	PX48	PX49	PX50
Wire-wrap pins										
Tip (left pin)	J0125	J0225	J0325	J0425	J0525	J0625	J0725	J0825	J0925	J1025
	J0127	J0227	J0327	J0427	J0527	J0627	J0727	J0827	J0927	J1027
	J0129	J0229	J0329	J0429	J0529	J0629	J0729	J0829	J0929	J1029
	J0131	J0231	J0331	J0431	J0531	J0631	J0731	J0831	J0931	J1031
	J0133	J0233	J0333	J0433	J0533	J0633	J0733	J0833	J0933	J1033
	J0135	J0235	J0335	J0435	J0535	J0635	J0735	J0835	J0935	J1035
	J0137	J0237	J0337	J0437	J0537	J0637	J0737	J0837	J0937	J1037
	J0139	J0239	J0339	J0439	J0539	J0639	J0739	J0839	J0939	J1039
	J0141	J0241	J0341	J0441	J0541	J0641	J0741	J0841	J0941	J1041
	J0143	J0243	J0343	J0443	J0543	J0643	J0743	J0843	J0943	J1043
	J0145	J0245	J0345	J0445	J0545	J0645	J0745	J0845	J0945	J1045
	J0147	J0247	J0347	J0447	J0547	J0647	J0747	J0847	J0947	J1047
Ring (right pin)	J0126	J0226	J0326	J0426	J0526	J0626	J0726	J0826	J0926	J1026
	J0128	J0228	J0328	J0428	J0528	J0628	J0728	J0828	J0928	J1028
	J0130	J0230	J0330	J0430	J0530	J0630	J0730	J0830	J0930	J1030
	J0132	J0232	J0332	J0432	J0532	J0632	J0732	J0832	J0932	J1032
	J0134	J0234	J0334	J0434	J0534	J0634	J0734	J0834	J0934	J1034
	J0136	J0236	J0336	J0436	J0536	J0636	J0736	J0836	J0936	J1036
	J0138	J0238	J0338	J0438	J0538	J0638	J0738	J0838	J0938	J1038
	J0140	J0240	J0340	J0440	J0540	J0640	J0740	J0840	J0940	J1040
	J0142	J0242	J0342	J0442	J0542	J0642	J0742	J0842	J0942	J1042
	J0144	J0244	J0344	J0444	J0544	J0644	J0744	J0844	J0944	J1044
	J0146	J0246	J0346	J0446	J0546	J0646	J0746	J0846	J0946	J1046
	J0148	J0248	J0348	J0448	J0548	J0648	J0748	J0848	J0948	J1048

ADSL_OUT to subscriber	AV8100 voice shelf slot									
	11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
FutureBus connector	PX51	PX52	PX53	PX54	PX55	PX56	PX57	PX58	PX59	PX60
Wire-wrap pins										
Tip (left pin)	J1125	J1225	J1325	J1425	J1525	J1625	J1725	J1825	J1925	J2025
	J1127	J1227	J1327	J1427	J1527	J1627	J1727	J1827	J1927	J2027
	J1129	J1229	J1329	J1429	J1529	J1629	J1729	J1829	J1929	J2029
	J1131	J1231	J1331	J1431	J1531	J1631	J1731	J1831	J1931	J2031
	J1133	J1233	J1333	J1433	J1533	J1633	J1733	J1833	J1933	J2033
	J1135	J1235	J1335	J1435	J1535	J1635	J1735	J1835	J1935	J2035
	J1137	J1237	J1337	J1437	J1537	J1637	J1737	J1837	J1937	J2037
	J1139	J1239	J1339	J1439	J1539	J1639	J1739	J1839	J1939	J2039
	J1141	J1241	J1341	J1441	J1541	J1641	J1741	J1841	J1941	J2041
	J1143	J1243	J1343	J1443	J1543	J1643	J1743	J1843	J1943	J2043
	J1145	J1245	J1345	J1445	J1545	J1645	J1745	J1845	J1945	J2045
	J1147	J1247	J1347	J1447	J1547	J1647	J1747	J1847	J1947	J2047
Ring (right pin)	J1126	J1226	J1326	J1426	J1526	J1626	J1726	J1826	J1926	J2026
	J1128	J1228	J1328	J1428	J1528	J1628	J1728	J1828	J1928	J2028
	J1130	J1230	J1330	J1430	J1530	J1630	J1730	J1830	J1930	J2030
	J1132	J1232	J1332	J1432	J1532	J1632	J1732	J1832	J1932	J2032
	J1134	J1234	J1334	J1434	J1534	J1634	J1734	J1834	J1934	J2034
	J1136	J1236	J1336	J1436	J1536	J1636	J1736	J1836	J1936	J2036
	J1138	J1238	J1338	J1438	J1538	J1638	J1738	J1838	J1938	J2038
	J1140	J1240	J1340	J1440	J1540	J1640	J1740	J1840	J1940	J2040
	J1142	J1242	J1342	J1442	J1542	J1642	J1742	J1842	J1942	J2042
	J1144	J1244	J1344	J1444	J1544	J1644	J1744	J1844	J1944	J2044
	J1146	J1246	J1346	J1446	J1546	J1646	J1746	J1846	J1946	J2046
	J1148	J1248	J1348	J1448	J1548	J1648	J1748	J1848	J1948	J2048

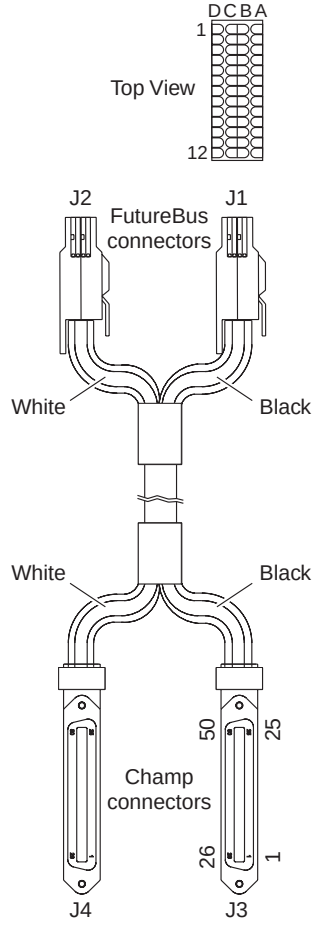
AV8100 Subscriber Interface Cables

The cable assemblies listed in the table below and in the pinout tables with illustrations on page 136 and page 137 are used to connect the AV8000 to the Avidia 8100 (PN 120-1233-*xx*) and to connect the AV8100 to both a voice switch and the MDF (PN 120-1227-*xx*). The cable assemblies are used in the section "Connect ADSL For Data and POTS" on page 116.

Item	Description	Used For
Cable assembly (ADC PN 120-1233-*xx*)	Cable assembly, with two 25-pair champ connectors on one end and two 48-position FutureBus connectors on the other end	Connects two Network Card 25-pair champ connectors on the AV8000 chassis backplane to two voice Network Card FutureBus connectors (ADSL_IN) on the voice shelf backplane.
Cable assembly (ADC PN 120-1227-*xx*)	Cable assembly, with one 25-pair champ connector on one end and two 48-position FutureBus connectors on the other end	Connects two POTS splitter cards in the AV8100 voice shelf using the FutureBus connectors to the CO MDF using the 25-pair champ connector for ADSL_OUT. Also, connects two POTS splitter cards in the AV8100 voice shelf using the FutureBus connectors to a voice switch using the 25-pair champ connector for POTS.

See below for pinout assignments and a diagram for cable assembly PN 120-1233-*xx*:

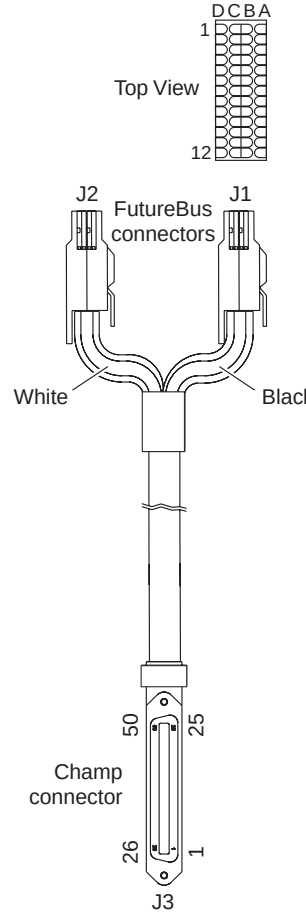
J4 Pin #	J2 Pin #	Signal
1	A12	xDSL_1_RING_2
2	B11	xDSL_2_RING_2
3	A10	xDSL_3_RING_2
4	B9	xDSL_4_RING_2
5	A8	xDSL_5_RING_2
6	B7	xDSL_6_RING_2
7	A6	xDSL_7_RING_2
8	B5	xDSL_8_RING_2
9	A4	xDSL_9_RING_2
10	B3	xDSL_10_RING_2
11	A2	xDSL_11_RING_2
12	B1	xDSL_12_RING_2
26	C12	xDSL_1_TIP_2
27	D11	xDSL_2_TIP_2
28	C10	xDSL_3_TIP_2
29	D9	xDSL_4_TIP_2
30	C8	xDSL_5_TIP_2
31	D7	xDSL_6_TIP_2
32	C6	xDSL_7_TIP_2
33	D5	xDSL_8_TIP_2
34	C4	xDSL_9_TIP_2
35	D3	xDSL_10_TIP_2
36	C2	xDSL_11_TIP_2
37	D1	xDSL_12_TIP_2



J3 Pin #	J1 Pin #	Signal
1	A12	xDSL_1_RING_1
2	B11	xDSL_2_RING_1
3	A10	xDSL_3_RING_1
4	B9	xDSL_4_RING_1
5	A8	xDSL_5_RING_1
6	B7	xDSL_6_RING_1
7	A6	xDSL_7_RING_1
8	B5	xDSL_8_RING_1
9	A4	xDSL_9_RING_1
10	B3	xDSL_10_RING_1
11	A2	xDSL_11_RING_1
12	B1	xDSL_12_RING_1
26	C12	xDSL_1_TIP_1
27	D11	xDSL_2_TIP_1
28	C10	xDSL_3_TIP_1
29	D9	xDSL_4_TIP_1
30	C8	xDSL_5_TIP_1
31	D7	xDSL_6_TIP_1
32	C6	xDSL_7_TIP_1
33	D5	xDSL_8_TIP_1
34	C4	xDSL_9_TIP_1
35	D3	xDSL_10_TIP_1
36	C2	xDSL_11_TIP_1
37	D1	xDSL_12_TIP_1

See below for pinout assignments and a diagram for cable assembly PN 120-1227-*xx*:

J3 Pin #	J2 Pin #	Signal
13	A12	xDSL_1_RING_2
14	B11	xDSL_2_RING_2
15	A10	xDSL_3_RING_2
16	B9	xDSL_4_RING_2
175	A8	xDSL_5_RING_2
18	B7	xDSL_6_RING_2
19	A6	xDSL_7_RING_2
20	B5	xDSL_8_RING_2
21	A4	xDSL_9_RING_2
22	B3	xDSL_10_RING_2
23	A2	xDSL_11_RING_2
24	B1	xDSL_12_RING_2
38	C12	xDSL_1_TIP_2
39	D11	xDSL_2_TIP_2
40	C10	xDSL_3_TIP_2
41	D9	xDSL_4_TIP_2
42	C8	xDSL_5_TIP_2
43	D7	xDSL_6_TIP_2
44	C6	xDSL_7_TIP_2
45	D5	xDSL_8_TIP_2
46	C4	xDSL_9_TIP_2
47	D3	xDSL_10_TIP_2
48	C2	xDSL_11_TIP_2
49	D1	xDSL_12_TIP_2



J3 Pin #	J1 Pin #	Signal
1	A12	xDSL_1_RING_1
2	B11	xDSL_2_RING_1
3	A10	xDSL_3_RING_1
4	B9	xDSL_4_RING_1
5	A8	xDSL_5_RING_1
6	B7	xDSL_6_RING_1
7	A6	xDSL_7_RING_1
8	B5	xDSL_8_RING_1
9	A4	xDSL_9_RING_1
10	B3	xDSL_10_RING_1
11	A2	xDSL_11_RING_1
12	B1	xDSL_12_RING_1
26	C12	xDSL_1_TIP_1
27	D11	xDSL_2_TIP_1
28	C10	xDSL_3_TIP_1
29	D9	xDSL_4_TIP_1
30	C8	xDSL_5_TIP_1
31	D7	xDSL_6_TIP_1
32	C6	xDSL_7_TIP_1
33	D5	xDSL_8_TIP_1
34	C4	xDSL_9_TIP_1
35	D3	xDSL_10_TIP_1
36	C2	xDSL_11_TIP_1
37	D1	xDSL_12_TIP_1

ADSL POTS SPLITTER CARD

Each Avidia Model 670 (AV670) POTS splitter card in the AV8100 voice shelf can interface to 12 full-duplex ADSL lines (12 individual ADSL modems, for example). The POTS splitter card provides filtering and protection for ADSL lines in addition to providing POTS splitter functions and mounts into an Avidia 8100 voice shelf. The table below provides power and physical specifications for the AV670 voice Network Card. Note that the AV670 does not contain LED indicators.

ADSL POTS Splitter Card Specifications

Physical

Power	None (Passive Device)
Size	
Height	9.78 inches (248.41 mm)
Width	0.7 inches (17.78 mm)
Depth	9.50 inches (241.30 mm)
Weight	1.8 lbs (0.82 kg)

Functional

The POTS splitter cards contain the features described in the table below.

Product Features	• provides secondary filtering and protection for ADSL lines • provides concurrent support of analog POTS through an embedded POTS splitter; POTS will not be interrupted if ADSL transceivers are turned off or if power is lost • provides life line bypass using passive splitter design
CO Port POTS Splitter Specifications	Tested over all ANSI T1.413-1998 compliant test loops.

Each Avidia Model 670 (AV670) voice Network Card, in the AV8100 voice shelf, can interface with 12 full-duplex ADSL lines (for example, 12 individual ADSL modems). The POTS splitter card provides filtering and line protection for ADSL lines in addition to providing POTS splitter functions.

SYSTEM SPECIFICATIONS A

An AV8000 system is comprised of three major components: chassis, cards, and card interfaces. You can attach the AV8000 system to an AV8100 voice shelf, or other ADC voice shelf product to combine ADSL data with voice that can be transmitted to a customer. See "Adding Voice Shelf Capability to the AV8000" on page 107 for more information regarding this topic.The following sections provide detailed descriptions and specifications for each system component.

