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Standard

600 Technology Park Drive  
Billerica, MA 01821-4130

# **Nortel VPN Router Installation — VPN Router 1010/1050/1100**

**NORTEL**

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

**Note:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

### European requirements only

#### EN 55 022 statement

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Cet appareil numérique (VPN Router 1010/1050/1100) respecte les limites de bruits radioélectriques visant les appareils numériques de classe B prescrites dans le Règlement sur le brouillage radioélectrique du ministère des Communications du Canada.

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## New in this release

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The following section details what's new in *Nortel VPN Router Installation—VPN Router 1010/1050/1100* (NN46110-313) for Release 7.05.300:

### Features

See the following section for information about feature changes:

#### **1000BASE-T (1000 GT) Ethernet card**

The 1000BASE-T (1000 GT) Ethernet card replaces the 10/100BASE-TX Ethernet card. See [“1000BASE-T \(1000 GT\) Ethernet interface card LEDs” on page 30](#) and [“1000BASE-T \(1000 GT\) Ethernet interface card” on page 47](#).



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## How to get help

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This chapter explains how to get help for Nortel products and services.

### Finding the latest updates on the Nortel Web site

The content of this documentation was current at the time the product was released. To check for updates to the latest documentation and software for VPN Router, go to:

[www.nortel.com/support](http://www.nortel.com/support)

Select Security & VPN and then, in the section called Virtual Private Networking (VPN), IPSEC, and SSL, click the appropriate VPN Router product.

### Getting help from the Nortel Web site

The best way to get technical support for Nortel products is from the Nortel Technical Support Web site:

[www.nortel.com/support](http://www.nortel.com/support)

This site provides quick access to software, documentation, bulletins, and tools to address issues with Nortel products. From this site you can:

- download software, documentation, and product bulletins
- search the Technical Support site and the Nortel Knowledge Base for answers to technical issues
- sign up for automatic notification of new software and documentation for Nortel equipment
- open and manage technical support cases

## Getting help over the phone from a Nortel Solutions Center

If you do not find the information you require on the Nortel Technical Support Web site, and you have a Nortel support contract, you can also get help over the phone from a Nortel Solutions Center.

In North America, call 1-800-4NORTEL (1-800-466-7835).

Outside North America, go to the following Web site to obtain the phone number for your region:

[www.nortel.com/callus](http://www.nortel.com/callus)

## Getting help from a specialist by using an Express Routing Code

To access some Nortel Technical Solutions Centers, you can use an Express Routing Code (ERC) to quickly route your call to a specialist in your Nortel product or service. To locate the ERC for your product or service, go to:

[www.nortel.com/erc](http://www.nortel.com/erc)

## Getting help through a Nortel distributor or reseller

If you purchased a service contract for your Nortel product from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller.



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## Preface

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The VPN Router 1010, 1050, and 1100 are part of the Nortel VPN Router system. Nortel VPN Routers support secure, reliable IP VPNs in a single, integrated hardware device. Throughout this guide, the VPN Router 1010, 1050, and 1100 are also referred to collectively as the *gateway*.

This guide provides instructions about how to install the VPN Router 1010, 1050, and 1100 and about how to install and replace option cards in the VPN Router 1100. This guide also includes technical specifications.

For complete information about configuring and monitoring the VPN Router 1010, 1050, and 1100, see the documentation on the software CD. (For information about VPN Router documentation, see [“Related publications” on page 19.](#))

## Before you begin

This guide is intended for qualified service personnel who are installing the VPN Router 1010, 1050, or 1100 for the first time or who need to install or replace an option card in the VPN Router 1100.



**Note:** Before you install the VPN Router 1010, 1050, or 1100, use standard cable system practices to install all network wiring on the premises.

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## Text conventions

This guide uses the following text conventions:

<b>bold Courier text</b>	Indicates command names and options and text that you need to enter. Example: Use the <b>show health</b> command. Example: Enter <b>terminal paging {off   on}</b> .
<i>italic text</i>	Indicates new terms and book titles.
plain Courier text	Indicates system output, for example, prompts and system messages. Example: File not found.
separator ( > )	Shows menu paths. Example: Choose Status > Health Check.

## Acronyms

This guide uses the following acronyms:

ADSL	asymmetric digital subscriber line
AIS	alarm indication signal
BRI	Basic Rate Interface
CSU/DSU	channel service unit/digital service unit
DIMM	dual inline memory module
DTE	data terminal equipment
FRU	field replacement unit
IP	Internet Protocol
ISDN	Integrated Services Digital Network
LAN	local area network
LED	light emitting diode
LOS	loss of signal

MAC	media access control
MDI-X	medium dependent interface crossover
OOF	out of frame
PCI	peripheral component interconnect
URL	uniform resource locator
VPN	virtual private network
WAN	wide area network

## Related publications

For more information about using the VPN Router 1010, 1050, and 1100 (formerly known as the Contivity Secure IP Services Gateway 1010, 1050, and 1100), refer to the following publications (included on the VPN Router software CD):

- Release notes provide the latest information, including brief descriptions of the new features, problems fixed in this release, and known problems and workarounds.
- *Read Me First: Connecting for VPN Access* (314962-C) describes how to set up the VPN Router 1010/1050/1100 for basic Internet and VPN access.
- *Nortel VPN Router Configuration — Basic Features* (NN46110-500) introduces the product and provides information about initial configuration.
- *Nortel VPN Router Security — Servers, Authentication, and Certificates* (NN46110-600) provides instructions for configuring authentication servers and services, as well as digital certificates.
- *Nortel VPN Router Security — Firewalls, Filters, NAT, and QoS* (NN46110-601) provides instructions for configuring the VPN Router Stateful Firewall, NAT, and VPN Router interface and tunnel filters.
- *Nortel VPN Router Configuration — Tunneling Protocols* (NN46110-503) provides instructions for configuring the tunneling protocols IPsec, L2TP, PPTP, and L2F.

- *Nortel VPN Router Configuration — Advanced Features* (NN46110-502) provides instructions for configuring 802.1Q VLANs, circuitless IP, advanced WAN settings, PPP, PPPoE, frame relay, ADSL and ATM, T1/E1 CSU/DSU interfaces, dial services and BIS, DLSw, IPX, and Hardware Accelerator cards.
- *Nortel VPN Router Configuration — Routing* (NN46110-504) provides instructions for configuring RIP, OSPF, and VRRP, as well as instructions for configuring ECMP, routing policy services, and client address redistribution.
- *Nortel VPN Router Configuration — SSL VPN Services* (NN46110-501) provides instructions for configuring services on the SSL VPN Module 1000, including authentication, networks, user groups, and portal links.
- *Nortel VPN Router Using the Command Line Interface* (NN46110-507) provides syntax, descriptions, and examples for the commands that you can use to configure, manage, and monitor the gateway.
- *Nortel VPN Router Troubleshooting* (NN46110-602) provides information about backup and recovery, file management, upgrading software, and troubleshooting. This guide also provides instructions for monitoring gateway status and performance.
- *Nortel VPN Router Configuration — TunnelGuard* (NN46110-307) provides information about configuring and using the TunnelGuard feature.