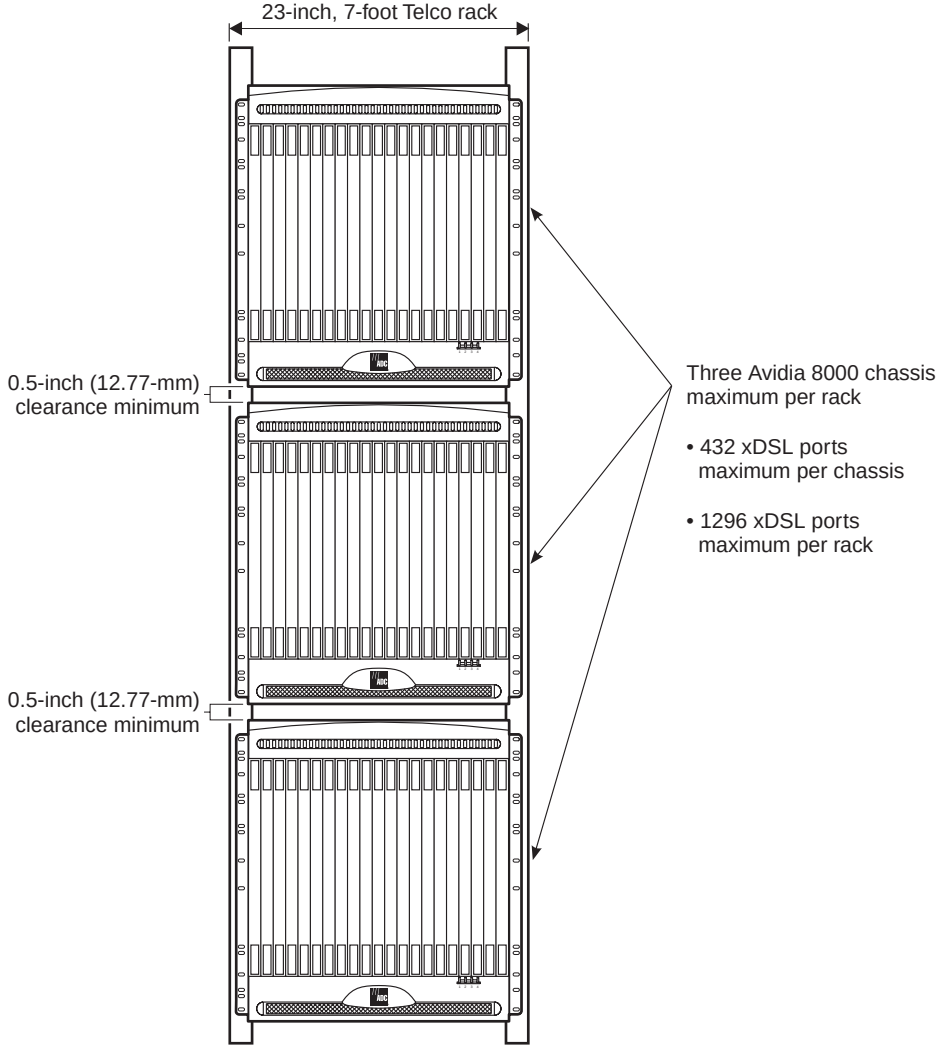
The AV8000 system is an ATM switching platform that supports standard ATM quality of service (QoS), in-band management, and layers 2 and 3 internetworking services. The AV8000 system can handle both frame-based and cell-based customer traffic, as well as transparent LAN services. The ADSL, SDSL, DS1 (T1), and E1 transmission technologies support network interfaces (layers 2 and 3 internetworking services) such as ATM, Frame Relay, TDM (IDSL and frame SDSL), and Ethernet in a single, integrated platform.

Features of the AV8000 system include:

- capability to remove and replace (hot swap) components under power, including the management card, network card, subscriber card, and fan tray
- integrated cell, packet, and circuit emulation for access (subscriber side) and network (uplink side) interfaces
- integrated switching
- redundancy

AV8000 CHASSIS

The AV8000 chassis mounts in a 23-inch, 7-foot Telco rack. Three chassis are the maximum number that fit into one rack, when a fuse panel is not installed in the same rack. Adequate clearance must be allowed between the chassis for ventilation and cabling, and must comply with IEC 297-2 and ANSI/EIA-RS-310-C standards.



With all Network Card slots occupied, one AV8000 chassis supports up to 432 xDSL ports. Installation of up to three AV8000 chassis in a Telco rack provides up to a maximum of 1296 xDSL ports.

Specifications for the AV8000 chassis are summarized below. The figure on page 143 shows the location of chassis components.

CHASSIS SPECIFICATIONS

Power

-48 Vdc	-42.5 to -56.5 Vdc, 30 Amps minimum
Fan tray	15 W (typical)

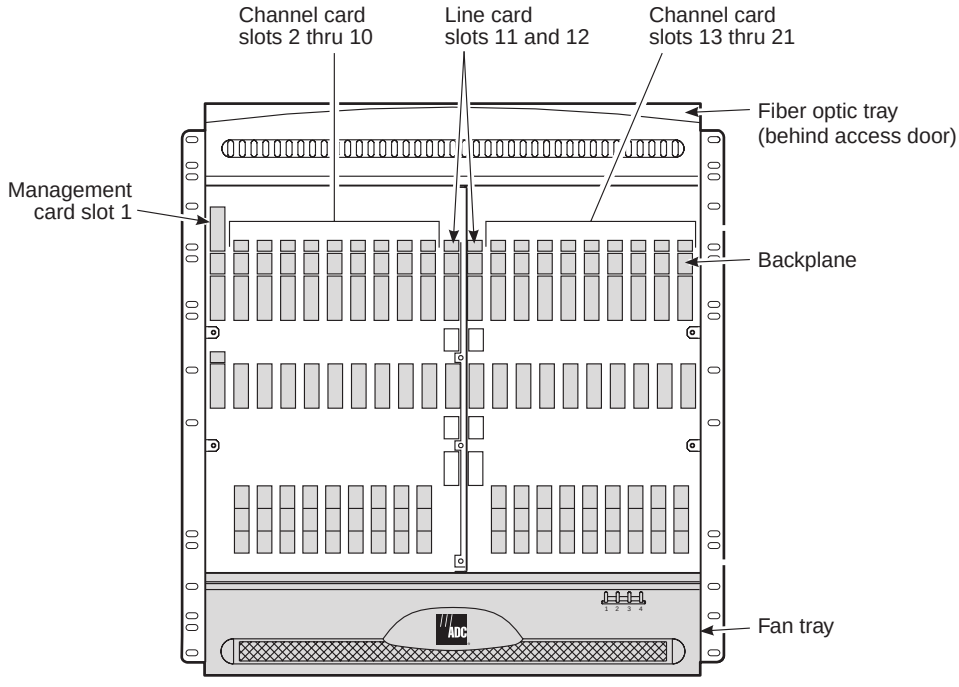
Physical

Card slots (21 total):	
1	one management card
11 and 12	one or two network cards (OC3, DS3, or DSX-1)
2-10 and 13-21	up to eighteen xDSL subscriber cards or other subscriber-side cards (8xDS1 or 8xE1 network cards, for example)
Backplane	Contains the interfaces for connecting power, network and subscriber lines, and a management interface.
Fiber-optic cable tray	Provides a space to coil fiber-optic cables for the OC-3 network card interface on top of the chassis.
Chassis Power and Grounding	Requires input from one -48 Vdc CO power source. Input from a second -48 Vdc CO power source is for redundant, but isolated, power. Ground lug provides grounding from chassis to facility (earth) ground point. Ground terminals on both A-side and B-side -48 Vdc of the power terminal block are electrically tied to the Frame GND lug.
Fan tray	A fan tray located at the bottom of the chassis is removable and replaceable under power. The fans provide chassis cooling. LEDs indicate status for the fan tray: • off indicates normal operation • lighted red indicates a non-operational fan

Chassis size	
Height	24.47 inches (621.54 mm)
Width (with mounting brackets)	23.17 inches (588.52 mm)
Width (without mounting brackets)	21.17 inches (537.72 mm)
Depth	12.00 inches (304.80 mm)
Weight	67 lbs (30.39 kg)

Environmental

Ambient Operating Temperature	+32 °F to +122 °F (0 °C to +50 °C)
Relative Humidity	10% to 80% (non-condensing)
Operating Altitude	Up to 10,000 feet (3048 m)
Ambient Storage Temperature	-40 °F to +158 °F (-40 °C to +70 °C) 5% to 95% relative humidity
Storage Altitude	-1000 to +30,000 feet (-305 m to +9144 m)
Environment Space	Controlled (indoor)


Channel card
slots 2 thru 10
Line card
slots 11 and 12
Channel card
slots 13 thru 21
Fiber optic tray
(behind access door)
Management
card slot 1
Backplane
Fan tray

AVIDIA CARDS AND CHASSIS POWER REQUIREMENTS

Three types of cards are used in an AV8000 chassis:

- management (page 146)
- network (page 151)
- subscriber (page 175)

A basic (minimal) AV8000 chassis, consists of:

- one AMC management card—17 W
- one DS3 network card—22 W or one OC3 network card—24 W
- the cooling fan tray—18 W

The basic configuration above, having one OC3 card, will typically require 59 W.

If an additional DS3 network card or an OC3 network card is installed, then the typical power requirements will increase to approximately 83 W.

Each 12-port ADSL subscriber card requires a maximum of 52 W when operational.

The IDSL (frame-based), SDSL (frame-based and cell-based) subscriber cards each require 29 W when operational.

The T1, E1, DS1and the DSX-1 cards each require 22 W when operational.

A typical loaded Avidia chassis, might consists of:

- one AMC management card—17 W
- two DS3 network cards—42 W or two OC3 network cards—48 W
- the cooling fan tray—18 W
- 18 operational ADSL subscriber cards—52 W (each)

The configuration described above, having two OC3 cards, will typically require 1019 W.

The following table summarizes the operational power requirements for Avidia cards.

Avidia Card Component	**Operational Power (Watts)**
Avidia Management Card (AMC)	17 W
DS3 Network Card	22W
OC3 Network Card	24W
8xE1/8xDS1 Network Card	22 W
8xDSX-1 Card	22 w
ADSL 12-Port Subscriber Card	52 W
IDSL (frame) Subscriber Card	29 W
SDSL 24-Port Subscriber Card (cell/frame)	31W

Minimal	Power consumption figure represents card powered up; all ports turned off; no modems connected.
Operational	Power consumption figure represents card powered up; all ports turned on; no modems connected.
Maximum	Power consumption figure represents card powered up: all ports turned on; all modems connected and turned on.

AVIDIA MANAGEMENT CARD

The Avidia 210 (AV210) management card, functioning as a Network Element (NE), provides configuration and management communication for all interconnected network cards, subscriber cards, and remote devices. Configuration and management for the AV8000 system occurs using one of these interfaces:

- command-line (on the management card)
- Web (on the management card)
- StarGazer Element Management System (a separate Avidia EMS software)
- other SNMP-based management platforms

Always place the management card in slot 1 of an AV8000 chassis.

Master Agent SNMP Function

In the Simple Network Management Protocol (SNMP) master agent/subagent architecture, the management card performs the master agent functions for other cards or devices in the Avidia system that implement the subagent function (for example, subscriber cards).

The management card communicates with the StarGazer management system or other SNMP-based management systems. For information about the MIBs that the management card supports, see the *Avidia System Configuration and Management User Manual*.

Management Card Front Panel

LED	Mode	Color	Management (AV210) Card Status Indication
POWER	On	Green	Indicates the management card has power and its power supply is functioning properly.
	Off	None	Indicates one of the following: • The management card is not receiving power. • The management card power supply is not functioning properly.
FAULT	On	Red	Indicates a fault occurred.
	Off	None	Indicates no management card fault exists.
F1 and F2	On	Red	Reserved.
	Off	None	Reserved.
INPUT POWER	On	Green	Indicates the power supply has -48 Vdc power present.
1 and 2	Off	None	Indicates the power supply does not have -48 Vdc power present.
10/100BT	Indicates Ethernet management interface activity for each of two ports:		
LINK	On	Green	Ethernet link is good at either 10 or 100 Mbps.
	Off	None	Ethernet link is not available at either 10 or 100 Mbps.
ACT	On	Green	Data is being transmitted or received on the link.
	Off	None	No data is being transmitted or received on the link.
SPD	On	Green	Speed of transmission is 100 Mbps.
	Off	None	Speed of transmission is 10 Mbps.
ABN	On	Yellow	Reserved.
	Off	None	Reserved.
ALARM	Indicates alarm activity:		
CRT	On	Red	Critical alarm condition exists.
	Off	None	No critical alarm condition exists.
MAJ	On	Red	Major alarm condition exists.
	Off	None	No major alarm condition exists.
MIN	On	Yellow	Minor alarm condition exists.
	Off	None	No minor alarm condition exists.
PWR MIN	On	Yellow	Reserved.
	Off	None	Reserved.

LED	Mode	Color	Management (AV210) Card Status Indication
ACO/LED TEST	On	Green	Indicates one of the following: • An alarm condition exists for which the audible alarm was disabled. • The front panel ACO pushbutton is currently pressed.
	Off	None	Indicates that no audible alarm is masked, or the ACO pushbutton is not currently pressed.

Management Card Specifications

Specifications for the management card are provided below.

Physical

Power	-48 Vdc, 17 W (Operational)
Height	16.51 inches (419.35 mm)
Width	1.00 inch (25.40 mm)
Depth	9.50 inches (241.30 mm)
Weight	2.2 lbs (1.0 kg)

Functional

SNMP	• SNMP agent • standard and proprietary support for ATM, xDSL, chassis, agent, and MIB-II attributes
E2A Alarms	• critical, major, and minor alarms • power alarm for each battery input (A-side and B-side) indicating whether power sources are supplying -48 Vdc See the *Avidia System Configuration and Management User Manual* for data about faults that cause the alarm conditions.
ATM Features	ATM connections (PVCs) comprise Virtual Path Connections (VPCs) and Virtual Subscriber Connections (VCCs), including: • maximum of 1 VPIs per port • VPI range of 0; VCI range of 1024-4095 • 1 VPIs can carry 3072 VCIs each per port (VCCs) • system limit—up to 4,096 PVCs (VPC+VCC) Additional ATM features: • virtual path tunneling • Connection Admission Control (CAC)
Configuration Management	Trivial File Transfer Protocol (TFTP) used for file transfer with minimum overhead. The management card provides device configuration and system image download functions.

Maintenance Reporting

The management card provides maintenance records for subscriber cards and network cards residing in its same chassis on:

- 15-minute performance
- 24-hour performance
- current statistics tables
- test results
- alarms and alarm history
- network interface errors as reported by the network cards
- ATM failures monitored and reported by ATM-based network cards and cell xDSL subscriber cards
- ATM level performance as monitored and reported by ATM-based network cards and cell xDSL subscriber cards
- AAL (all versions) level performance as monitored and reported by network cards or cell-based xDSL subscriber cards
- congestion level performance as monitored and reported by network cards or cell-based xDSL subscriber cards

AVIDIA NETWORK CARDS

Network cards provide an uplink interface to an ATM network. They supply both ATM traffic management and physical layer functionality. Only one network card is required to provide a link between the subscriber and the ATM backbone, but you can install a second network card for redundancy or for dual homing. See "Redundancy" on page 77 for more information about redundancy and dual homing configurations. Network cards are typically placed in network card slots 11 and 12; however, 8xDS1 and 8xE1 cards must be placed in subscriber card slots 2-10 or 13-21.

Network cards can also provide a subscriber-side connection when used for subtending. Subscriber-side means that the cards do not provide an uplink network connection, but provide a connection downstream to another Avidia chassis that is being subtended. See "Subtending Multiple Systems" on page 86 for more information about how to select and place network cards for this application. For this type of application, the OC3 card can be placed in subscriber card slots 2-10 or 13-21

The table below lists network cards that are available for use in the AV8000 chassis and the page where they are described in this section.