## Printed technical manuals

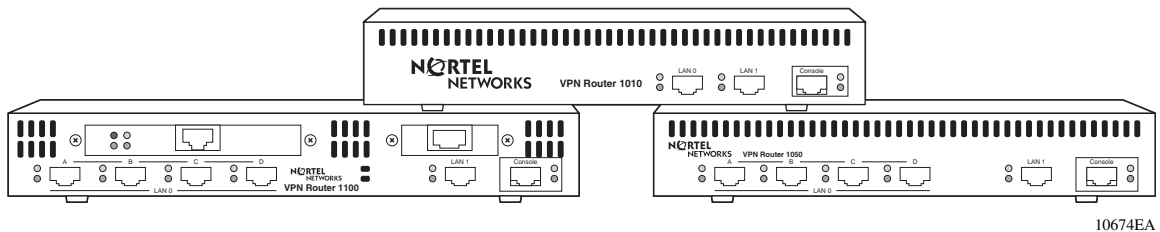
You can print selected technical manuals and release notes free, directly from the Internet. Go to [www.nortel.com/documentation](http://www.nortel.com/documentation), find the product for which you need documentation, then locate the specific category and model or version for your hardware or software product. Use Adobe Reader to open the manuals and release notes, search for the sections you need, and print them on most standard printers. Go to Adobe Systems at [www.adobe.com](http://www.adobe.com) to download a free copy of the Adobe Reader.

# Chapter 1

## Hardware overview

The Nortel VPN Router 1010/1050/1100 series provides scalable, secure, manageable extranet access for up to five concurrent tunnels across the public data network. These models are based on Intel architecture with a 300 MHz Celeron CPU and 128 MB SDRAM. Instead of a hard drive, this series uses a removable, upgradeable compact flash card. The VPN Router 1010, 1050, and 1100 fit on a bookshelf or on a shelf in a rack (Figure 1).

**Figure 1** VPN Router 1010/1050/1100 series



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The VPN Router 1010/1050/1100 series provides the following network ports:

- The VPN Router 1010 has dual 10/100BASE-TX Ethernet ports and a serial port.
- The VPN Router 1050 has a single Ethernet port and a four-port switch.
- The VPN Router 1100 has a single Ethernet port, a four-port switch, and two PCI slots (purchase option cards separately).
- All models have a serial (console) port.



**Caution:** Route all cabling for all WAN, LAN, and serial connections inside the building environment.

[Table 1](#) lists the hardware accessories and other items shipped with the VPN Router 1010, 1050, and 1100.



**Note:** Nortel does not ship a power cord with the VPN Router unless you order one.

---

**Table 1** Items shipped with the VPN Router 1010, 1050, and 1100

Description	Quantity
VPN Router 1010/1050/1100	1
Molded serial cable RJ-45 to DB9 <sup>1</sup>	1
AC to DC external power supply	1
VPN Router CD (contains documentation)	1
Ethernet crossover cable (VPN Router 1010 only)	1
Power cord (if ordered separately)	1

<sup>1</sup> To connect the gateway to a modem, you can order a null modem adapter.

Inspect all items for shipping damage. If you detect any damage, do not install the VPN Router 1010/1050/1100. Call the Nortel Technical Solutions Center in your area ([“How to get help” on page 15](#)).

## Internal LAN connections (LAN 0 and LAN 1)

The VPN Router 1010, 1050, and 1100 have two internal LANs built in:

- LAN 0 is the **private** LAN and also the LAN to use for Web management.
- LAN 1 defaults to a **public** LAN. The software refers to the LAN 1 port as slot 1, interface 1.

The VPN Router 1010 has a single autonegotiating 10/100 Ethernet port on LAN 0. The VPN Router 1050 and the VPN Router 1100 have an internal four-port autonegotiating 10/100 Ethernet switch for LAN 0.



**Note:** The LAN 0 statistics for the VPN Router 1050 and 1100 provide accurate information for reports and troubleshooting, but the LAN 0 interface always reports a 100 Mb/s full-duplex connection regardless of the actual connection speed. For example, if one of the LAN 0 ports on a VPN Router 1050 is connected to a hub, the connection runs at half duplex, but the LAN 0 statistics page reports a full-duplex connection.

Figure 2, Figure 3 on page 24, and Figure 4 on page 24 show the front views of the VPN Router 1010, the VPN Router 1050, and the VPN Router 1100, respectively. For a description of the LEDs, see “Understanding the LEDs” on page 27.

**Figure 2** VPN Router 1010 front view

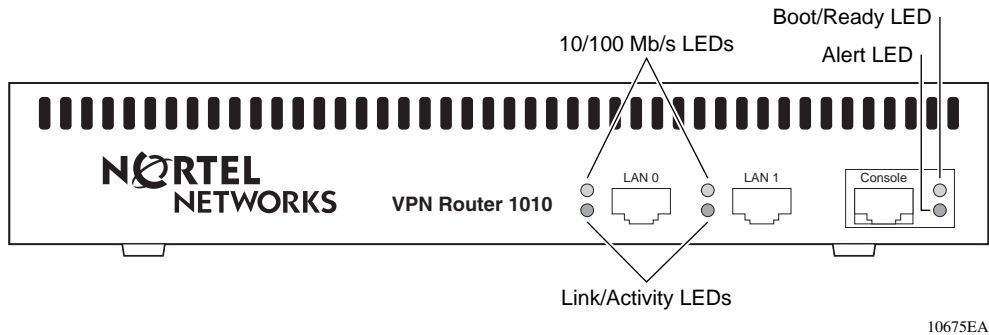


Figure 3 VPN Router 1050 front view

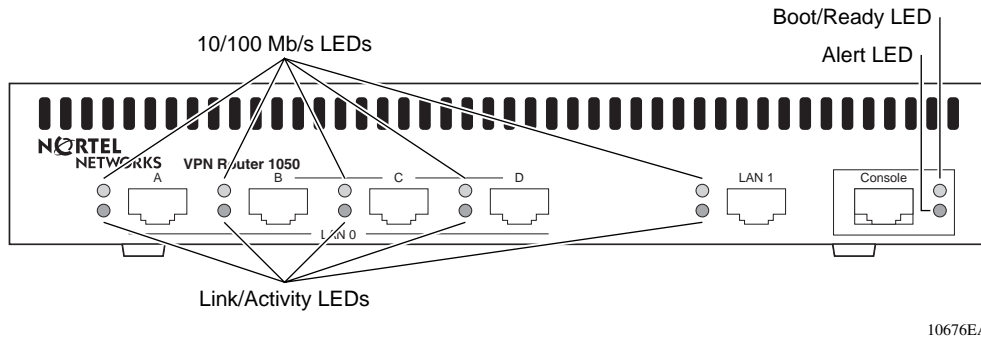
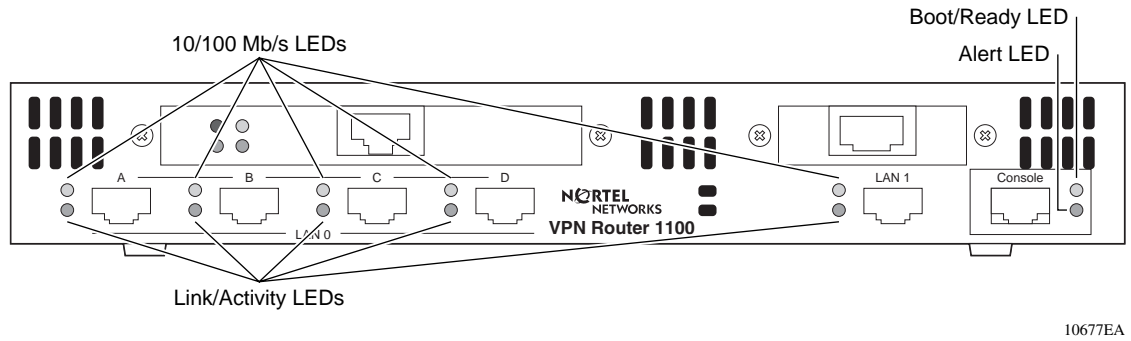