Type	Avidia Model	Transmission Format	Transmission Speed (Mbps)	Interface	Page
OC3-c					153
Multimode	AV311	ATM	155.520	dual-PHY SONET	
Single Mode intermediate range	AV312	ATM	155.520	dual-PHY SONET	
Single Mode long range	AV313	ATM	155.520	dual-PHY SONET	
DS3 ATM	AV323	ATM	44.736	WAN	157
8xDS1 CSU/DSU Management	AV351	ATM	8 x 1.544	DS1	161
8xE1 CSU/DSU Management	AV352	ATM	8 x 2.048	E1	166
8xDSX-1 DSU Management	AV353	ATM	8 x 1.544	DSX-1	170

Select network cards for the AV8000 that are compatible with the network equipment:

- OC3 network cards connect to a SONET network.
- DS3 network cards connect to the ATM backbone network.
- 8xDS1 network cards connect to DS1 links.
- 8xDSX-1 network cards connect to DSX-1 links.
- 8xE1 network card connects to E1 links.

OC3 Network Card

The OC3 network card provides uplink transmission at a rate of 155.52 Mbps and provides connection to the ATM backbone network as a SONET-based fiber-optic User Network Interface (UNI). It has two physical (dual-PHY) SONET interfaces, each with a transmit and receive port. Under normal operation, all traffic is carried through the first interface; the second is not used. For Automatic Protection Switching (APS), use the second interface to provide backup to the first.

Three versions of the OC3 network card are available:

- The AV311 OC3 network card provides a multi-mode, long-haul SONET connection.
- The AV312 OC3 network card provides a single-mode, intermediate-range SONET connection.
- The AV313 OC3 network card provides a single-mode, long-range SONET connection.

Cabling

With an AV311 OC3 network card, use multimode fiber with SC fiber connectors. With an AV312 OC3 intermediate-range (IR) network card or an AV313 OC3 long-range (LR) network card, use single mode fiber with SC fiber connectors. Select an appropriate fiber-optic cable to connect to your OC3 network card by using the following table.

Use This Fiber-Optic Cable	With This OC3 Network Card	Maximum Output Power (dBm)	Minimum Output Power (dBm)	Wavelength (NM)	Minimum Input Power (dBm)	Maximum Input Power (dBm)	Maximum Cable Length
Multimode	AV311	-14.0	-19.0	1310	-30.0	-14.0	6,561 feet (2 km)
Single Mode IR	AV312	-8.0	-15.0	1310	-29.0	-8.0	49,212 feet (15 km)
Single Mode LR	AV313	0.0	-5.0	1310	-32.0	-3.0	131,233 feet (40 km)

For information about running loopback tests on this network card, see the *Avidia System Configuration and Management* manual.

OC3 Card Front Panel

LED [a]	Mode	Color	OC3 (AV311, AV312, AV313) Network Card Status Indication
POWER	On	Green	Indicates the OC3 network card is receiving power and its power supply is functioning properly.
	Off	None	Indicates one of the following faults: • The OC3 network card is not receiving power. • The OC3 network card power supply is not functioning properly.
FAULT	On	Red	Indicates a fault in the functionality of the OC3 network card.
	Off	None	Indicates no fault in the OC3 network card.
APS	On	Yellow	Reserved.
	Off	None	Reserved.
Tx1 and	On	Green	Indicates the OC3 port is transmitting user data.
Tx2	Off	None	Indicates the OC3 port is not transmitting user data.
Rx1 and	On	Green	Indicates the OC3 port is receiving user data.
Rx2	Off	None	Indicates the OC3 port is not receiving user data.
SYNC1 and	On	Green	Indicates the OC3 network is synchronized with the distant end.
SYNC2	Off	None	Indicates the OC3 network is not synchronized with the distant end.

(a) Tx1, Rx1, and SYNC1 refer to OC3 port 1. Tx2, Rx2, and SYNC2 refer to OC3 port 2.

OC3 Card Specifications

Features for all the OC3 network cards are described below

Physical

Power	-48 Vdc, 24W (Operational)
Height	16.51 inches (419.35 mm)
Width	1.00 inch (25.40 mm)
Depth	9.50 inches (241.30 mm)
Weight	2.2 lbs (1.0 kg)

Functional

Product Features

- multi-processor architecture, providing Permanent Virtual Circuit (PVC)
- ATM Operation, Administration, and Management (OAM) generation and termination functions
- Automatic Protection Switching (APS)

ATM Features

ATM connections (PVCs) comprise Virtual Path Connections (VPCs) and Virtual Subscriber Connections (VCCs), including:

- maximum of 4096 VPIs per port
- VPI range of 0-255; VCI range of 32-1023
- 16 VPIs can carry 992 VCIs each per port (VCCs)
- system limit—up to 4,096 PVCs (VPC+VCC)

Additional ATM features:

- virtual path tunneling
- Connection Admission Control (CAC)

ATM Traffic Types

The OC3 network card supports these ATM traffic types:

- Constant Bit Rate (CBR) for digital information requiring continuous bit streams
- Unspecified Bit Rate (UBR) for LAN traffic
- Real-time Variable Bit Rate (rt-VBR) for packetized voice or video that is not transmitted at a fixed rate.
- Non-Real-Time Variable Bit Rate (nrt-VBR) for interactive transaction type transmissions that are bursty and demand significant bandwidth only for short periods of time.

Loopback	• Local loopback with signal being looped back within the network card at the transceiver • Line loopback with signal received at the network interface and looped back through the transmitter
Automatic Protection Switching	• OC3 network cards have two physical SONET interfaces, each with a transmit and receive port • Under normal operation, all traffic carried through first interface • APS uses the second interface as backup to the first interface • By default, APS is disabled and must be activated using any interface for Avidia.

DS3 Network Card

The Avidia 323 (AV323) ATM DS3 network card provides the connection to an ATM backbone network at a rate of 44.736 Mbps.

The use of two DS3 cards in an AV8000 system supports these modes:

- a single physical link mode
- dual physical link mode
- subtending

When using two cards for a single physical link mode (port redundancy with one network uplink connection), connect the coaxial cables from the ATM backbone network to the pair of BNC connectors marked DS3-2. When using two cards for a dual physical link mode (connection to two separate uplink networks), connect the coaxial cables from one ATM backbone network to the pair of BNC connectors marked DS3-2 and the coaxial cables from the second ATM backbone network to the pair of BNC connectors marked DS3-1.

See Chapter 8, “System Configuration for Special Applications” on page 73 for more information about this type of redundancy).

Cabling

The maximum lengths for the coaxial DS3 network cable is 450 feet (137 m).

DS3 Card Front Panel

LED	Mode	Color	DS3 (AV323) Network Card Status Indication [a]
POWER	On	Green	Indicates the DS3 network card is receiving power and its power supply is functioning properly.
	Off	None	Indicates one of the following faults: • Card is not receiving power. • Card power supply is not functioning properly.
FAULT	On	Red	Indicates a fault in the functionality of the DS3 network card.
	Off	None	Indicates no fault in the DS3 network card.
Port 1 (top cluster) and Port 2 (bottom cluster) indicators:			
Tx	On	Green	Indicates the DS3 port is transmitting user data.
	Off	None	Indicates the DS3 port is not transmitting user data.
Rx	On	Green	Indicates the DS3 port is receiving user data.
	Off	None	Indicates the DS3 port is not receiving user data.
LOS	On	Red	Indicates the port has lost the DS3 signal from the distant end.
	Off	None	Indicates the port has not lost the DS3 signal from the distant end.
LOF	On	Red	Indicates the port is receiving a red alarm signal from the distant end.
	Off	None	Indicates the port is not receiving a red alarm signal from the distant end.
AIS	On	Red	Indicates the port is receiving an Alarm Indication Signal (AIS) indicated by an all ones signal from the distant end.
	Off	None	Indicates the port is not receiving an all ones signal from the distant end.
RAI	On	Yellow	Indicates the port is receiving a Remote Alarm Indication (RAI) signal from the distant end.
	Off	None	Indicates the port is not receiving an RAI signal from the distant end.
LPBK	On	Yellow	Reserved.
	Off	None	Reserved.

(a) There are separate Tx, Rx, LOS, LOF, AIS, RAI, and loopback LEDs for port 1 and port 2. Only the severest alarm condition is activated at any instant.

DS3 Card Specifications

Features of the DS3 network card are described below.

Physical

Power	-48 Vdc, 22 W (Operational)
Height	16.51 inches (419.35 mm)
Width	1.00 inch (25.40 mm)
Depth	9.50 inches (241.30 mm)
Weight	2.0 lbs (0.91 kg)

Functional

Product Features	• multi-processor architecture, providing Permanent Virtual Circuit (PVC) • ATM Operation, Administration, and Management (OAM) generation and termination functions
ATM Features	ATM connections (PVCs) comprise Virtual Path Connections (VPCs) and Virtual Subscriber Connections (VCCs), including: • maximum of 4096 VPIs per port • VPI range of 0-255; VCI range of 32-1023 • 16 VPIs can carry 992 VCIs each per port (VCCs) • system limit—up to 4,096 PVCs (VPC+VCC) Additional ATM features: • virtual path tunneling • Connection Admission Control (CAC)
ATM Traffic Types	The DS3 network card supports these ATM traffic types: • Constant Bit Rate (CBR) for digital information requiring continuous bit streams • Unspecified Bit Rate (UBR) for LAN traffic • Real-time Variable Bit Rate (rt-VBR) for packetized voice or video that is not transmitted at a fixed rate. • Non-Real-Time Variable Bit Rate (nrt-VBR) for interactive transaction type transmissions that are bursty and demand significant bandwidth only for short periods of time.

Loopback	• Local loopback with signal being looped back within the network card at the transceiver • Line loopback with signal received at the network interface and looped back through the transmitter • Remote loopback with the signal sent to the far end, where it is looped back • For information about running loopback tests on this network card, see the *Avidia System Configuration and Management* manual.

8xDS1 Network Card

8xDS1 network card management functionality is available only when the card is used as a combination management card and DS1 uplink interface in the Avidia 2200. The following 8xDS1 network card components labeled on the front panel are therefore not operational in the AV8000: ACO functionality, the RS-232 CRAFT port; and the MAJOR and MINOR LEDs.

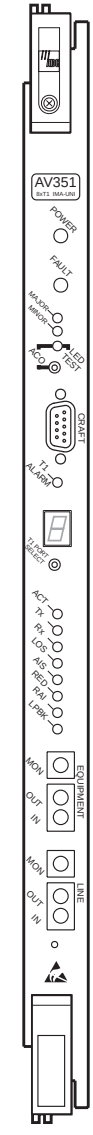
The Avidia 351 (AV351) 8xDS1 network card provides eight individual DS1 uplinks to transmit ATM cells to the ATM backbone network at a rate of 1.544 Mbps for each of the eight ports. The 8xDS1 network card provides eight short-haul or eight long-haul DS1 ports, each with a built-in Subscriber Service Unit (CSU). Install 8xDS1 network cards in subscriber card slots 2-10 and 13-21 only.

Cabling

The maximum lengths for the DS1 network cable is 6 kft (1,829 m) using copper twisted pair wire of 26 AWG.

8xDS1 Card Front Panel

LED	Mode	Color	8xDS1 (AV351) Network Card Status Indication
POWER	On	Green	Indicates the 8xDS1 network card is receiving power and its power supply is functioning properly.
	Off	None	Indicates one of the following faults: • Card is not receiving power. • Card power supply is not functioning properly.
FAULT	On	Red	Indicates a fault in the functionality of the 8xDS1 network card.
	Off	None	Indicates no fault in the 8xDS1 network card.
MAJOR	—	None	Not applicable. [a]
MINOR	—	None	Not applicable. [a]
ACO/ LED TEST	—	None	Not applicable. [a]
T1 ALARM	On	Red	One or more of the eight ports has an alarm condition.
	Off	None	None of the eight ports has an alarm condition.
For the T1 port selected using the T1 Port Select pushbutton:			
ACT	On	Green	Indicates the DS1 port is enabled to carry user traffic.
	Off	None	Indicates the DS1 port is in test mode.
Tx	On	Green	Indicates the DS1 port is transmitting user data.
	Off	None	Indicates the DS1 port is not transmitting user data.
Rx	On	Green	Indicates the DS1 port is receiving user data.
	Off	None	Indicates the DS1 port is not receiving user data.
LOS	On	Red	Indicates the port has lost the DS1 signal from the distant end.
	Off	None	Indicates the port has not lost the DS1 signal from the distant end.
AIS	On	Red	Indicates the port is receiving an Alarm Indication Signal (AIS) indicated by an all ones signal from the distant end.
	Off	None	Indicates the port is not receiving an all ones signal from the distant end.
RED	On	Red	Indicates the port is receiving a red alarm signal from the distant end.
	Off	None	Indicates the port is not receiving a red alarm signal from the distant end.



LED	Mode	Color	8xDS1 (AV351) Network Card Status Indication
RAI	On	Yellow	Indicates the port is receiving a Remote Alarm Indication (RAI) signal from the distant end.
	Off	None	Indicates the port is not receiving an RAI signal from the distant end.
LPBK	On	Yellow	Reserved.
	Off	None	Reserved.

(a) 8xDS1 network card management functionality is only applicable when the card is used as a combination management card and DS1 uplink interface in the Avidia 2200.

8xDS1 Card Specification

Features of the 8xDS1 network card are described below.

Physical

Power	-48 Vdc, 22 W (Operational)
Height	16.51 inches (419.35 mm)
Width	1.00 inch (25.40 mm)
Depth	9.50 inches (241.30 mm)
Weight	2.7 lbs (1.22 kg)

Functional

Product Features
- multi-processor architecture, providing Permanent Virtual Circuit (PVC)
- ATM Operation, Administration, and Management (OAM) generation and termination functions

ATM Features

ATM connections (PVCs) comprise Virtual Path Connections (VPCs) and Virtual Subscriber Connections (VCCs), including:
- maximum of 256 VPIs per port
- VPI range of 0-255; VCI range of 32-1023
- 3 VPIs can carry 992 VCIs each per port (VCCs)
- system limit—up to 4,096 PVCs (VPC+VCC)

Additional ATM features:
- virtual path tunneling
- Connection Admission Control (CAC)

ATM Traffic Types	The 8xDS1 network card supports these ATM traffic types: • Constant Bit Rate (CBR) for digital information requiring continuous bit streams. • Unspecified Bit Rate (UBR) for LAN traffic. • Real-time Variable Bit Rate (rt-VBR) for packetized voice or video that is not transmitted at a fixed rate. • Non-Real-Time Variable Bit Rate (nrt-VBR) for interactive transaction type transmissions that are bursty and demand significant bandwidth only for short periods of time.
Loopback	• Local loopback with signal being looped back within the network card at the transceiver. • Network loopback with signal received at the network interface and looped back through the transmitter. • Payload loopback with the card looping back to the payload (192 bits) through the receive section (including the framer) and to the transmit section, returning the payload and the newly-generated ESF framing. • Remote loopback with the signal sent to the far end, where it is looped back.

In addition to the status LEDs, the front panel displays the following components:

- T1 PORT SELECT pushbutton, when pressed, selects a port (1 through 8). Selection of any port performs two functions: lights the corresponding LED and activates the associated Bantam test jacks. When a port is deselected (no port), the port LED does not light, and the Bantam test jacks remain inactive.
- Bantam test jacks provide monitoring and direct access to the transmit and receive paths for each T1 port (each with Tip and Ring signals):
  - The Equipment IN and OUT jacks provide direct access to the transmit and receive signals of the active T1 port. The Equipment OUT jack supplies the transmitted output signal from the active T1 port; the Equipment IN jack feeds the received input to the active T1 port. A jumper cable connected between Equipment IN and OUT jacks provides loopback to test the card functionality and to isolate malfunctions of the T1 card for the active port.
  - The Line IN and OUT jacks provide direct access to the transmit and receive line signals from the active remote port. The Line OUT jack monitors the transmitted line signal from the active remote T1 network interface port; the Line IN jack monitors the received line signal to the remote T1 network interface port. A jumper cable connected between Line IN and OUT jacks bypasses the T1 card, allowing isolation of a malfunction of the network line function for the active port
  - The Equipment MON and Line MON jacks provide high impedance test points to be used for monitoring (example, T1 test equipment). The Equipment MON jack provides access to the T1 output. The Line MON jack provides access to the external line.

For information about running loopback tests on this network card, see the *Avidia System Configuration and Management* manual.

8xE1 Network Card

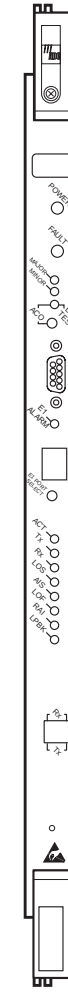
For future use, 8xE1 network card management functionality is only applicable when the card is used as a combination management card and E1 uplink interface in the Avidia 2200. Therefore, the following 8xE1 network card components labeled on the front panel are not operational in the AV8000: ACO functionality, the RS-232 CRAFT port, and the MAJOR and MINOR LEDs.

The Avidia 352 (AV352) 8xE1 network card provides eight individual E1 uplinks to transport subscriber traffic as ATM cell over each of the E1 links at a rate of 2.048 Mbps for each of the eight ports. Install 8xE1 network cards in subscriber card slots 2-10 and 13-21 only.

Cabling

The maximum lengths for the E1 network cable is 4.8 kft (1460 m) using copper twisted pair wire of 26 AWG.

8xE1 Card Front Panel



LED	Mode	Color	8xE1 (AV352) Network Card Status Indication
POWER	On	Green	Indicates the 8xE1 network card is receiving power and its power supply is functioning properly.
	Off	None	Indicates one of the following faults: • Card is not receiving power. • Card power supply is not functioning properly.
FAULT	On	Red	Indicates a fault in the functionality of the 8xE1 network card.
	Off	None	Indicates no fault in the 8xE1 network card.
MAJOR	—	None	Not applicable. [(a)]
MINOR	—	None	Not applicable. [(a)]
ACO/ LED TEST	—	None	Not applicable. [(a)]
E1 ALARM	On	Red	One or more of the eight ports has an alarm condition.
	Off	None	None of the eight ports has an alarm condition.
For the 8xE1 port selected using the E1 Port Select pushbutton:			
ACT	On	Green	Indicates the 8xE1 port is enabled to carry user traffic.
	Off	None	Indicates the 8xE1 port is in test mode.
Tx	On	Green	Indicates the 8xE1 port is transmitting user data.
	Off	None	Indicates the 8xE1 port is not transmitting user data.
Rx	On	Green	Indicates the 8xE1 port is receiving user data.
	Off	None	Indicates the 8xE1 port is not receiving user data.
LOS	On	Red	Indicates the port has lost the 8xE1 signal from the distant end.
	Off	None	Indicates the port has not lost the 8xE1 signal from the distant end.
AIS	On	Red	Indicates the port is receiving an Alarm Indication Signal (AIS) indicated by an all ones signal from the distant end.
	Off	None	Indicates the port is not receiving an all ones signal from the distant end.
LOF	On	Red	Indicates the port is receiving a red alarm signal from the distant end.
	Off	None	Indicates the port is not receiving a red alarm signal from the distant end.

LED	Mode	Color	8xE1 (AV352) Network Card Status Indication
RAI	On	Yellow	Indicates the port is receiving a Remote Alarm Indication (RAI) signal from the distant end.
	Off	None	Indicates the port is not receiving an RAI signal from the distant end.
LPBK	On	Yellow	Indicates a loopback is currently active on the port.
	Off	None	Indicates no loopback is active on the port.

(a) 8xDSX-1 network card management functionality is only applicable when the card is used as a combination management card and DS1 uplink interface in the Avidia 2200.

8xE1 Card Specifications

Physical

Power	-48 Vdc, 22 W (Operational)
Height	16.51 inches (419.35 mm)
Width	1.00 inch (25.40 mm)
Depth	9.50 inches (241.30 mm)
Weight	2.7 lbs (1.22 kg)

Functional

Features of the 8xE1 network card are described blow.

Product Features

- multi-processor architecture, providing Permanent Virtual Circuit (PVC)
- ATM Operation, Administration, and Management (OAM) generation and termination functions

ATM Features

ATM connections (PVCs) comprise Virtual Path Connections (VPCs) and Virtual Subscriber Connections (VCCs), including:

- maximum of 256 VPIs per port
- VPI range of 0-255; VCI range of 32-1023
- 3 VPIs can carry 992 VCIs each per port (VCCs)
- system limit—up to 4,096 PVCs (VPC+VCC)

Additional ATM features:

- virtual path tunneling
- Connection Admission Control (CAC)

ATM Traffic Types

The E1 network card supports these ATM traffic types:

- Constant Bit Rate (CBR) for digital information requiring continuous bit streams
- Unspecified Bit Rate (UBR) for LAN traffic
- Real-time Variable Bit Rate (rt-VBR) for packetized voice or video that is not transmitted at a fixed rate.
- Non-Real-Time Variable Bit Rate (nrt-VBR) for interactive transaction type transmissions that are bursty and demand significant bandwidth only for short periods of time.

Loopback	• Local loopback with signal being looped back within the network card at the transceiver. • Line loopback with signal received at the network interface and looped back through the transmitter.

8xDSX-1 Network Card

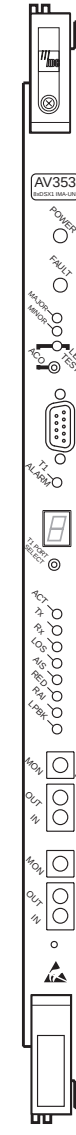
The Avidia 353 (AV353) 8xDSX-1 network card provides eight individual DSX-1 uplinks to transport subscriber traffic as ATM cell over each of the T1 links at a rate of 1.544 Mbps for each of the eight ports. The DSX-1 card is intended for connections that originate and terminate within the same building.

Cabling

The maximum lengths for the DSX-1 network cable is 655 feet (199 m).

8xDSX-1 Card Front Panel

LED	Mode	Color	8xDSX-1 (AV353) Network Card Status Indication
POWER	On	Green	Indicates the DSX-1 network card is receiving power and its power supply is functioning properly.
	Off	None	Indicates one of the following faults: • Card is not receiving power. • Card power supply is not functioning properly.
FAULT	On	Red	Indicates a fault in the functionality of the DSX-1 network card.
	Off	None	Indicates no fault in the DSX-1 network card.
MAJOR	—	None	Not applicable. [(a)]
MINOR	—	None	Not applicable. [(a)]
ACO/ LED TEST	—	None	Not applicable. [(a)]
T1 ALARM	On	Red	One or more of the eight ports has an alarm condition.
	Off	None	None of the eight ports has an alarm condition.
For the DSX-1 port selected using the T1 Port Select pushbutton:			
ACT	On	Green	Indicates the DSX-1 port is enabled to carry user traffic.
	Off	None	Indicates the DSX-1 port is in test mode.
Tx	On	Green	Indicates the DSX-1 port is transmitting user data.
	Off	None	Indicates the DSX-1 port is not transmitting user data.
Rx	On	Green	Indicates the DSX-1 port is receiving user data.
	Off	None	Indicates the DSX-1 port is not receiving user data.
LOS	On	Red	Indicates the port has lost the DSX-1 signal from the distant end.
	Off	None	Indicates the port has not lost the DSX-1 signal from the distant end.
AIS	On	Red	Indicates the port is receiving an Alarm Indication Signal (AIS) indicated by an all ones signal from the distant end.
	Off	None	Indicates the port is not receiving an all ones signal from the distant end.
RED	On	Red	Indicates the port is receiving a red alarm signal from the distant end.
	Off	None	Indicates the port is not receiving a red alarm signal from the distant end.



LED	Mode	Color	8xDSX-1 (AV353) Network Card Status Indication
RAI	On	Yellow	Indicates the port is receiving a Remote Alarm Indication (RAI) signal from the distant end.
	Off	None	Indicates the port is not receiving an RAI signal from the distant end.
LPBK	On	Yellow	Reserved.
	Off	None	Reserved.

(a) 8xDSX-1 network card management functionality is only applicable when the card is used as a combination management card and DSX-1 uplink interface in the Avidia 2200.

8x-DSX-1 Card Specifications

Features of the 8xDSX-1 network card are described below.

Physical

Power	-48 Vdc, 22 W (Operational)
Height	16.51 inches (419.35 mm)
Width	1.00 inch (25.40 mm)
Depth	9.50 inches (241.30 mm)
Weight	2.7 lbs (1.22 kg)

Functional

Product Features	• multi-processor architecture, providing Permanent Virtual Circuit (PVC) • ATM Operation, Administration, and Management (OAM) generation and termination functions
ATM Features	ATM connections (PVCs) comprise Virtual Path Connections (VPCs) and Virtual Subscriber Connections (VCCs), including: • maximum of 256 VPIs per port • VPI range of 0-255; VCI range of 32-1023 • 3 VPIs can carry 992 VCIs each per port (VCCs) • system limit—up to 4,096 PVCs (VPC+VCC) Additional ATM features: • virtual path tunneling • Connection Admission Control (CAC)
ATM Traffic Types	The DSX-1 network card supports these ATM traffic types: • Constant Bit Rate (CBR) for digital information requiring continuous bit streams. • Unspecified Bit Rate (UBR) for LAN traffic. • Real-time Variable Bit Rate (rt-VBR) for packetized voice or video that is not transmitted at a fixed rate. • Non-Real-Time Variable Bit Rate (nrt-VBR) for interactive transaction type transmissions that are bursty and demand significant bandwidth only for short periods of time.
Loopback	• Line loopback with signal received at the network interface and looped back through the transmitter. • Payload loopback with the card looping back the payload (192 bits) through the receive section (including the framer) and to the transmit section, returning the payload and the newly-generated ESF framing. • Remote loopback with the signal sent to the far end, where it is looped back

The Avidia 353 (AV353) 8xDSX-1 network card provides eight DSX-1 uplinks to transmit ATM cells to the ATM backbone network. The uplink transmission rate is 1.544 Mbps for each of the eight ports. Install DSX-1 network cards in network card slots (11 and 12).

8xDSX-1 network card management functionality is only applicable when the card is used as a combination management card and DS1 uplink interface in the Avidia 2200. The following 8xDSX-1 network card components labeled on the front panel are therefore not operational in the AV8000: ACO functionality, the RS-232 CRAFT port, and the MAJOR and MINOR LEDs.

In addition to the status LEDs, the front panel has the following components:

- T1 PORT SELECT button selects a DSX-1 port (1 through 8). Port selection lights the corresponding port LED and activates the associated Bantam test jacks. When a port is deselected, the port LED does not light and the Bantam test jacks for that port are inactive.
- Bantam test jacks provide monitoring (MON jack) and direct access (IN and OUT jacks) to the transmit and receive paths for each active DSX-1 port:
  - The Equipment IN and OUT jacks provide direct access to the transmit and receive signals for the active DSX-1 port. The Equipment OUT jack supplies the transmitted output signal from the active DSX-1 port; the Equipment IN jack feeds the received input to the active DSX-1 port. A jumper cable connected between Equipment IN and OUT jacks provides a loopback test to isolate a malfunction of the DSX-1 card for the active port.
  - The Line IN and OUT jacks provide direct access to the transmit and receive signals relating to the remote end. The Line OUT jack monitors the transmitted line signal from the active remote source; the Line IN jack supplies the received line signal to that remote unit. A jumper cable connected between Line IN and Line OUT jacks bypasses the DSX-1 card, allowing isolation of a malfunction of the network line function for the active port.
  - The Equipment MON and Line MON jacks provide high impedance test points to be used for monitoring (example, test equipment). The Equipment MON jack provides access to the output of the DSX-1 card; the Line MON jack provides access to the external line.

For information about running loopback tests on this card, see the *Avidia System Configuration and Management* manual.

AVIDIA SUBSCRIBER CARDS

Avidia subscriber cards provide two-way data communication with the subscribers. Subscriber cards are currently available in several transmission technologies: ADSL, cell SDSL, frame SDSL, and IDSL. You must select subscriber cards for the AV8000 that are compatible with the subscriber-end equipment:

- Select cell DMT ADSL subscriber cards to connect to cell-based DMT ADSL modems.
- Select frame SDSL subscriber cards to connect to frame SDSL modems.

Cell subscriber cards operate with a data stream of fixed length. The advantage of this format is that the network does not have to handle different sizes of packets or frames. This broadband technology transmits data quickly and efficiently. There are three cell subscriber cards: AV541, AV541-LP, and AV522.

Frame-based cards operate with a data stream of variable length. By using only a few bytes of overhead, the frame format makes efficient use of each frame. This means that more of the frame bandwidth is used for sending user data and less for overhead. Two Avidia cards are available for frame-based data: AV421 and AV412.

The table below lists all the subscriber cards available for the AV8000 system.

Avidia Model	xDSL Format	Type	Number of Ports	Page
		Cell Subscriber Cards		
AV541	ADSL	Rate-adaptive and rate-selective DMT cell-based	12	176
AV541-LP	ADSL	Identical to AV541 but with line protection	12	176
AV522	SDSL	Rate-selective, cell-based	24	180
		Frame Subscriber Cards		
AV421	SDSL	Rate-selective, frame-based	24	183
AV412	IDSL	Rate-selective, frame-based	24	186

ADSL Subscriber Card

The Avidia 541 (AV541) and Avidia Model 541-LP (AV541-LP) with line protection ADSL subscriber cards are cell-mode DMT ADSL subscriber cards. Each has 12 ports that provide interfaces for up to 12 subscribers. The selection of ADSL subscriber cards depends upon your Avidia system configuration:

- Use an Avidia 541 ADSL subscriber card to connect to an Avidia 8100.
- Use an Avidia 541-LP ADSL subscriber card with line protection to connect directly to a CO MDF.

ADSL Card Front Panel

LED	Mode	Color	ADSL (AV541 and AV541-LP) Subscriber Card Status Indication
POWER	On	Green	Indicates the subscriber card is receiving power and its power supply is functioning properly.
	Off	None	Indicates one of the following faults: • Card is not receiving power. • Card power supply is not functioning properly.
FAULT	On	Red	Indicates a fault in the subscriber card.
	Off	None	Indicates no fault in the subscriber card.
PORT STATUS	On	Green	Indicates the ADSL port (loop) link is up and linked to the remote unit.
(one indicator for each of 12 ports)	Flashing	Green	Indicates the ADSL port (loop) link is administratively up, and a modem is attempting to come up and is in training mode.
	On	Yellow	Indicates the ADSL port (loop) link is administratively up, and a modem is not connected.
	Off	None	Indicates the ADSL port (loop) link is administratively down whether or not a modem is attached.