Figure 4 VPN Router 1100 front view

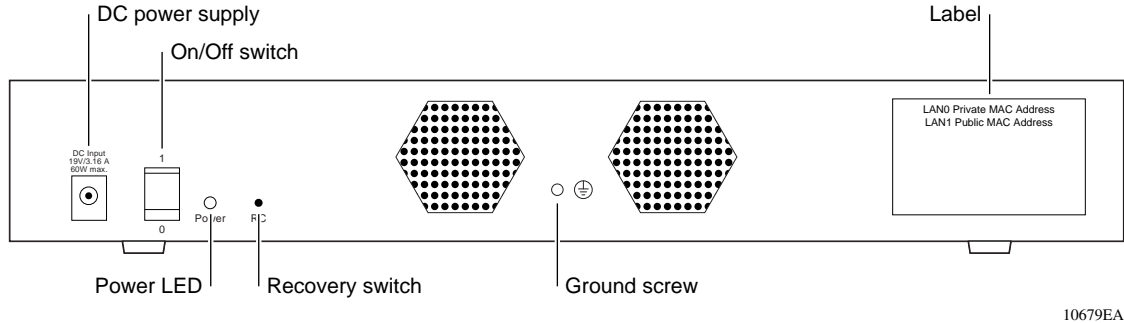




## Rear view of the gateway

Figure 5 shows the rear view of the VPN Router 1010, 1050, and 1100.

**Figure 5** Rear view of the VPN Router 1010/1050/1100



The components on the rear of the gateway include the following:

- The port labeled “DC Input” is the receptacle for the external power supply that is shipped with the VPN Router 1010, 1050, and 1100.
- Mechanical on/off switch.



**Note:** Nortel recommends that you wait 5 seconds after you turn off the gateway before you turn it on again.

- The Power LED is green when power is supplied to the unit and the internal power converters are not in a protective shutdown state.
- The recessed recovery switch boots the recovery image. To boot the recovery image, press the switch by inserting a paper clip into it during the power-on self-test memory test. For more information about system recovery, see *Nortel VPN Router Troubleshooting* (NN46110-602).
- You use the ground screw (GND) to ground the chassis.
- The label on the rear panel lists the media access control (MAC) addresses for LAN 0 and LAN 1.

## Connecting the power cord

You must order the power cord for the VPN Router 1010/1050/1100 separately. The power cord must meet the requirements described in [Table 2](#).



**Caution: Risk of equipment damage**

Do not modify or use the AC power cord if it is not the exact type that is required for your power outlet.

**Table 2** Power cord requirements

Requirement	Description
Current rating	The power cord must be rated for the available AC voltage and must have a current rating that is at least 125 percent of the gateway's current rating (1.5 A).
Certification	The power cord must have certification marks from an acceptable regional agency.
Cord length and flexibility	The power cord must be less than 4.5 meters (14.7 feet) long. It must be a flexible HAR (harmonized) cord or VDE-certified cordage to comply with the gateway's safety certifications.
Power supply connector	The connector that you plug into the AC receptacle on the gateway power supply must be an IEC 320, Sheet C5 female.
Wall outlet connector	The power cord must terminate in a male plug with appropriate grounding.



**Caution:** Before you connect the power supply to the gateway, connect the cables to the Ethernet and serial ports. If you have a VPN Router 1100, also connect the cables to the ports on any installed option cards.

To connect the power cord and turn on the power:

- 1 Plug the power cord into the AC receptacle on the external power supply shipped with the VPN Router 1010/1050/1100.

- 2 Plug the power cord into the AC power outlet.

**Caution: Risk of equipment damage**

Protect the VPN Router 1010/1050/1100 by plugging it into a surge suppressor.

---

- 3 Plug the external power supply into the port labeled “DC Input” on the back of the gateway ([Figure 5 on page 25](#)).
- 4 Press the power switch to the “on” position and wait for the gateway to boot.
- 5 Verify a successful installation by checking the LEDs on the front panel (see [“Front panel LEDs” on page 27](#)).



**Note:** For information about connecting the VPN Router 1010/1050/1100 to the network, see *Read Me First: Connecting for VPN Access* (314962-C).

---

## Understanding the LEDs

This section describes the LEDs on the front panel of the VPN Router 1010/1050/1100 and on the communication cards that you can install in the VPN Router 1100.

### Front panel LEDs

The front panel of the gateway has two LEDs that indicate the status of the VPN Router 1010/1050/1100: the Boot/Ready and the Alert LEDs ([Figure 6](#)). The VPN Router 1100 also has an audible alarm that corresponds to the Alert LED.

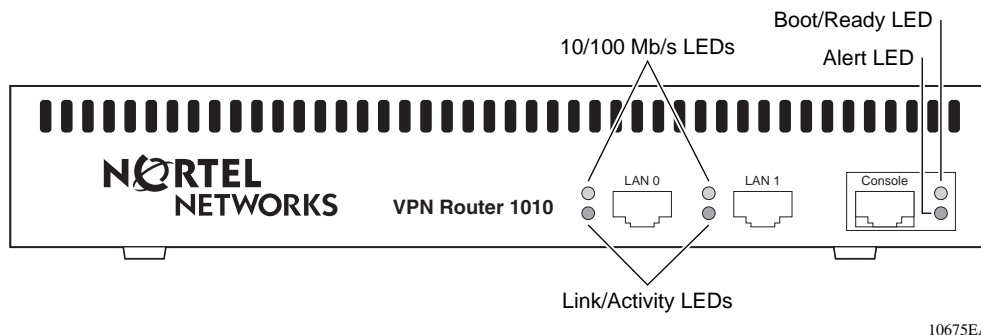
**Figure 6** Front panel of the VPN Router 1010

Table 3 describes the LEDs on the VPN Router 1010/1050/1100 front panel.

**Table 3** Front panel LED indicators

LED	Indicator	Description
Boot/Ready	Yellow	The gateway is booting and is in a non-ready state.
	Green	The boot process is complete and the gateway is in a state of readiness.
Alert	Yellow (on)	An alarm condition exists. The alarm may indicate a serious condition, such as a hardware defect, or a software attention condition. The alarm condition is described in the health check display.
	Off	No alarm condition exists.

For complete information about the health check, see *Nortel VPN Router Troubleshooting* (NN46110-602).

## Ethernet port LEDs

To confirm that you cabled the Ethernet LAN interface properly, examine the port LEDs on the front of the gateway. (Figure 6 on page 28 shows the LAN 0 and LAN 1 port LEDs on the front of the VPN Router 1010.)

Table 4 describes the Ethernet port LEDs on the VPN Router 1010/1050/1100.

**Table 4** Ethernet port LED indicators

LED	Indicator	Description
10/100 Mb/s (Amber)	On	The LAN port is operating at 100 Mb/s.
	Off	The LAN port is operating at 10 Mb/s.
Link/Act (Green)	On	The cable connections between the LAN port and the hub are good.
	Off	The cable connections between the LAN port and the hub are faulty.
	Flashing	The LAN port is sending or receiving network data. The frequency of the flashes increases with increased traffic.

## 10/100BASE-TX Ethernet interface card LEDs

Figure 7 shows the LEDs on the 10/100BASE-TX Ethernet interface card.

**Figure 7** LEDs on the 10/100BASE-TX Ethernet interface card

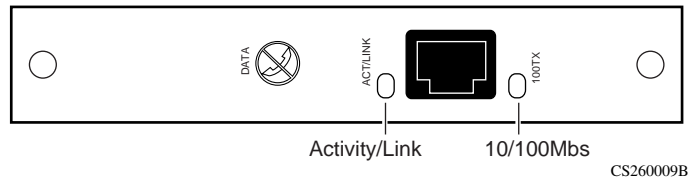


Table 5 describes the LEDs on the 10/100BASE-TX Ethernet interface card.