ADSL Card Specifications

Physical

Power	-48 Vdc, 52 W (Operational)
Height	16.51 inches (419.35 mm)
Width	1.00 inch (25.40 mm)
Depth	9.50 inches (241.30 mm)
Weight	AV541 - 2.4 lbs (1.09 kg) AV541-LP - 2.5 lbs (1.13 kg)

Functional

The Avidia ADSL subscriber card features are described below.

Data Transmission	Provides transport of ADSL data at a BER of 10^{-7}. The margin used is 6 dB for the reach and BER specified. The subscriber card supports two data rate configurations: fixed data rate and adaptive data rate. The fixed data rate supports the exact data rate specified by the user. The adaptive data rate automatically adapts to different line conditions such as loop length, bridge taps, and noise level, to select the highest data rate possible, up to the maximum you specified when configuring. The rate-adaptive transmission range is: • 600 kbps to 7 Mbps for downstream data (to subscriber) • 64 kbps to 1 Mbps for upstream data (from subscriber) The data rate resolution is 32 kbps both upstream and downstream.
Product Features	• allows a subscriber to subscribe to multiple Internet access providers or multiple private IP networks • allows mechanism to provide subscribers simultaneous access to multiple networks

ATM Features	ATM connections (PVCs) comprise Virtual Path Connections (VPCs) and Virtual Subscriber Connections (VCCs), including: • maximum of 256 VPIs per port • VPI range of 0-255; VCI range of 32-255 • 4 VPIs can carry 224 VCIs each per port (VCCs) • system limit—up to 4,096 PVCs (VPC+VCC) Additional ATM features: • virtual path tunneling • Connection Admission Control (CAC)
Alarm History	Provides alarm history for the following: • first LLOS timestamp • last LLOS timestamp • current LLOS state • total LLOS count • first LOSW timestamp • last LOSW timestamp • current LOSW count • first ES threshold exceeded timestamp • last ES threshold exceeded timestamp • current ES threshold exceeded state • total ES threshold exceeded count • first margin (SNR) threshold exceeded timestamp • last margin threshold exceeded timestamp • current margin value • first power open timestamp • last power open timestamp • current power open state

The Avidia 541 (AV541) and Avidia 541-LP (AV541-LP) subscriber cards are cell-based, DMT ADSL, rate-adaptive units, each with twelve independent ports. The AV541-LP version has line protection for subscriber traffic. Selection of the proper ADSL subscriber card depends upon your individual Avidia system application:

- Use an Avidia 541 ADSL subscriber card to connect to an AV8100 voice shelf
- Use an Avidia 541-LP ADSL card to connect directly to a Central Office (CO) Main Distribution Frame (MDF)

Cell-Based SDSL Subscriber Card

The Avidia 522 (AV522) SDSL Subscriber Card is cell-based and rate-adaptive. It has 24 ports that provide interfaces for up to 24 subscribers.

SDSL Cell Card Front Panel

LED	Mode	Color	Cell SDSL (AV522) Subscriber Card Status Indication
POWER	On	Green	Indicates the subscriber card is receiving power and its power supply is functioning properly.
	Off	None	Indicates one of the following faults: • Card is not receiving power. • Card power supply is not functioning properly.
FAULT	On	Red	Indicates a fault in the subscriber card.
	Off	None	Indicates no fault in the subscriber card.
PORT STATUS	On	Green	Indicates the SDSL port (loop) link is up and linked to the remote unit.
(one indicator for each of 24 ports)	Flashing	Green	Indicates the SDSL port (loop) link is administratively up, and a modem is attempting to come up and is in training mode.
	On	Yellow	Indicates the SDSL port (loop) link is administratively up, and a modem is not connected.
	Off	None	Indicates the SDSL port (loop) link is administratively down whether or not a modem is attached.

Cell-Based SDSL Card Specifications

The cell SDSL subscriber card features are described below.

Physical

Power	-48 Vdc, 31 W (Operational)
Height	16.51 inches (419.35 mm)
Width	1.00 inch (25.40 mm)
Depth	9.50 inches (241.30 mm)
Weight	2.5 lbs (1.13 kg)

Functional

Data Transmission	Provides transport of SDSL, directly-mapped, ATM cell subscriber card connectivity to the Avidia system via a single-pair wire at a BER of 10^{-7} or less The symmetric rate-selective transmission range is 144 kbps to 2320 kbps in 8 kbps increments
Product Features	• allows a subscriber to subscribe to multiple Internet access providers or multiple private IP networks • allows mechanism to provide subscribers simultaneous access to multiple networks • supports industry standard SDSL cell-based CPE devices
Alarm History	Provides alarm manager support for the following: • Loss-of-signal. LOSS counts will be incremented for each second that a port is out of SDSL synchronization. • Loss-of-cell-delineation. LOCD counts will be incremented each second that a port has one or more LOCD events • Severe loss-of-cell-delineation. SLOCD counts will be incremented when more than 50% of the cells cause LOCD events in a given second • Signal-to-noise ratio (SNR)

ATM Features

ATM connections (PVCs) comprise Virtual Path Connections (VPCs) and Virtual Subscriber Connections (VCCs), including:

- maximum of 128 VPIs per port (24 ports)
- VPI range of 0-127; VCI range of 32-127
- 2 VPIs can carry 96 VCIs each per port (VCCs)
- system limit—up to 4,096 PVCs per port (VPC+VCC)
- Connection Admission Control (CAC)

Frame-Based SDSL Subscriber Card

The Avidia 421 (AV421) SDSL Subscriber Card is a frame-mode subscriber card. It has 24 ports that provide interfaces for up to 24 subscribers.

SDSL Frame Card front Panel

LED	Mode	Color	Frame SDSL (AV421) Subscriber Card Status Indication
POWER	On	Green	Indicates the subscriber card is receiving power and its power supply is functioning properly.
	Off	None	Indicates one of the following faults: • Card is not receiving power. • Card power supply is not functioning properly.
FAULT	On	Red	Indicates a fault in the subscriber card.
	Off	None	Indicates no fault in the subscriber card.
PORT STATUS	On	Green	Indicates the SDSL port (loop) link is up and linked to the remote unit.
(one indicator for each of 24 ports)	Flashing	Green	Indicates the SDSL port (loop) link is administratively up, and a modem is attempting to come up and is in training mode.
	On	Yellow	Indicates the SDSL port (loop) link is administratively up, and a modem is not connected.
	Off	None	Indicates the SDSL port (loop) link is administratively down whether or not a modem is attached.

Frame-Based SDSL Card Specifications

The frame SDSL subscriber card features are described below.

Physical

Power	-48 Vdc, 31 W (Operational)
Height	16.51 inches (419.35 mm)
Width	1.00 inch (25.40 mm)
Depth	9.50 inches (241.30 mm)
Weight	2.5 lbs (1.13 kg)

Functional

Data Transmission	Provides transport of SDSL data over single-pair wire at a BER of 10^{-7}. The margin used is 6 dB for the reach and BER specified. The symmetric rate-selective transmission range is 128 kbps to 2048 kbps in 64 kbps.
Product Features	Supports MAC+LLC over ATM.
ATM Features	ATM connections (PVCs) comprise Virtual Path Connections (VPCs) and Virtual Subscriber Connections (VCCs), including: • maximum of 1 VPIs per port • VPI range of 0; VCI range of 1024-4095 • 1 VPIs can carry 3072 VCIs each per port (VCCs) • system limit—up to 4,096 PVCs (VPC+VCC)

Alarm History — Provides alarm history for the following:

- first unavailable seconds (UAS) threshold exceeded timestamp
- last UAS threshold exceeded timestamp
- UAS threshold exceeded count
- current UAS threshold state
- first errored seconds (ES) threshold exceeded timestamp
- last ES threshold exceeded timestamp
- ES threshold exceeded count
- current ES threshold exceeded state
- first margin (SNR) threshold exceeded timestamp
- last margin threshold exceeded timestamp
- margin threshold exceeded count
- current margin threshold state
- first loss of synch word (LOSW) timestamp
- last LOSW timestamp
- LOSW count
- current LOSW state

IDSL Subscriber Card

The Avidia 412 (AV412) frame-based IDSL subscriber card is frame-based and is rate-selectable. It provides 24 ports for IDSL subscriber traffic with interfaces for up to 24 subscribers.

IDSL Card Front Panel

LED	Mode	Color	IDSL (AV412) Subscriber Card Status Indication
POWER	On	Green	Indicates the subscriber card is receiving power and its power supply is functioning properly.
	Off	None	Indicates one of the following faults: • Card is not receiving power. • Card power supply is not functioning properly.
FAULT	On	Red	Indicates a fault in the subscriber card.
	Off	None	Indicates no fault in the subscriber card.
PORT STATUS	On	Green	Indicates the IDSL port (loop) link is up and linked to the remote unit.
(one indicator for each of 24 ports)	Flashing	Green	Indicates the IDSL port (loop) link is administratively up, and a modem is attempting to come up and is in training mode.
	On	Yellow	Indicates the IDSL port (loop) link is administratively up, and a modem is not connected.
	Off	None	Indicates the IDSL port (loop) link is administratively down whether or not a modem is attached.

IDSL Card Specifications

This IDSL subscriber card has the features described below.

Physical

Power	-48 Vdc, 29 W (Operational
Height	16.51 inches (419.35 mm)
Width	1.00 inch (25.40 mm)
Depth	9.50 inches (241.30 mm)
Weight	2.5 lbs (1.13 kg)

Functional

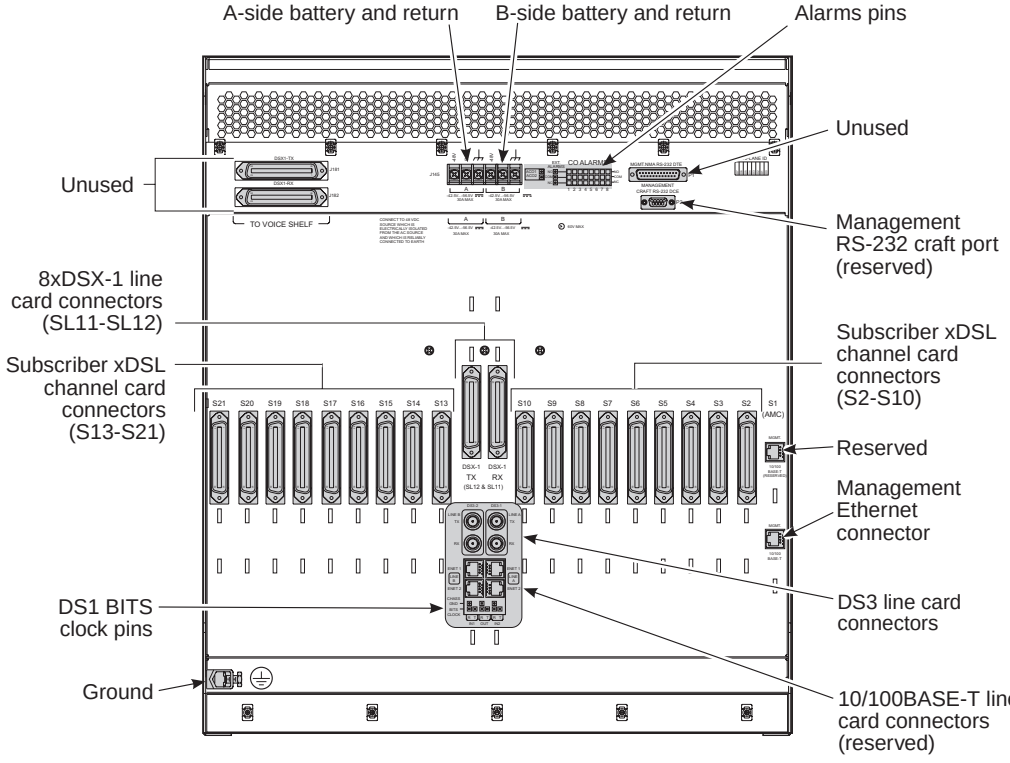
Data Transmission	Provides transport of IDSL data over single-pair wire. The symmetric rate-selective transmission rates are as follows: 64 kbps, 128 kbps, and 144 kbps.
Product Features	• frame relay compatible with FRF.5 and FRF.8 internetworking standards; supports bridging and routing sessions • supports RFC 1490 to RFC 1483 encapsulation
ATM Features	ATM connections (PVCs) comprise Virtual Path Connections (VPCs) and Virtual Subscriber Connections (VCCs), including: • maximum of 1 VPIs per port • VPI range of 0; VCI range of 1024-4095 • 1 VPIs can carry 3072 VCIs each per port (VCCs) • system limit—up to 4,096 PVCs (VPC+VCC)

Alarm History	Provides alarm history for the following: • Performance monitoring (PM) data: – path or segmented statistics – current 1-hour BE counts (each direction) – current 1-hour ES counts (each direction) – current 1- hour SES counts (each direction) – previous 8 one-hour BE counts (each direction) – previous 8 one-hour ES counts (each direction) – previous 8 one-hour SES counts (each direction) – current 24-hour ES counts (each direction) – current 24-hour SES counts (each direction) – previous 24-hour ES counts (each direction) – previous 24-hour SES counts (each direction)
Alarms	• Alarms: – ISDN loss of signal – ISDN PM alarms • hourly ES threshold • hourly SES threshold • daily ES threshold • daily SES threshold

AVIDIA CARD INTERFACES

The figure below shows the location of the card interfaces on the chassis backplane. The table on page 190 provides a description for each interface.

The subscriber xDSL subscriber card connectors S2 through S10 and S13 through S21 also serve as the interface connectors for 8xDS1 network cards.



Interface	Location	Description
		Configuration and Management Interface
Management RS-232 Craft Port	Management card (slot 1)and backplane (reserved)	Provides a serial connection for an ASCII terminal or a PC running a terminal emulation application. The interface is a DB-9 female connector, configured DCE. Through this interface, you can use the Command-Line Interface to configure and manage the Avidia system.
Management Ethernet	Chassis backplane	Provides an RJ-45 Ethernet port for remote management. The interface provides 10/100BASE-T Ethernet service. Through the connector labeled MGMT. 10/100BASE-T, you can use the Command-Line Interface with Telnet, Web-Based Interface software, or StarGazer software for system configuration and management. The other connector is reserved for future use.
		Subscriber Interface
Subscriber xDSL (S2 through S10 and S13 through S21)	Chassis backplane	Provides 18 backplane connections for subscriber lines to interface to subscriber cards. The connection is made using 25-pair champ connectors labeled S2 through S10 and S13 through S21. Connectors support all xDSL subscriber transmission, with up to 24 subscribers interfacing to one subscriber card through the champ connector (one subscriber card equates to one chassis slot). The backplane supports up to 432 xDSL ports. Also, provides a backplane connection for an 8xDS1 or an 8xE1 network card that can be placed only in a subscriber card slot (limited by backplane connector).
		Network Interface
DS3	Chassis backplane	Provides two DS3 interfaces between the AV8000 and the ATM backbone network. For each network card interface, one BNC connector is used to transmit, and the other connector is used to receive over coaxial cable. Each set of interface connectors is shared between network card slot 11 and network card slot 12. The DS3 card provides one primary port and one redundant DS3 port per card. Only one DS3 port can be active on the card at a time. The DS3 cards in slots 11 and 12 can be configured in redundant mode, where a failure on one card causes switchover to the other card.
10/100BASE-T	Chassis backplane	Provides 10/100BASE-T interface between the AV8000 and a frame-based Ethernet WAN backbone network using RJ-45 connectors. Two interfaces are provided for each of the two network card slots. Each interface has one RJ-45 jack. The 10/100BASE-T connectors are reserved for future use.