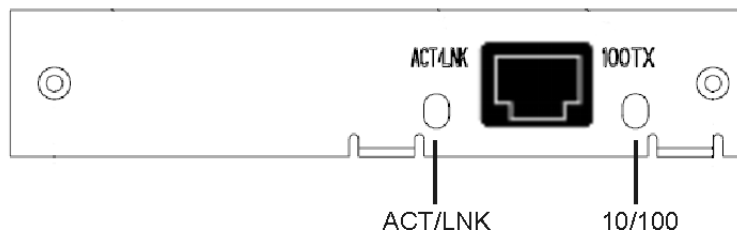
**Table 5** LED indicators on the 10/100BASE-TX Ethernet interface card

LED	Indicator	Description
ACT/LINK	Steady green or Flashing green	The card is sending or receiving network data. The frequency of the flashes increases with increased traffic.
	Off	The card is not sending or receiving data.
10/100TX	Green	The port is operating at 100 Mb/s.
	Off	The port is operating at 10 Mb/s.

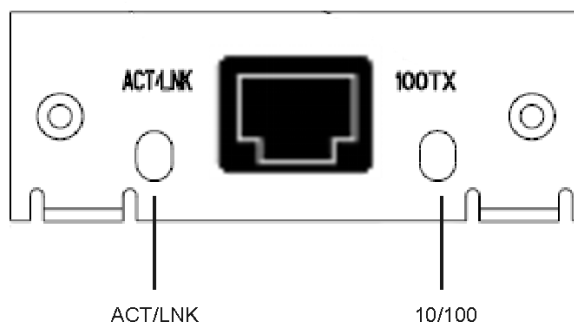
## 1000BASE-T (1000 GT) Ethernet interface card LEDs

The following figures show the LEDs on the 1000BASE-T (1000 GT) Ethernet interface card. Although the card supports 10/100/1000 Mbit/s operation, the VPN Router 1100 only supports 10/100 Mbit/s operation.

**Figure 8** LEDs on the full-height 1000BASE-T (1000 GT) Ethernet interface card



**Figure 9** LEDs on the half-height 1000BASE-T (1000 GT) Ethernet card



The following table describes the LEDs on the 1000BASE-T (1000 GT) Ethernet interface card.

**Table 6** LED indicators on the 1000BASE-T (1000 GT) Ethernet interface card

LED	Indicator	Description
ACT/LINK	Steady green	The port is connected to a valid link partner.
	Flashing green	The card is sending or receiving network data. The frequency of the flashes increases with increased traffic.
	Off	The card is not sending or receiving data.
10/100TX	Green	The port is operating at 100 Mb/s.
	Off	The port is operating at 10 Mb/s.

## 56/64K CSU/DSU WAN interface card LEDs

Figure 10 shows the LEDs on the 56/64K CSU/DSU WAN interface card.

**Figure 10** LEDs on the 56/64K CSU/DSU WAN interface card

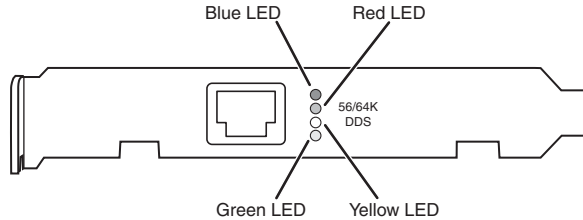


Table 7 describes the LEDs on the 56/64K CSU/DSU WAN interface card.

**Table 7** LED indicators on the 56/64K CSU/DSU WAN interface card

LED	Description
Blue	The blue alarm LED is lit when receiving an upstream failure denoted by an alarm indication signal (AIS).
Red	The red alarm LED is lit when a loss-of-signal (LOS) or out-of-frame (OOF) condition is detected on the receive signal.
Yellow	The yellow alarm LED is lit when the far-end equipment is in the red alarm condition.
Green	The green LED is lit when the condition is normal operation.

## ADSL WAN interface card LEDs

Figure 11 shows the LEDs on the ADSL WAN interface card.

**Figure 11** LEDs on the ADSL WAN interface card

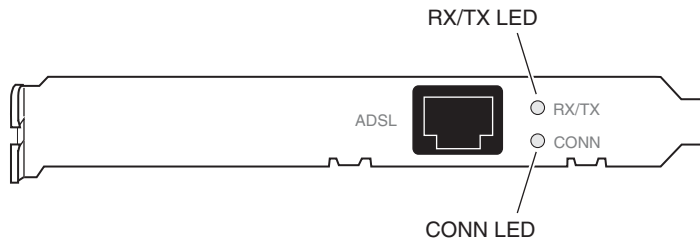


Table 8 describes the LEDs on the ADSL WAN interface card.

**Table 8** LED indicators on the ADSL WAN interface card

CONN LED	Tx/Rx LED	Description
Steady green	Steady green	The ADSL interface card is not initialized; the software driver is not installed.
Off	Off	The ADSL interface card is initialized, but has not established a link with the ADSL network.
Flashing green	Off	The ADSL interface card is attempting to establish a link with the ADSL network.
Steady green	Off	The ADSL interface card has established a link with the ADSL network.
Steady green	Flashing green	The ADSL interface card is sending or receiving network data. (The LED can be dim.)

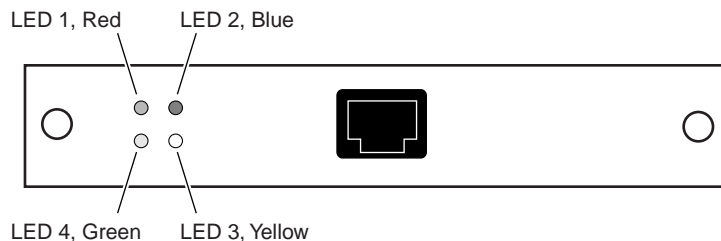
## T1/E1 CSU/DSU WAN interface card LEDs

Figure 12 shows the LEDs on the T1/E1 CSU/DSU WAN interface card.



**Note:** The brackets of the full-height and half-height T1/E1 CSU/DSU cards are almost identical. The LEDs on the two cards indicate the same conditions.

**Figure 12** LEDs on the T1/E1 CSU/DSU WAN interface card



CS160012A



Table 9 describes the LEDs on the T1/E1 CSU/DSU WAN interface card.

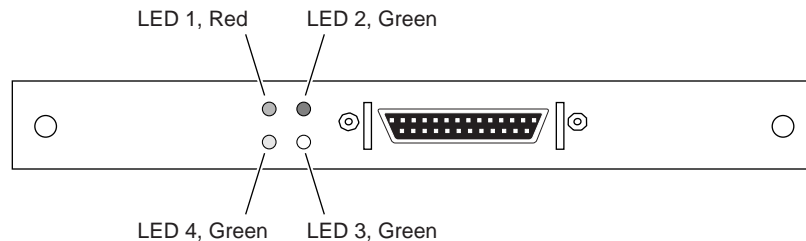
**Table 9** LED indicators on the T1/E1 CSU/DSU WAN interface card

LED	Indicator	Description
LED 1	Red	The red alarm LED is lit when a loss-of-signal (LOS) or out-of-frame (OOF) condition is detected on the receive signal.
LED 2	Blue	The blue alarm LED is lit when receiving an upstream failure denoted by an alarm indication signal (AIS).
LED 3	Yellow	The yellow alarm LED is lit when the far-end equipment is in the red alarm condition.
LED 4	Green	The green LED is lit when the condition is normal operation.

## Single V.35/X.21 WAN interface card LEDs

Figure 13 shows the LEDs on the single V.35/X.21 WAN interface card.

**Figure 13** LEDs on the single V.35/X.21 WAN interface card



CS160011A

Table 10 describes the LEDs on the single V.35/X.21 WAN interface card.

**Table 10** LED indicators on the single V.35/X.21 WAN interface card

LED	Indicator	Description
LED 1	Red	No external transmit clock source is available.
LED 2	Green	The signals CDC and DSR are on between the DSU and the adapter. LED 2 detects receive link status.

**Table 10** LED indicators on the single V.35/X.21 WAN interface card

LED 3	Green	Power to the adapter is on and the onboard microcode is loaded.
LED 4	Green	Cable is detected.

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## Chapter 2

# Installing option cards in the Nortel VPN Router 1100

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The Nortel VPN Router 1100 has two expansion slots for option cards. This chapter provides instructions about how to install and replace LAN, WAN, and serial option cards in the VPN Router 1100.

[Table 11](#) lists the option cards that you can install in the VPN Router 1100..



**Note:** The 1000BASE-T (1000 GT) Ethernet interface card only operates at 10/100 Mbit/s on the VPN Router 1100.

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[Table 11](#) lists the option cards that you can install in the VPN Router 1100.

**Table 11** Supported option cards for the Nortel VPN Router 1100

Option card	Maximum number <sup>1</sup>
10/100BASE-TX Ethernet interface	2
1000BASE-T (1000 GT) Ethernet interface <sup>2</sup>	2
56/64K CSU/DSU WAN interface <sup>3</sup>	2
ADSL WAN interface <sup>4</sup>	2
ISDN BRI S/T or U interface <sup>5</sup>	1
T1/E1 CSU/DSU WAN interface (half-height)	2
T1 CSU/DSU WAN interface (full-height)	1
Single V.35/X.21 WAN interface (half-height) <sup>6</sup>	2
Single V.35/X.21 WAN interface (full-height)	1
V.90 modem interface <sup>7</sup>	1

<sup>1</sup> When only one card of a type is supported, you must install that card in the larger slot, that is, slot 2.

- 2 The VPN Router 1100 must be running Version 5.05.330, 6.05.140 and later, 7.00.062, 7.05.100 and later, or 7.05.300 and later. The VPN Router 1100 supports 10/100 Mbps operation only.
- 3 The VPN Router 1100 must be running Version 5.0 or later.
- 4 The VPN Router 1100 must be running Version 4.90 or later.
- 5 The VPN Router 1100 must be running Version 4.80 or later.
- 6 The VPN Router 1100 must be running Version 4.80 or later.
- 7 The VPN Router 1100 must be running Version 4.80 or later.

To install a new LAN, WAN, or serial option card:

- 1 Use the Web GUI or the command line interface to shut down the gateway.
  - Web GUI: Choose Admin > Shutdown. Select the option to power off the gateway after shutdown.
  - Command line interface: Use the **reload** command to shut down the system. For example, enter **reload power-off disable-logins "Upgrade hardware"** (for the complete syntax of the **reload** command, see *Nortel VPN Router Using the Command Line Interface*).
- 2 Wait for the system to shut down.
- 3 Turn off the VPN Router 1100 power.

The power switch and power outlet are on the rear of the VPN Router 1100.
- 4 Disconnect the power cord from the power outlet and then disconnect the cord from the VPN Router 1100.



**Warning: Risk of electric shock**

Make sure to turn off the VPN Router 1100 and unplug it before you attempt to remove or install an option card.

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- 5 Remove the cables attached to the ports of the VPN Router 1100.
- 6 If there are option cards currently installed, unscrew the two screws on each bracket and remove the bracket.



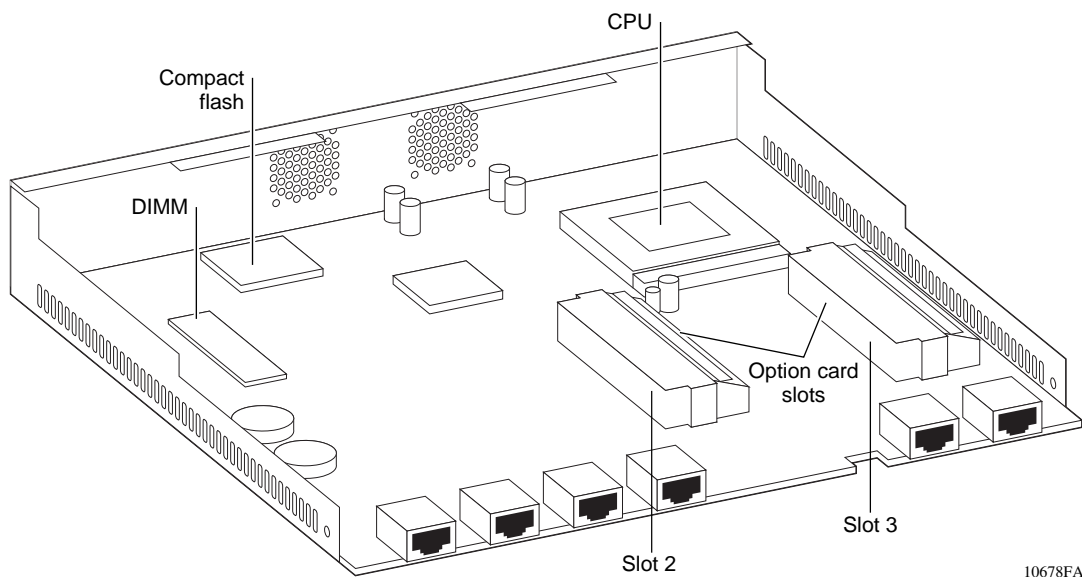
**Caution: Risk of equipment damage**

Unscrew the option card brackets before you remove the cover from the VPN Router 1100, or you will damage the option cards.

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- 7 Remove the four screws on the sides of the VPN Router 1100.
- 8 Slide the chassis cover away from the base.  
The VPN Router 1100 system board is now exposed. [Figure 14 on page 37](#) shows the location of the option card slots on the system board.
- 9 Locate the slot where you plan to install the new or replacement option card ([Table 11 on page 35](#)).

**Figure 14** VPN Router 1100 system board



**Warning: Risk of injury**

Beware of danger if you incorrectly replace the battery. Replace the battery with the same type or an equivalent battery only, as recommended by the manufacturer's instructions. In spite of this warning, which is mandated for regulatory approval, you must not change the battery. If you suspect a dead battery, contact Nortel Customer Support.

- 10 Attach an antistatic wrist strap (not included with the VPN Router 1100 shipment).



**Caution: Risk of equipment damage**

Electrostatic discharge can damage VPN Router 1100 components.

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- 11 Remove the blank card bracket (or the option card that you are replacing) from the slot.



**Caution: Risk of equipment damage**

If you must remove an ADSL option card from slot 3 ([Figure 14 on page 37](#)), lift the free end of the card so that the card is at a slight angle, and then carefully pull it up and out of the slot so that the card clears the connector of the adjacent slot 2. If you damage components on the underside of the ADSL interface card, the card does not work.

---

- 12 Install the new option card.



**Caution: Risk of equipment damage**

To prevent stress damage to components on the underside of the ADSL option card when you install that card in slot 3 ([Figure 14 on page 37](#)), hold the card at a slight angle and insert it into the connector so that the card clears the connector of the adjacent slot 2. If you damage components on the underside of the ADSL interface card, the card does not work.

---

Press the card all the way into the PCI connector on the motherboard.

- 13 Carefully slide the chassis cover onto the base, and secure it with the four screws.
- 14 Attach the bracket of the new option card to the front panel with two screws.
- 15 Connect the cables to the system ports and to the option card ports.
- 16 Plug the power cord into the AC power outlet.
- 17 Plug the external power supply into the port labeled *DC Input* on the back of the VPN Router 1100.