Interface	Location	Description
		Network Interface (continued)
8xDSX-1	Network Card Chassis backplane (SL11 and SL12)	Provides a short-haul DSX-1 connection for interface to 8xDSX-1 network cards installed in slots 11 and 12. The connection is made using 25-pair champ connectors, SL11 and SL12. One connector is for the transmit (Tx) signal for both network card slots; the other connector is for the receive (Rx) signal for both network card slots. Use both the SL11 and SL12 champ connectors for transmit and receive for the network cards in slots 11 and 12.
8xDS1	Chassis backplane (Slots S2 through S10 and S13 through S21)	Provides a long-haul DS1 connection for interface to 8xDS1 network cards. The connection is made by using 25-pair champ connectors labeled S2 through S10 and S13 through S21. This network card functions in any subscriber card slot (slots 2 through 10, and 13 through 21).
8xE1	Chassis backplane (Slots S2 through S10 and S13 through S21)	Provides a long-haul E1 connection for interface to 8xE1 network cards. The connection is made by using 25-pair champ connectors labeled S2 through S10 and S13 through S21. This network card functions in any subscriber card slot (slots 2 through 10, and 13 through 21).
OC3 (not shown in figure)	OC3 network card front	Provides a dual-PHY SONET interface between the AV8000 system and the ATM backbone network. Dependent on which OC3 network card you selected, the connection is made using either an SC single mode fiber connector or an SC multimode fiber connector that is located on the front of the OC3 network card. The primary SC interface is for the primary fiber-optic line; the secondary SC connector is for the secondary (redundant) fiber-optic line. If the OC3 is the sole network card in the AV8000, it must be installed in slot 12. In a subtended system or when using either load sharing or redundant network cards, a second network card is installed in slot 11. Added line or subtending OC3 cards can also be installed in any subscriber card slot.
		Battery and Ground
A- and B-side battery and return	Chassis backplane	Provides connection for -48V battery and 0V return from two battery sources. The second battery is redundant.
Ground	Chassis backplane	Provides secondary voltage protection through connection to earth ground.
		Clock and Alarms
Alarm pins	Chassis backplane	Indicates AV8000 alarm conditions as audible, visual, or power relay by connecting to the CO alarm system. Provides connection for external alarm input into the AV8000 and for remote Alarm Cut Off (ACO) control. The external alarm functions are reserved for future use.
DS1 BITS clock pins	Chassis backplane	The BITS (Building Integrated Timing System) clock pins provide external clock to the network cards to manage device timing. The cell bus clock signal and arbiter clock are available to network cards in slots 11 and 12.

METRICS B

INTERNATIONAL WIRE GAUGE

The following tables show metric equivalents for wire gauges used in the AV8000. The first table shows metric equivalents for solid copper wire used in local loops (smaller gauges) and chassis ground (larger gauges). The second table shows metric equivalents for stranded copper wire used to ground the chassis.

AWG	Diameter of solid copper wire (mm)	Cross-Sectional Area (in square millimeters)	Cross-Sectional Area (in circular mils)	SWG British Standard (nearest)	IEC Metric Size (diameter mm) Standard NS=Non-standard
6	4.115	13.302	26,240	8	4.115 NS
10	2.588	5.269	10,380	12	2.588 NS
14	1.628	2.081	4,110	16	1.628 NS
18	1.024	0.820	1,620	19	1.023 NS
20	0.813	0.517	1,020	21	0.813 NS
22	0.643	0.324	640	23	0.643 NS
24	0.511	0.205	404	25	0.510 NS
26	0.404	0.128	253	27	0.404 NS
27	0.3607	0.102	202	28	0.360 NS
28	0.320	0.081	159	30	0.320 NS

AWG	Stranding (#strands/AWG)	Diameter of stranded copper wire (mm)	Cross-Sectional Area (in square millimeters)	Cross-Sectional Area (in circular mils)
6	133/27	4.674	17.158	26,866
10	49/27	2.946	6.813	9,898
14	19/27	1.854	2,672	3,838

TECHNICAL ASSISTANCE C

This chapter describes how to contact ADC for technical support and warranty service.

TECHNICAL SUPPORT

Technical support is available 24 hours a day, 7 days a week by contacting the ADC Technical Assistance Center (TAC) at one of the following numbers:

- Telephone: 800.638.0031
  714.730.3222
- Fax: 714.832.9924
- E-mail wsd_support@adc.com

A Customer Service Engineer answers technical assistance calls Monday through Friday between 7:30 AM and 5:30 PM, Pacific Time, excluding holidays. At all other times, an on-duty Customer Service Engineer returns technical assistance calls within 30 minutes.

WORLD WIDE WEB

Avidia product information can be found at *http://www.adc.com* using any Web browser.

ADVANCE REPLACEMENT

Any product determined by ADC not to comply with the applicable warranty within 30 calendar days from the date of shipment to the Buyer, or as otherwise authorized, are eligible for advance replacement free of charge. A replacement product will be shipped to the Buyer within 24 hours of ADC's receipt of notification from the Buyer.

If products returned to ADC for advance replacement are not received by ADC within 30 calendar days of shipment of the replacement product or if no trouble is found (NTF) as determined by ADC, the Buyer will be responsible for payment of the cost of the replacement product. Advance Replacement service outside the warranty period is chargeable at ADC's prevailing rates.

BILLING

ADC's repair of products returned for repair, replacement, or credit, whether in warranty or out of warranty, which are found to be damaged due to customer negligence or which have had parts removed will be billed at prevailing time and material rates.

In the event that the returned equipment is not covered by warranty, ADC will contact the customer with estimated repair or replacement charges and obtain customer disposition of the product if a purchase order has not been provided.

Equipment returned for repair or replacement is subject to a $250 per unit no trouble found (NTF) charge in the event that diagnostic evaluation reveals no evidence of functional failure or physical defects.

RETURNS

To return equipment to ADC:

1 Locate the purchase order number under which the equipment was purchased. You will need to provide this number to ADC Customer Service to obtain a return authorization.

2 Call ADC Customer Service to ask for a Return Material Authorization (RMA) number and instructions before returning products. Use the telephone number, fax number, or e-mail address listed below:

- Telephone: 800.366.3891 ext. 63748 or 952.946.3748

  The 800 line is toll-free in the U.S. and Canada.

- Fax: 952.946.3237
- E-mail Address: repair&return@adc.com

3 Be prepared to provide the following information:

- Company name, address, telephone number, and the name of a person Customer Service can contact regarding this equipment.
- A description of the equipment as well as the number of units that you are returning. Be sure to include the model and part number of each unit.
- The shipping address to which Customer Service should return the repaired equipment.
- The reason for the return.

GLOSSARY D

Numeric

10/100BASE-T The Institute of Electrical and Electronic Engineers (IEEE) 802.3 specification for Ethernet over thin coaxial cable.

2B1Q Two Binary, One Quarternary. A line encoding technique used by ISDN BRI, HSDL and SHDSL. 2B1Q is a four-level PAM (Pulse Amplitude Modulation) technique which maps two bits of data to one quaternary symbol, with each symbol comprising one of four variations in amplitude and phase. Essentially, this technique transmits data at around twice the frequency of the signal.One of three modulatio techniques used to support xDSL.

A

AAL1 ATM Adaption Layer 1. Used for time-dependent traffic that is intolerant to delay. It is used to carry any transmission that requires a constant bit rate (CBR).

AAL2 ATM Adaptation Layer 2. Used for compressed voice and video that is intolerant of delay. This layer is used by G.shdsl xDSL technology.

AAL5 ATM Adaptation Layer 5. AAL5 has been adopted by the ATM Forum fro a Class of Service called High Speed Data transfer. It typically supports all types of data traffic. Originally designed to support TCP/IP.

access method The method by which networked stations determine when they can transmit data on a shared transmission medium

access provider Organization providing and maintaining network services for subscribers. Example: Internet Service Provider (ISP); ATM Service provider (ASP)

access rate	The transmission speed, in bits per second (bps) of the physical access circuit between the end user and the network.
ACO	The Alarm Cut Off button on the management card front panel is used to silence audible alarms.
ADSL	Asymmetric Digital Subscriber Line is a technology in which data is transferred asymmetrically from the service provider to the subscriber at up to 7.552 Mbps, and from the subscriber to service provider at up to 928 Kbps. ADSL operates over single twisted-pair copper media. ADSL is the implementation of the physical layer for transmission of data.
AN	Access Node. Usually formed by the presence of a router and user access equipment. May also refer to points on the edge of a large network providing the means whereby users on a smaller network may gain access to the larger network. Example: ATM edge switches: Digital Loop Carrier systems
ANSI	American National Standards Institute. Accredits and implements standards developed by other organizations. member of ISO.
APS	Automatic Protection Switching. When the error rate or failure of a primary switching device (line card) is detected, data transmission automatically shifts from the failed device to a standby secondary device.
ASP	ATM Network Provider
asymmetric transmission	Transmission in which a channel sends and receives data at different signaling rates. Usually the received data has a higher stream rate than does the transmitted data. See ADSL
ATM	Asynchronous Transfer Mode is a high bandwidth, low delay, connection-oriented, packet-like switching and multiplexing technique that uses 53-byte fixed-size cells to transmit voice, video and data over a network. ATM layers define how cells are formatted and provide the transport of the fixed length cells between the modem and the service provider (or endpoints of the virtual connection).
ATM Forum	An industry organization comprised of more than 800 members whose focus is aimed at speeding the development, standardization and deployment of ATM products and the ATM network.
attenuation	The dissipation of the power of a transmitted signal as it travels over copper wire, measured in decibels (dB).

ATU ADSL Transceiver Unit. ADSL Forum terminology for xDSL equipment based on the ADSL model. The xDSL endpoint is known as the ATU-R and the CO unit is known as the ATU-C.

ATU-C ATU-Central Office. ATU equipment placed in a carrier's central office in support of xDSL based services.

ATU-R ATU-Remote. Equipment placed in customer's locations in support of xDSL based services.

authentication Security feature offered through PAP and CHAP with PPP sessions.

AWG American Wire Gauge is the standard used to describe wire size. The diameter of the wire increases as the gauge decreases. 26 gauge is 0.0159 inches (0.405 mm) in diameter, 24 gauge is 0.0201 inches (0.511 mm), etc.

B

B-Channel in ISDN, a full duplex, 64kbps channel for sending data.

backbone Equipment that provides connectivity for users of distributed networks and includes all of the network infrastructure required to provide connectivity between the network edge devices.

backbone network The main artery or link for a private or public network. This network is capable of carrying a high-bandwidth load and is the network to which smaller networks are linked.

bandwidth A term used to describe the capacity or amount t of traffic that a certain communications line is capable of accommodating—measured in Hertz, Kilohertz, or Megahertz.

bseband Transmission scheme in which the entire bandwidth of a medium is used to carry a single digital signal between multiple users.

BER Bit Error Rate is a measure of transmission quality. It is the ratio of error bits to the total number of bits transmitted. Also refers to the Basic Encoding Rate. These represent rules for encoding data units as described in ANS.1.

Bit A bit is the smallest unit of data that a computer or other digital equipment is able to process. It can have only one of two states A "1" indicates one state and a "0" represents the other. The significance of either depends on the equipment and the software operating on that equipment.

BITS clock Building Integrated Timing Supply clock. This is the master reference clock source used by switching equipment at the CO and is generally obtained from.

bit error When a bit unintentionally changes state during transmission from one point in a circuit to another, this is considered a transmission error condition, or a bit error.

bit-per-second (bps) Bits-per-second is the number of bits transferred during each second of data transmission. Commonly known as the bit-rate.

BRI (Basic Rate Interface) An ISDN interface that provides each user with two 64k kbps bearer channels and one 16 kbps data channel (2B+D).

bridge A data communications device that is able to connect two or more networks running different protocols. The bridge forwards data packets between these networks. Bridges operate at the Layer 2, data layer of the OSI model. Bridges simply read, filter, and direct data packets between networks.

bridge/router A device that can provide the functions of a bridge, router or both concurrently. Bridge/Routers can route one or more protocols, such as TCP/IP, and bridge all other traffic.

C

cable blnder In the telephone network, multiple insulated copper pairs are bundled together into a cable called a cable binder.

CAC Connection Admission Control determines whether a connection request can be accepted or should be rejected. A feature of Qos

call setup This is the process of creating a connection between two or more devices on a network. it may be applied to either analog (voice) or digital (data) networks. This process, like call teardown, is protocol driven and involves the negotiation of various parameters.

call teardown The opposite of call setup. In this case, the connection is systematically dissolved. This process, like call setup, is protocol driven and involves the negotiation of various parameters.

campus area network A network which encompasses interconnectivity between floors of a building and/or buildings in a confined geographic area such as a campus or industrial park.

CAP	Carrierless Amplitude & Phase modulation. A transmission technology for implementing a DSL network, supporting ADSL, HDSL, SDSL, and RADSL line coding. Less effective than DMT, it is one of three modulation techniques used to support xDSL.
CAP	Competitive Access Provider. Alternative provided to Local Exchange Carrier (LEC). See also **CLEC**
CAT5	Category 5. Specifications from EIA/TIA-507 refer to CAT5 and grade UTP5 unshieilded twisted pair wiring.
CBR	Constant Bit Rate is a traffic class that carries a guaranteed constant bandwidth. It is best suited for applications that require fixed bandwidth, such as uncompressed voice, video, and circuit emulation. CBR is a Quality of Service class defined by the ATM Forum for ATM networks.
CCITT	Consultative Committee for International Telegraph and Telephone—now known as ITU-T. Develops standards for communications. Example: Recommendation X.25.
cell	A fixed-length packet. Also, the unit of data transmission used in ATM. Each ATM cell contains a fixed-size frame (53 bytes) consisting of a five-byte header and a 48-byte payload.
cell relay	A form of packet switching which uses fixed-length data packets. Each cell 53 octets in length—48 bytes of data "payload" and 5 bytes of address. Cell relay is capable of supporting very high speed data transmissions of both digital and audio information.
channel	A communications path. Multiple channels can be multiplexed over a single cable in certain environments.
CO	Central Office is the building containing the telephone company equipment.
CoS	Class of Service. a classification of xDSL traffic flows into certain categories to which a specific quality of service (QoS) is then applied.
circuit-switched network	A network that establishes a temporary physical circuit, until it receives a disconnect signal.
circuit switching	Switching system in which a dedicated physical circuit path must exist between sender and receiver for the duration of the "call." Used heavily in the phone industry within their communications network structure. Often contrasted with message and packet switching as a switching technique.