**18** Press the power switch to the *on* position and wait for the gateway to boot.



**Caution:** The boot process can take as long as 3 minutes. Do not turn the power off and on again; recycling the power quickly can cause problems. Always wait at least 5 seconds, after you turn off the power, before you turn it on again.

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## Appendix A

### Technical specifications

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This appendix provides technical specifications for the VPN Router 1010, 1050, and 1100 chassis and for their interfaces.

### Chassis specifications

[Table 12](#) lists the physical specifications for the VPN Router 1010, 1050, and 1100 chassis.

**Table 12** Physical specifications

Chassis	Height	Width	Depth	Weight
VPN Router 1010	1.75 in. (4.44 cm)	8.25 in. (21 cm)	7.5 in. (19 cm)	2.65 lb (1.2 kg)
VPN Router 1050	1.75 in. (4.44 cm)	8.25 in. (21 cm)	7.5 in. (19 cm)	2.75 lb (1.25 kg)
VPN Router 1100	1.75 in. (4.44 cm)	8.25 in. (21 cm)	10.75 in. (27.3 cm)	3.8 lb (1.7 kg)

[Table 13](#) lists the electrical and environmental specifications for the chassis.

**Table 13** Electrical and environmental specifications

Specification	Description
Electrical	
Voltage	100–240 VAC
Current	1.5 A
Frequency	50–60 Hz
Operating environment	
Temperature	32–104°F (0–40°C)
Relative humidity	10–90% noncondensing

## System ports

The VPN Router 1010/1050/1100 system board provides the following interfaces:

- 10/100BASE-TX Ethernet LAN ports
- Serial port

This section provides information about the 10/100BASE-TX Ethernet LAN ports and the serial port on the system board.

### 10/100BASE-TX Ethernet LAN ports

The VPN Router 1010, 1050, and 1100 have two internal LANs built in:

- LAN 0 is the private LAN and also the LAN to use for Web management.
  - The LAN 0 connector on the front of the VPN Router 1010 is an Ethernet MDI configuration and requires a crossover cable (included with your shipment).
  - The LAN 0 connectors on the front of the VPN Router 1050 and 1100 are an Ethernet medium dependent interface crossover (MDI-X) configuration. These ports support the Auto-MDI-X feature, so either straight-through or crossover cables can be used.
- LAN 1 defaults to a public LAN. The software refers to the LAN 1 port as slot 1, interface 1.

The LAN 1 connector on the front of the VPN Router 1010, 1050, and 1100 is an Ethernet MDI configuration and requires an RJ-45 straight-through cable. Depending on whether you use the interface for 10BASE-T or 100BASE-TX operation, select cables for the interfaces as follows:

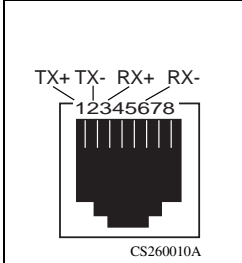
- 100BASE-TX connections require Category 5 twisted-pair wire. The 100BASE-TX specification supports 100 Mb/s transmission over two pairs of Category 5 twisted-pair Ethernet wiring: one pair each for transmit and receive operations.

Nortel recommends a maximum length of 100 meters for the cable segment between a 100BASE-TX repeater and a workstation (due to signal timing requirements). This wiring scheme complies with the EIA 568 wiring standard.

- 10BASE-T connections can use Category 3, 4, or 5 twisted-pair wiring.

Table 14 provides the 10/100BASE-TX Ethernet port pinouts for the system ports on the VPN Router 1100.

**Table 14** 10/100BASE-TX Ethernet port pinouts

	Pin	Description
	1	TX +
	2	TX -
	3	RX +
	6	RX -

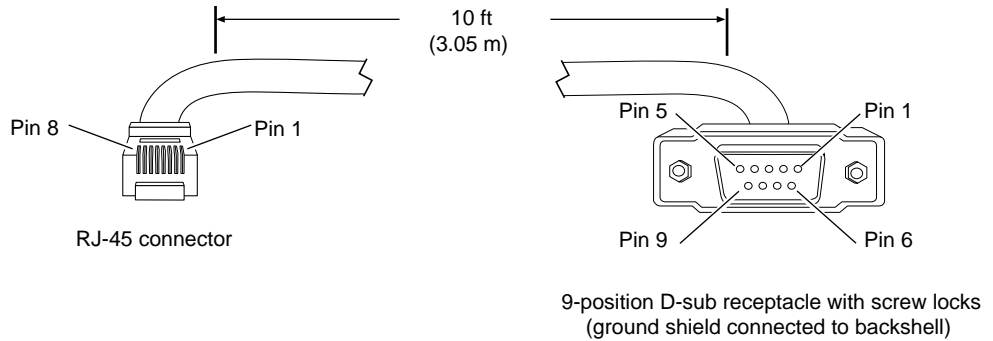
## Serial port

The system board provides a serial port on the front of the VPN Router 1010, 1050, and 1100 to enable out-of-band management of the gateway. The serial cable provided with the VPN Router 1010, 1050, and 1100 is an RJ-45-to-DB9 cable (Figure 15 on page 44). The RJ-45 connector goes into the VPN Router 1010, 1050, or 1100, and the DB9 connector goes into your workstation.



**Caution:** Use this cable to connect a PC or modem to the VPN Router 1010/1050/1100. Do not use this cable to attach a PC or modem to any other VPN Router device.

**Figure 15** Serial cable (RJ-45-to-DB9)



CAB0110A

Table 15 provides the RJ-45-to-DB9 serial interface cable pinouts.

**Table 15** RJ-45 to DB9 pinouts

RJ-45 termination			DB-9 termination
Signal	Pin #	Direction	Pin #
Request to Send	1	--->	8
Data Terminal Ready	2	--->	6
Receive Data	3	<---	3
Not Connected	4	<--->	1
Send Data	5	--->	2
Gnd	6	<--->	5
Data Set Ready	7	<---	4
Clear to Send	8	<---	7
	N/A	N/C	9

## External modem adapter

If you need to connect a VPN Router 1010, 1050, or 1100 to a modem, you can order a null modem adapter from Nortel. With this adapter, you can connect the VPN Router 1010/1050/1100 console cable (shipped with the gateway) to an RS-232-C modem port.



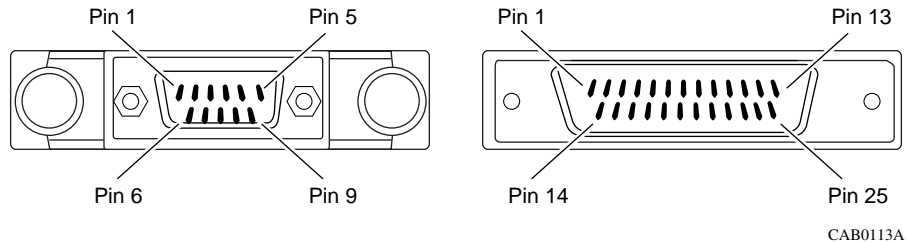
### Caution: Risk of EMI

Use only the serial cable shipped with the VPN Router 1010, 1050, or 1100 and this modem adapter to connect a modem to the VPN Router 1010, 1050, or 1100. Other cables and adapters cannot provide adequate shielding for EMI regulatory compliance.

To ensure correct dial-in and dial-out operation, configure the modem with the settings *verbal result codes* and *display result codes*. For more information, see the modem documentation.

The cable adapter has a DB9 connector that connects to the serial cable and a DB-25 connector that connects to the modem ([Figure 16](#)).

**Figure 16** Serial cable adapter for connection to modem (DB9-to-DB25)



[Table 16](#) provides the null modem adapter cable pinouts.

**Table 16** Null modem adapter cable pinouts

DB9 termination	DB25 termination
Pin # to Pin #	
2	2
3	3

**Table 16** Null modem adapter cable pinouts (continued)

<b>DB9 termination</b>	<b>DB25 termination</b>
<b>Pin # to Pin #</b>	
4	6
5	7
6	20
7	5
8	4

## Hardware option cards

The VPN Router 1100 has two expansion slots that support a combination of the following network interface cards:

- 10/100BASE-TX Ethernet
- 10/100/1000BASE-X Ethernet
- 56/64K CSU/DSU WAN
- ADSL WAN
- ISDN BRI
- T1/E1 CSU/DSU WAN (half-height card)
- T1 CSU/DSU WAN (full-height card)
- V.90 modem
- Single V.35/X.21 WAN

This section provides information about the connectors and cable pinouts for each supported interface card. For instructions about installing an option card, see [Chapter 2, “Installing option cards in the Nortel VPN Router 600 1100,”](#) on page 35.

## 10/100BASE-TX Ethernet interface card

The 10/100BASE-TX Ethernet interface card has a single RJ-45 connector that provides the signals needed to interface to 10BASE-T and 100BASE-TX Ethernet equipment. [Figure 17](#) shows the 10/100BASE-TX Ethernet interface card.

**Figure 17** 10/100BASE-TX Ethernet interface card



CS26009B

For information about the cables that you can connect to this interface and the cable pinouts, see [“10/100BASE-TX Ethernet LAN ports”](#) on page 42.

## 1000BASE-T (1000 GT) Ethernet interface card

The 1000BASE-T (1000 GT) Ethernet card replaces the 10/100BASE-TX Ethernet card (see the previous section). This card provides 10/100/1000 Mbit/s Ethernet services and supports autonegotiation. The card supports the IEEE 802.3ab standard and provides RJ-45/CAT 5 interconnection. It can operate in either full or half duplex mode at 10/100 Mbit/s, and in full duplex mode at 1 Gbit/s. At 1 Gbit/s, autonegotiation must be used.



**Note:** The 1000BASE-T (1000 GT) Ethernet interface card can only operate at 10/100 Mbit/s on the VPN Router 1100.

The VPN Router 1100 only supports 10/100 Mbit/s operation for the 1000BASE-T (1000 GT) Ethernet card. To ensure reliable speed/duplex operation on these platforms, Nortel recommends that both the interface and the attached devices are hard-coded to the appropriate matching 10/100 speed and duplex settings.

For the 1000BASE-T (1000 GT) Ethernet interface card to be recognized by the system, the minimum required VPN Router operating software is:

- 5.05.330

- 6.05.140 and all subsequent versions
- 7.00.062
- 7.05.100 and all subsequent versions (FIPS branch)
- 7.05.300 and all subsequent versions

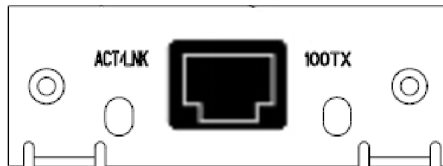
The following figures show the full and half-height Ethernet faceplates for the VPN Router 1100.

**Figure 18** VPN Router 1100 full-height 1000BASE-T (1000 GT)



The full-height model is for installation in slot 2; the half-height model is for installation in slot 3.

**Figure 19** VPN Router 1100 half-height 1000BASE-T (1000 GT)



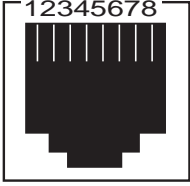
Select cables for this card as follows. Keep in mind that this card is auto-negotiating and uses the highest possible data rate:

- For 100BASE-TX operation, use Category 5 twisted-pair wiring: one pair each for transmit and receive operations. The cable must comply with the EIA 568 wiring specification. Nortel recommends a maximum length of 100 meters for the cable segment.
- For 10BASE-T operation, use Category 3, 4, or 5 twisted-pair wiring.



The following table provides the pinouts for the 1000BASE-T (1000 GT) Ethernet interface card..

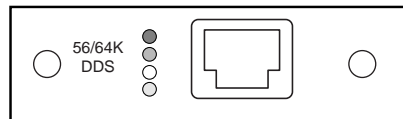
**Table 17** 1000BASE-T (1000 GT) Ethernet pinouts

 CS260010A	Pin	Description
	1	TP0+
	2	TP0-
	3	TP1+
	4	TP2+
	5	TP2-
	6	TP1-
	7	TP3+
	8	TP3-

## 56/64K CSU/DSU WAN interface card

The 56/64K CSU/DSU WAN interface card has a single RJ-48 connector that provides the signals needed to interface to network equipment. [Figure 20](#) shows the 56/64K CSU/DSU WAN interface card.

**Figure 20** 56/64K CSU/DSU WAN interface card



10972EA

The connector on the 56/64K CSU/DSU WAN interface card accommodates an 8-pin RJ-48 modular patch cord. These cables are sold as Category 5, or Ethernet, cables.



**Note:** Nortel does not supply an interface cable with the 56/64K CSU/DSU WAN interface card.

Use cable that is wired in accordance with EIA-568-A wiring style. This wiring style ensures that a twisted pair inside the patch cord carries the transmit signal (pins 1 and 2) and the receive signal (pins 7 and 8). Nortel strongly recommends that you use factory-made patch cords.

You connect the 56/64K CSU/DSU WAN interface card to the service provider network using a straight-through cable or a crossover cable, depending on how the service provider wired its jack.

- For a straight-through connection, you can use a standard Category 5 (Ethernet) straight-through cable.
- For a crossover connection, you cannot use a standard Category 5 crossover cable. Do not interchange the 56/64K CSU/DSU crossover cable and the Ethernet crossover cable.

[Table 18](#) provides the 56/64K CSU/DSU cable pinouts for a crossover connection.

**Table 18** 56/64K CSU/DSU cable pinouts for crossover connection

Nortel termination		Remote termination	
Signal	Pin # to Pin #	Signal	
Transmit tip	1	7	Receive tip
Transmit ring	2	8	Receive ring
not used	3	3	not used
not used	4	4	not used
not used	5	5	not used
not used	6	6	not used
Receive tip	7	1	Transmit tip
Receive ring	8	2	Transmit ring

The cable operates properly if you do not connect pins 3, 4, 5, and 6.



**Caution:** For crossover connections, do not use Ethernet cable. If you use Ethernet cable, the link cannot be established.

Table 19 provides the 56/64K CSU/DSU cable pinouts for a straight-through connection.

**Table 19** 56/64K CSU/DSU cable pinouts for straight-through connection

Nortel termination		Remote termination	
Signal	Pin #	Pin #	Signal
Transmit tip	1	1	Transmit tip
Transmit ring	2	2	Transmit ring
not used	3	3	not used
not used	4	4	not used
not used	5	5	not used
not used	6	6	not used
Receive tip	7	7	Receive tip
Receive ring	8	8	Receive ring

## ADSL WAN interface card

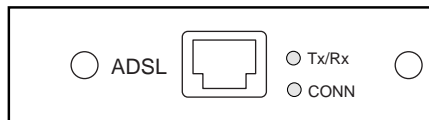
The ADSL Annex A and Annex B WAN interface cards have a single RJ-11 connector that provides the signals needed to interface to the digital subscriber line access multiplexer (DSLAM) and to telephone equipment.

Figure 21 shows the ADSL WAN interface card.



**Note:** The ADSL Annex A and Annex B cards look identical.

**Figure 21** ADSL WAN interface card



10972EA

Included in the accessory box is a 7-foot RJ-11 cable to attach to the DSLAM.

Table 20 provides the ADSL port pinouts.