CLEC	Competitive Local Exchange Carrier. Alternative provider to a Local Exchange Carrier (LEC). See also **CAP**.
client	Clients are network devices and systems that request shared resources such as files, printers, and e-mail form a network server.
coaxial cable	A type of wire or conductor having a fixed characteristic impedance, structured so that a central solid or stranded conductor is maintained at a fixed distance from an outer foil or braided conductor by a solid dielectric medium (an insulator). An outer protective jacket is then moulded over the entire assembly.Coaxial cables provide high noise immunity and low power loss.
compression	Reducing the size of a data set to lower the bandwidth or space required for transmission or storage.
concentrator	A device that serves as a wiring hub in a star-topology network. Sometimes refers to a device containing multiple modules of network equipment.
CPE	Customer Premises Equipment. Terminating equipment supplied by the phone company or the customer, installed at a customer site, and connected to the phone company network. Example: terminals, phones, routers, modems.
CRC	Cyclic Redundancy Check is an algorithmic method used to verify the integrity of data transmission.
crosstalk	Line interference occurring between wire pairs within the same bundle that are used for separate transmissions.
CSU/DSU	Channel Service Unit/Data service Unit. A digital interface unit that connects end-user equipment to the local digital telephone loop.

D

D-Channel Full Duplex 16 kbps (basic rate) or 64 kbps (primary rate) ISDN channel.

DACS Digital Access & Cross-Connect System. A digital cross-connect device for routing lines among multiple ports. Connections are typically set up in advance of the call.

DCE Data Circuit-terminating Equipment. Equipment that resides at the customer end of a transmission link and provides all necessary termination functions for that link.

DCE Data Communications Equipment. The devices and connections of a communications network that connect the communications circuit with the end device (Data Terminal Equipment). Example: a modem

DDS Digital Data Service. Private line digital data service.

decibel (db) A ratio of either power, voltage, current or acoustic wave signals measured in units called decibels This system is commonly used to describe the gain or loss in signal strength between to measured points.

dedicated line A transmission circuit installed between two sites of a private network and then “open” or available at all times.

demarcation point The point of intersection at a customer site which divides the wiring, and its maintenance responsibility, between the customer and the service provider. It is usually marked by some type of network interface device (NID).

demultiplexing The counter part to multiplexing. In this case, multiplexed signals or channels are processed so as to separate them into their original individual form.

deMUX Demultiplexer.
(1) A technique that enables a single physical media (line) containing several multiplexed (combined) data streams to be separated into the original individual signals.
(2) A device for disassembling several channels being carried by one physical line or fiber optic cable into the original constituent signals.

DHCP Dynamic Host Control Protocol. A TCP/IP protocol.

dial-up A type of communications that is established by a switched-circuit connection using the telephone network.

DLC	Digital Loop Carrier is equipment that bundles multiple individual phone line signals into a single multiplexing digital signal for signals between a central office and a customer. Network transmission equipment used to provide a pair-gain function, consisting of a CO terminal and a remote terminal.
DMT	Discrete Multi-Tone. A modulation technique used for coding an ADSL transmission. In DMT, a large number (256) of low-rate carrier frequencies are QAM-modulated at a low rate in order to transmit a single high-rate data stream. This technique essentially adds a layer of multiplexing to the data stream. Data transmission can be isolated from poor quality sub-channels and transferred to high quality sub-channels, automatically. DMT is the official ANSI, ETSI and ITU-T standard for ADSL. One of three modulation techniques used for ADSL.
downstream traffic	Communications from a service provider to the service user.
DS-0	Digital Signal Level 0 is the worldwide standard for transmission at 64 kbps for PCM digitized voice channels. 24 DS-0's exist in each DS-1 (T1) signal
DS-1	Digital Signal, level 1 carries information at the rate of 1.544 Mbps in North America. Supports 24 simultaneous DS-0 signals. Generally synonymous with TI transmission rates.
DS-3	Digital Signal, level 3 carries information at 44.736 Mbps in North American and Japan. Supports 28 simultaneous DS-1 signals.
DSL	Digital Subscriber Line is a generic name for a family of digital services to be provided by local telephone companies to their local subscribers. The DSL can carry voice, video, and other data signals in both directions at the same time, as well as the signaling date used for call information and customer data.
DSLAM	Digital Subscriber Line Access multiplexer. Provides high-speed Internet or Intranet access over traditional twisted-pair telephone through the use of xDSL technology. provides simultaneous high-speed digital data access and POTS analog service over the same twisted-pair telephone line. Installed at the CO or at an ISP site adjacent to the CO.
DSU	Digital Service Unit. Digital loop device residing on customer premises and providing an interface to the customer's DTE.
DSX-1	Digital Signal Cross-connect, level 1 is the set of parameters for cross-connecting DS-1 signals, generally employed at the CO for interconnecting plant equipment.

DTE Data Terminal Equipment. That part of a data station that serves as a data source, destination or both, and that provides for the data communications control function according to protocol. DTE includes computers, protocol translators, and multiplexers.

duplex A data transmission mode that may take one of two forms: full-duplex, allowing simultaneous transmission of data in both directions, and half-duplex, permitting only transmissions in one direction or the other to occur at any one point in time.

E

E1 The European version of T-1. This digital facility is used for transmitting data over a telephone network at 2.048Mbps.

E3 The hi8ghesttransmission rate generally available in European digital infrastructure, transmitting data at 34 Mbps.

echo cancellation A process by which a transmitter/receiver cancels out the transmitted signal in a full-duplex loop, so as to hear the received signal without interference.

encapsulation A technique used by layered protocols in which one layer adds header information to the PDU (Protocol Data Unit) from another layer—essentially embedding the frames or cells of one protocol as the data payload in another protocol. Example: IP over ATM, or PPP over ATM. This technique enables successful data transmission between different protocol networks.

EIA/TIA Electronic Industries Association/Telecommunication Industry Association. This organization provides standards for the data communication industry to ensure the uniformity if the interface between DTEs and DCEs.

EMI ElecrtoMagnetic Interference. Leakage of radiation from a transmission medium due to high frequency energy.This leakage may adversely affect other equipment and services if sufficient power from these signals should escape the enclosure or transmission media. The FCC regulates the levels of EMI and RFI that may be emitted by an enclosed electronic switching device.

EMS Element Management System. A management system that provides functions at the network element management layer

enterprise network A larger corporate network under the auspices of one organization.

ethernet A baseband LAN specification invented by Xerox Corporation and developed jointly by Xerox, Intel, and Digital Equipment Corporation. Ethernet allows networks to operate at a transfer rate either 10 or 100 Mbps, depending on the media, quality, and rating of the interface.

ETSI European Telecommunications Standards Institute. Proposes standards for integrating European telecommunications throughout the entire European Community (EC).

EU European Union

exchange Sometimes used to refer to a telephone switching center—a Central Office—a physical room or building. Outside of north America, a telephone central office is often referred to as a "Public Exchange."

F

FCC Federal Communications Commission. The United States federal regulatory agency responsible for regulation interstate and international communications.

FDDI A LAN Token Ring standard using fiber optic cable

FDI Feeder Distribution Interfaces. Points where cable bundles from the telephone switch connect to individual drop lines leading to the service end-users.

FDM Frequency Division Multiplexing

FEXT Crosstalk that travels along a circuit in the same direction as the desired signal. The terminals of the offending channel and the offended channel are usually remote from each other.

fiber optics A transmission medium that uses glass or plastic fibers, rather than copper wire, to transport data and voice signals. The signal is imposed on to the fiber via modulated pulses of light from a small specially designed laser or a light-emitting diode (LED). Due to its high bandwidth and lack of susceptibility to interference, fiber-optic cable is used in long-haul or noisy applications.

fractional T1 A WAN communications service that provides the user with some portion of a T1circuit which has been divided into 24 separate 64 Kbps channels.

frame relay This is a high-speed data communications protocol for transmitting packet-mode data. Frame relay supports variable-length packets; therefore, a fame relay network can support many different native protocols and payload lengths.

FRAD Frame Relay Access Device

FTP File Transfer protocol. Internet protocol used for accessing files linked to the Internet

G

G.lite Special version of ADSL known as ADSL.lite. G.lite has a downstream data rate of 1.5 Mbps or less. It has a reach similar to full-rate ADSL (G.dmt). G.lite is ideal for consumer use because of its ease of installation and no need for a line splitter or wiring modifications at the customers site.

G.dmt Full-rate ADSL.

Gbps Gigabits per Second. 1,000,000,000 bits per second. A measurement of data transmission speed.

GUI Graphical User Interface

H

HDSL High-bit-rate Digital Subscriber Line). Designed to be a cost-effective method of delivering T1/E1 over unconditioned copper cable—without the use of repeaters.

HDSL2 Similar to HDSL but HDSL2 supports full T1/E1 over a single twisted pair—it is interoperable with many vendors and it is ANSI standards based.

Hertz Frequency measurement, 1 Hertz = 1 cycle per second.

HTU-C HDSL Transceiver Unit-Central Office

HTU-R HDSL Transceiver Unit-Remote

I

IAD Integrated Access Device. A device which supports voice, data and video information streams over a single high-capacity circuit. The IAD serves as the ATU-R device at the service user's location supporting SHDSL ATM transmissions.

IDSL IDSN based DSL using 2B1Q modulation line code.

IEEE Institute of Electrical and Electronic Engineers. Professional organization that, among other activities, defines network standards. These standards constitute the predominant LAN standards body today.

ILEC Incumbent Local Exchange Carrier. This refers to the primary existing carrier, as distinguished from the newer competitive carriers, following deregulation.

interoperability The ability of equipment from multiple vendors to communicate with one another using standardized protocols.

interface (1) The point at which two systems or pieces of equipment are connected.
(2) A connection between two systems or devices. A shared boundary defined by common physical interconnection characteristics, signal characteristics, and meanings of interchanged signals.

intranet A private network that uses Internet software and standards.

IP Internet Protocol. A standard describing software that keeps track of the Internetwork addresses for different nodes, routes outgoing messages, and recognizes incoming messages.

IP address A 32-bit address used in IP routing. The address consists of four octets separated by decimals. The octets comprise a network section, a subnet section (optional) and a host section.

IPX Internetwork Packet Exchange. LAN communications protocol used to move data between server and/or workstation programs running on different network nodes.

ISA Industry Standard Architecture. A personal computer bus architecture.

ISDN Integrated Services Digital Network. ACCITT networking standard devised to provide end-to-end, simultaneous handling of digitized voice and data traffic on the same link.

ISO International Standards organization. Founded in 1946 to facilitate the development of industrial standards.

ISP Internet Service Provider

ITU International Telecommunications Union. Standards body that produces standards for all internationally controlled aspects of analog and digital communications. Formerly known as CCITT.

IXC IntereXchange Carrier.
(1) A long-distance telephone carrier offering circuit-switched, leased-line or packet-switched service or some combination of these.
(2) Any individual, partnership, association, joint-stock company, trust, government entity or corporation engaged for hire in interstate or foreign communications by wire, or radio, between two or more exchanges.

J

K

Kbps Kilobits per second. 1,000 bits per second. A measure of data transmission speed.

L

L2TP Layer 2 Tunneling Protocol.

LAN Local Area Network. The mean by which a local community of users and workgroups can share information and resources electronically. Many communications protocols are used to accomplish this; the most prevalent of which are Ethernet and Token Ring.

LANE LAN Emulation. Typically used in LANE over ATM.

LATA	Local Access and Transport Area. (1) A geographic area established for the provision and administration of communications services. It encompasses one or more designated exchanges, which are grouped to serve common social, economic, or other common purposes. (2) Contiguous local exchange areas that include every point served by a LEC within an existing community of interest and that serve as the dividing line for the allocation of assets and liabilities between the IXC and the LEC. (3) A telephone company term that defines a geographic area; sometimes corresponds to an area code, though not always.
last mile	A reference to the "Local Loop," the distance between a local telco office and the subscriber; a distance actually less than three miles (0 to 4 kilometers).
layer	OSI Reference model. Each layer performs certain tasks necessary in order to move information from the sender to the receiver. Protocols within each layer of the OSI model, define the set of tasks required of the network but not the method of accomplishing these tasks.
leased line	A transmission line reserved by a communications carrier for the private use of a customer.
LEC	Local Exchange Carrier. LECs provide local telephone, voice and data, services to the end-user.
lifeline POTS	A minimum telephone service designed to extend a "lifeline" to the telephone system in the event of an emergency, particularly when electric power is lost.
line code	Any method of converting digital information to analog form for transmission on a telephone line. Example: 2B1Q, DMT, and CAP are all line codes.
link	The physical connection between two nodes in a network. It can consist of a data communication circuit or a direct channel (cable) connection. Also an LED signal at the card or system level that indicates that a connection or connections has been established
local loop	This refers to the physical copper wire pair or "loop" of wire from the Central Office (CO) to the end-user or subscriber.
LOF	Loss Of Frame is an error indicating that the receiving equipment has lost a frame.
LOS	Loss Of Signal is an error indicating that the receiving equipment has lost the signal.

M

MAC Media Access Control. A method of controlling access to a transmission medium. Example: Ethernet, Token Ring, FDDI

MAC address The address for a device on a network, located at the Media Access Layer (MAC) in the network architecture.

MAN metropolitan Area network. A data communications network covering the geographic area of a city. often used by a CAP to carry backbone traffic in the area served by the network.

margin The noise margin in decibels that the modem must achieve with a BER of 10^{-7} or better to successfully complete initialization.

Mbps Megabits per second. 1,000,000 bits per second.

MDF Main Distribution Frame. A central point where all local loops terminate within the Central Office (CO).

MDI Medium Dependent Interface devices communicate with MDI-X devices using a straight-through cable. *X* means that you have crossed the transmit and receive lines. MDI devices communicate with other MDI devices using a crossover cable (the cable crosses the transmit and receive lines).

message packet A unit of information used in network communication. Messages sent between devices are formed into packets by the source device, sent through the network, and then reassembled at the receiving end by the receiving device. An individual packet consists of a header and a data payload. At the receiving end the headers are stripped off and the data (message) recovered. Large messages are distributed as multiple message packets which are sequenced at the source and re-sequenced into the proper ordered at the receiver—regardless of the order in which they were actually received.

MIB Management Information dataBase. A set of variables that define the configuration and status parameters for network management. Network management stations can retrieve information from and write information to an MIB. The Internet Engineering Task Force (IETF) specifies standard MIBS for certain types of devices, ensuring any NMS can manage the devices. Vendors can specify proprietary MIBs for their devices to fit specific needs.

NMS Network Management System communicates with SNMP agents in managed devices to:

- set configuration.
- get configuration.
- get status.

modem An electronic device designed to perform two primary functions: **mo**dulations and **dem**odulation of a carrier signal. At the transmitting end, a carrier waveform is modulated by a data signal; at the receiving end, the carrier is demodulated and the original signal is recovered.

modulation Process by which a carrier's characteristics are transformed to convey information (the data signal). Types of modulation include: frequency modulation (FM), pulse amplitude modulation (PAM), discrete multitone (DMT), phase modulation (PM), Pulse Code Modulation (PCM), and many other forms.

multiplexer The counterpart to demultiplexing. In this case, individual channels or signals are combined so as to form one aggregate signal for transmission.

MUX Multiplexer.
(1) A technique that enables several data streams to be sent over a single physical media (line). It is also a function by which one connection from a layer is used to support more than one connection to the next higher layer.
(2) A device for combining several channels to be carried by one physical line or fiber optic cable. The signals are then recovered through de-multiplexing and a demultiplexer at the receiving end of the connection.

N

NAP Network Access Provider. The NAP provides a transit network service that permits the connection of service subscribers to NSPs (Network Service Providers). The NAP is typically the network provider that has access to the copper twisted pairs over which the xDSL-based service operates.

NDIS Network Design Interface Specification. Used for all communications with network adapters. These work primarily with LAN managers and allow multiple protocol stacks to share a single NIC.

NEBS Network Equipment Building Standard. NEBS defines a rigid and extensive set of performance, quality, environmental, and safety requirements developed by Bellcore, the R&D and standards organization owned by the seven Regional Bell Operating Companies (RBOC). NEBS compliance is often required by telecommunications service providers and IECs (Interexchange Carriers) for equipment installed in their switching offices.

NEXT Near End crosstalk. Crosstalk in which the interfering signal is traveling in the opposite direction with respect to the desired signal.

NIC Network Interface Card. The circuit board installed in a PC that provides the interface between a communicating PC and the network.

NID Network Interface Device. An electronic device that connects the telephone line and the POTS splitter to the local loop.

NMS Network management System. A system responsible for managing at least a part of a network. MNSs communicate with agents, which reside in the managed nodes, to help keep track of network statistics and responses. NMS usually employ MIBS, public and private, to carry out their tasks, and utilize a network management protocol.

NNI Network to Network Interface. The interface between two public pieces of network equipment.

node A node on a network is usually formed by the presence of a router and user assess equipment. Often, several leased lines are joined together at a network node.

NSN Network Service Node.

NSP Network Service Provider. This can include a local telephone company LEC, ISP, ASP or CLE.C

NTU Network Termination Unit. Equipment at the customer premises which terminates a network access interface.

O

OAM Operations, Administration and Maintenance is a major part of ATM-layer management. ATM-layer management is concerned with the general functions of monitoring the network behavior and status, detection and analysis of troubles, and system protection and repair.

OC3 Optical Carrier 3 carries information at the rate of 155.52 million bits per second on SONET channels.

octet An eight-bit byte. octets are always 8-bits in length as opposed to bytes which can sometimes vary in length with applications or technologies.

OCn Optical Carrier Level-N signal. The fundamental transmission rate for SONET. Example: OC3 operates at 1.55 Mbps.

optical fiber A special mono filament made of plastic or glass that is used to guide light waves from one point to another. Optical cables form the backbone of the SONET network. The advantages of optical fiber over copper include: high immunity to electromagnetic interference, very low transmission losses, bandwidth that is wider than any other known transmission medium, it does not radiate, and can be formed into a multi-filament structure which is able to carry a great deal of information within one bundle —without harmful interference between the fibers.

OSI model Open Systems Interconnection This is the only internationally accepted framework (model) of standards for communications between different systems made by different vendors. Most of the more dominant protocols used today have a structure based on the OSI model. The OSI model organizes the communications process into seven distinct sequenced layers. These deal with the complete, end-to-end, communications between the messaging source and the messaging destination, as well as the actual physical and logical network access itself.

P

packet (1) A logical grouping of information that includes a header and usually a data payload.
(2) A continuous sequence of binary digits of information switched through a network as an integral unit of data.

packet switching network A network in which data is transmitted in units called packets.The packets can be routed individually over the best available network connection and reassembled to form the complete, original, message at its destination. Data is assembled into small data packets by the PAD (Packet Assembler/Disassembler) sent through the network and then disassembled by the PAD at the destination node restoring the complete message.

PBX Private Branch Exchange

POP Point of Presence. A POP refer to a node of an ISP or other NSP. A POP is usually a network node.

port The physical or logical point where access to a network may be gained. May also apply to devices and computers in general. Ports are usually associated with port numbers.

POTS Plain Old Telephone Service. The basic service supplying standard single line telephones, telephone lines, and access to the public switched network.

POTS splitter A device that rejects the xDSL signal and allows the POTS signal, voice frequencies, to pass through unimpeded.

PPP Point-to-Point Protocol. A protocol that allows a PC to connect to the Internet using a dial-up connection and a high speed modem. PPP is the most common means of carrying IP frames over a circuit. This protocol features error detection and data compression.

PPPoA PPP over ATM. The transport of PPP frames over ATM.

PPPoE PPP over Ethernet. The transport of PPP frames over Ethernet.

PSC Public Service Commission

PSTN Public Switched Telephone Network. The generic term for the collection of networks which provide public telephone switching service.

PVC Permanent Virtual Circuit is a logical connection comprising a predefined static route across a packet-switched network that is always in place and always available. The end-points in a PVC circuit are pre-defined and fixed by the network manager.

PVCC Permanent Virtual Channel Connection. A Virtual Channel Connection (VCC) is an ATM connection in which switching is performed on VPI/VCI fields of each ATM cell. A PVCC connection is normally provisioned by some network management function and left in place indefinitely.

PVPC Permanent Virtual Path Connection. A virtual Path Connection (VPC) is an ATM connection in which switching is performed on only the VPI field of the ATM cell. A PVPC connection is normally provisioned by some network management function and left in place indefinitely.

Q

QAM Quadrature Amplified Modulation. A two-dimensional modulation scheme used for ADSL. CAP is a special case of QAM. In QAM, a single carrier frequency is modulated in both sine and cosine components.

QoS Quality of Service. QoS is an equal function of both transmission performance and service availability. Term for a set of categories and their parameter values which determine the overall performance of a given virtual circuit. These configured traffic parameters are assigned to a specific virtual circuit and specify how swiftly and how accurately data is transferred from the sender to the receiver. The ATM Forum has defined QoS parameters that define various levels of performance for the User Network Interface (UNI).

QoS categories There are five basic service categories supported by ATM traffic management: Constant Bit Rate (CBTR), Real-Time Variable Bit Rate (rt-VBR), Non-Real-Time Variable Bit Rate (nrt-VBR), Available Bit Rate (ABR), and Unspecified Bit Rate (UBR). Each of these categories service clearly defined applications, and have their own data types, and QoS parameters.

QoS service parameters A set of parameters that characterize the performance of an ATM connection. These include: Peak-to-peak Cell delay Variation (p-pCDV), Maximum cell transfer delay (max CTD), Cell Loss Ratio (CLR)

QoS traffic parameters A set of parameters that describe the traffic characteristics of the source and the connection. These include: Peak Cell Rate (PCR), Cell delay Variation Tolerance (CDVT), Sustainable Cell Rate (SCR), Maximum Burst Size (MBS), and Minimum Cell Rate (expected) (MCR).

R

RADSL Rate Adaptive DSL. An extension of DSL which encompasses a wide variety of data rates. These rates are dependent upon the condition of a given transmission line and its signal capabilities.

rate adaptation A system that is rate adaptive is capable of assessing the conditions of the line (local loop), determining the maximum allowable bit rate that can be implemented, and then configuring the transmission to realize the maximum bit rate possible under the present conditions. Rate Adaptation is a feature of DMT used with ADSL.

RBOC Regional Bell Operating Companies. The seven LEC telephone companies created after AT&T divestiture.

remote LAN access Data communications within a corporate or campus environment in which the computer networks can be accessed remotely via public telecommunications networks.

repeater An electronic device used to regenerate digital signals and restore signal quality over a certain distance. This is only possible with digital signals—analog signals may not be regenerated. Repeaters may be used to boost and amplify analog signals that have deteriorated in strength and quality over distance—but they may not “regenerate” them.

RFC Request For Comment is a series of notes that contain surveys, measurements, ideas, techniques, and observations, as well as proposed and accepted TCP/IP protocol standards. RFCs are available on the Internet.

RFI Radio Frequency Interference. Radio frequencies are defined for the electromagnetic spectrum between 3 KHz and 300 GHz. These are unwanted emissions from electronic switching circuits that must be minimized in accordance with FCC regulations.

router A device that interconnects LANs and can automatically route traffic at the Layer 3 network level of the OSI model. Routers are either protocol dependent, relying on LAN based computers for the address of the destination computer, or protocol independent, relying on their own routing tables for routing information and destination addresses. Routers provide more functionality than do bridges, providing network management capabilities as well as some troubleshooting tools.

RT Remote Terminal. The local loop terminates at Remote terminal intermediate points closer to the service user to improve service reliability.

RTU Remote Termination Unit. A device installed at the service user's site that connects to the local loop to provide high-speed connectivity. Also referred to as an ATU-R

S

SDH Synchronous Digital Hierarchy. An international standard for data transmission using SONET.

SDSL frame Symmetrical Digital Subscriber Line Frame is a technology in which data frames are transferred between the service provider and the subscriber at up to 1.544 Mbps each direction.

SDSL cell Symmetric Digital Subscriber Line Cell is a technology in which ATM cells are transferred between the service provider and the subscriber at up to 2048 kbps in each direction.

server A LAN network device which permits shared access to file systems, printers, common file areas, shared resources, and e-mail, by acting as the distribution center for these resources. Selected clients on a network share one or more common servers.

SHDSL Single Pair, high speed, multirate, symmetric DSL. SHDSL Provides data rates from 192 Kbps to 2.304 Mbps over a single twisted pair. Range is as much as 18, 000 feet. SHDSL operates with pure digital voice and data providing more than 16 voice lines in addition to data over a single two-wire copper interface.

SEF Severely Errored Frames is an incoming signal that has at least four consecutive errored framing patterns.

service provider An organization that provides telecommunication services and systems and arranges and manages user connections to a network system. A service provider may supply access to the Internet, an ATM network or other type of Wide Area Network (WAN).

SES Severely Errored Seconds are seconds during which more than 2,500 bipolar errors are detected on the line.

session The time during which two computers maintain a communication connection.

simplex A unidirectional data transmission mode. See **duplex.**

SNMP Simple Network Management Protocol is a protocol that specifies how to send information between a NMS and managed devices on a network. Initially, SNMP was established in order to allow milt-vendor networking devices to be managed more easily with a common management tool. The managed devices run a program called an agent. The agent interprets SNMP request and responds to them. SNMP is used to set device configurations, read device configurations, read the device status, and aggregate statistics.

SOHO Small Office / Home Office

SONET Synchronous Optical Network. A recently emerging networking standard that utilizes fiber optics to create backbone networks, capable of transmitting at extremely high data rates and accommodating gigabit-level bandwidth.

spanning tree An algorithm used to prevent bridging loops by creating a spanning tree. The algorithm is now documented in the IEEE802.1d specification.

STRATUM Clock The telephone industry has agreed on a standard for classifying timing (clock) oscillators. Highly stable external clock sources are used to synchronize digital transmissions on a network. Stratum 1 is considered the external clock source with the highest accuracy and maximum stability of 1×10^{-1}seconds per day. Less accurate Stratum sources are assigned higher numbers, progressively. Stratum 4, for example, has an accuracy of 3.2×10^{-5} seconds per day.

STS-1 Synchronous Transport Signal 1. A SONET standard for transmission over OC-1 optical fiber at 51.84 Mbps.

STS-3 Synchronous Transport Signal 3. A SONET standard for transmission over OC-3 optical fiber at 155 Mbps.

SVC Switched Virtual Circuit. A virtual circuit connection which is established across a network on an as-needed basis. This circuit exists only for the duration of the data transfer, and then it is destroyed. The user defines the end-points when the call is initiated—the connection is broken at the termination of the call. Unlike a PVC, the end-points of the communication are not established and fixed by the network manager but by the call itself.

subscriber A subscriber is usually an individual end-user or group of individual end-users of a telecommunications service or equipment provided by a service provider (phone company, ISP, ASP).

SVCC Switched Virtual Channel Connection. A switched VCC circuit is one which is created and then destroyed, dynamically, through control signaling. LIke a PVCC connection, the ATM connection is performed using both the VPI and VCI fields of the AYTM cell.

switch A switch is a system or device which interconnects circuit paths by opening certain connections and closing others in order to create a temporary path from a specific source device to a designated destination device.

symmetric transmission Transmission in which a channel sends and receives data with the same signaling rate.

T

T1 Digital transmission facility operating with a nominal bandwidth of 1.544 Mbps. Also known as Digital Signal Level 1 (DS1). DS! consists of 24 DS-0 channels in many cases. The T1 digital transmission system is the primary digital communications system in north America. In Europe, the nearest equivalent transmission facility is the E1.

T3 A digital facility operating at 45 Mbps bandwidth. The T# or equivalent DS-3 signal is composed of 28 DS-1 channels in many cases.

TCP/IP Transmission Control Protocol is a connection-oriented protocol in which datagrams are divided when sent and reassembled when received. This allows the different components of the message to be routed differently to increase the speed of transmission. TCP is a full-duplex, connection-oriented end-to-end transport protocol running on top of IP

TCP/IP Transmission Control Protocol/Internet Protocols a protocol used for communications between computers over networks and the internet.

TDM Time Division Multiplexing. A technique where data from multiple channels is allocated bandwidth on a single wire pair based on time slot assignment

Telnet A program that allows you to connect to other computers over the Internet.

TM Traffic Management. TM allows voice, video, and data to co-exist on the same ATM network. Traffic Management methodology permits the ATM network to provide different levels of QoS for different customers and data types. TM also has the responsibility for preventing congestion in the network and thereby maximizing the network's operating efficiency.

TFTP Trivial File Transfer Protocol is a protocol used to download card images or other files from an external TFTP server to the NVRAM of any installed cards, or to upload files from an installed card to an external TFTP server.

transparent LAN service Service offered by a provider that is used to connect LANs at geographically separated sites. "Transparent" means that the connection is invisible to the user and typically runs at the same speed as the LAN.

twisted pair Cable consisting of two 18 to 24 AWG (American Wire Gauge) solid copper strands twisted around each other. The twisting provides a measure of protection from electromagnetic and radio-frequency interference.

U

UAS Unavailable Seconds is the number of seconds during which the line is unavailable.

UBR Unspecified Bit Rate is a best-effort class of traffic, best suited for Local Area Networks. When network congestion occurs, the data is stored in a buffer until it can be sent.

UDP User Datagram Protocol is a protocol in which datagrams are sent whole and in the correct order.

UNI User Network Interface. A standard defined by the ATM Forum for access to public and private networks. A UNI connects an ATM end system (such as a router) and an ATM switch. This is also used for frame-relay. A UNI is the actual physical, electrical, and functional demarcation point between the public network service provider and the end user.

URL Universal Resource Locator. Used with the World Wide Web as an address.

upstream traffic Communications from a user to a service provider.

UTP Unshielded Twisted Pair. See CAT5.

V

VC or VCC A Virtual Channel or Virtual Circuit Connection is a logical connection in the ATM network over which ATM cells are transmitted. Requires both VPI and VCI to identify a particular cell traveling over this path.

VDSL Very High Bit Rate DSL. Generally, this refers to 52 Mbps DSL transmissions in one direction and 2 Mbps in the other (asymmetric) over short distances. Typically, at around 1 Km, speed is around 26 Mbps.

VP or VPC A Virtual Path or Virtual Path Connection is a group of VCs carried between two points. The VP/VPC provides a means of bundling traffic traveling in the same direction. VPs and VPCs are defined by a unique VPI value. Requires only a VPI to identify a particular cell traveling over this path.

VPI Virtual Path Identifier. An 8-bit field in the ATM cell header that is used to identify a specific virtual path over which the cell is traveling. It identifies a particular VP link.

W

WAN Wide Area Network is a network consisting of nodes located across a large geographical area.

X,Y,Z

xDSL Digital Subscriber Line. Refers to a set of similar technologies that provide high bandwidth over the copper twisted pair local loop cable, without amplifiers or repeaters along the route. It is compatible with existing services such as POTS, IDSN, and DDS and will function over most of the current existing copper infrastructure.

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