**Table 20** ADSL cable pinouts

Pin	Function
1	N/C
2	Tip
3	Ring
4	N/C

## ISDN BRI interface card

The ISDN BRI S/T and ISDN BRI U interface cards have a single RJ-45 connector that provides the signals needed to interface to ISDN equipment. (To connect the ISDN BRI S/T interface to the ISDN network, you must attach an external NT-1 device to the RJ-45 connector.)

Figure 22 shows the ISDN BRI S/T interface card.

**Figure 22** ISDN BRI S/T interface card

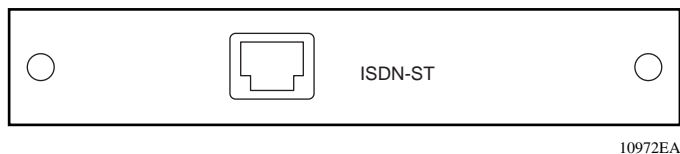
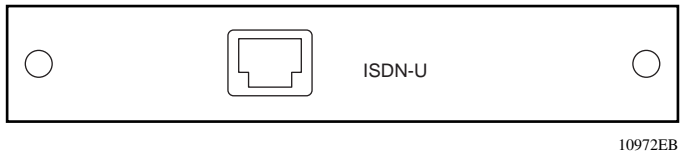


Figure 23 shows the ISDN BRI U interface card.

**Figure 23** ISDN BRI U interface card



The connector on the ISDN BRI S/T and ISDN BRI U interface cards accommodates an 8-pin RJ-45 modular patch cord. These cables are sold as Category 5, or Ethernet, cables.



**Note:** Nortel does not supply a cable with the ISDN BRI interface cards.

Table 21 provides the ISDN BRI S/T cable pinouts.

**Table 21** ISDN BRI S/T cable pinouts

Pin	Function
1	N/C
2	N/C
3	Receive +
4	Transmit +
5	Transmit -
6	Receive -
7	N/C
8	N/C

Table 22 provides the ISDN BRI U cable pinouts.

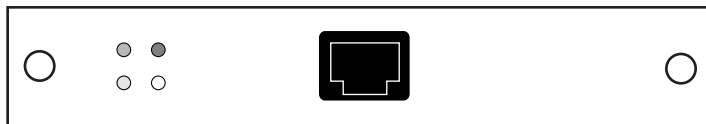
**Table 22** ISDN BRI U cable pinouts

Pin	Function
1	N/C
2	N/C
3	N/C
4	U interface network connection (tip)
5	U interface network connection (ring)
6	N/C
7	N/C
8	N/C

## T1/E1 CSU/DSU WAN interface card

The T1/E1 CSU/DSU WAN interface card has a single connector that provides the signals needed to interface to T1 or E1 equipment. [Figure 24](#) shows the T1/E1 CSU/DSU WAN interface card. This interface card ships as a half-height card and as a full-height card.

**Figure 24** T1/E1 CSU/DSU WAN interface card



CS160012A



**Note:** The brackets of the half-height and full-height cards are almost identical. For E1 service, you must install the half-height version of the T1/E1 CSU/DSU WAN interface card.

The connector on the T1/E1 CSU/DSU WAN interface card accommodates an 8-pin RJ-48 modular patch cord. These cables are sold as Category 5, or Ethernet, cables. Nortel does not supply an interface cable with the T1/E1 CSU/DSU WAN interface card.

Use cable that is wired in accordance with EIA-568-A wiring style. This wiring style ensures that a twisted pair inside the patch cord carries the transmit signal (pins 4 and 5) and the receive signal (pins 1 and 2). Nortel strongly recommends that you use factory-made patch cords.

You connect the T1/E1 CSU/DSU WAN interface card to the service provider network using a straight-through cable or a crossover cable, depending on how the service provider wired its jack.

- For a straight-through connection, you can use a standard Category 5 (Ethernet) straight-through cable.
- For a crossover connection, you cannot use a standard Category 5 crossover cable. Do not interchange the T1/E1 CSU/DSU crossover cable and the Ethernet crossover cable.

Table 23 provides the T1/E1 CSU/DSU cable pinouts for a crossover connection.

**Table 23** T1/E1 CSU/DSU cable pinouts for crossover connection

Standard-wired end 8-pin male	Signal name	Pair number and conductor	Special-wired end 8-pin male
1	RXDA<-TXDA	wht/org pair 2A	5
2	RXDB<-TXDB	orange pair 2B	4
3	not used	wht/grn pair 3A	3
4	TXDB->RXDB	blue pair 1B	2
5	TXDA->RXDA	wht/blu pair 1A	1
6	not used	green pair 3B	6
7	not used	wht/brn pair 4A	7
8	not used	brown pair 4B	8

The cable operates properly if you do not connect pins 3, 6, 7, and 8.



**Caution:** For crossover connections, do not use Ethernet cable. If you use Ethernet cable the T1/E1 CSU/DSU does not work to specifications. This condition can corrupt the data.

Table 24 provides the T1/E1 CSU/DSU cable pinouts for a straight-through connection.

**Table 24** T1/E1 CSU/DSU cable pinouts for straight-through connection

Nortel termination		Remote termination	
Signal	Pin # to Pin #	Signal	
Receive A (RXDA)	1	1	Receive A (RXDA)
Receive B (RXDB)	2	2	Receive B (RXDB)
not used	3	3	not used
Transmit B (TXDB)	4	4	Transmit B (TXDB)
Transmit A (TXDA)	5	5	Transmit A (TXDA)
not used	6	6	not used

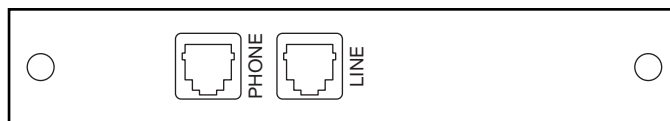
**Table 24** T1/E1 CSU/DSU cable pinouts for straight-through connection

Nortel termination		Remote termination	
not used	7	7	not used
not used	8	8	not used

## V.90 modem interface card

The V.90 modem interface card has two RJ-11 connectors that provide the signals needed to interface to an incoming telephone line and to telephone equipment.

[Figure 25](#) shows the V.90 modem interface card.

**Figure 25** V.90 modem interface card

10973EA

Included in the accessory box is a 7-foot RJ-11 cable to attach to a telephone jack.

[Table 25](#) provides the V.90 modem port cable pinouts.

**Table 25** V.90 modem cable pinouts

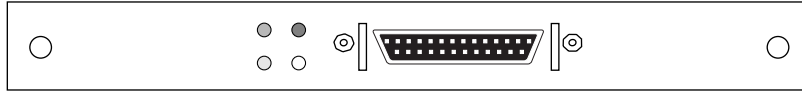
Pin	Function
1	N/C
2	Tip
3	Ring
4	N/C



## Single V.35/X.21 WAN interface card

The single V.35/X.21 WAN interface card has a single DB28S connector that provides the signals needed to interface to V.35 and X.21 equipment. [Figure 26](#) shows the single V.35/X.21 WAN interface card.

**Figure 26** Single V.35/X.21 WAN interface card



CSI60011A

You need a DSU/CSU (digital service unit/channel service unit) between the WAN connection and the gateway. You can order a V.35 or X.21 cable from Nortel to attach to the connector. This cable enables the WAN adapter to function as DTE (data terminal equipment).

[Table 26](#) provides the V.35 cable pinouts. [Table 27 on page 59](#) provides the X.21 cable pinouts. (The pair suffix A or B refers to an individual wire within a twisted pair.)

**Table 26** V.35 cable pinouts

Standard-wired end 28-pin male	Signal name	Pair number and conductor	Special-wired end 34-pin male	Notes
2	TXDA	pair 1A	P	
14	TXDB	pair 1B	S	
3	RXDA	pair 2A	R	
16	RXDB	pair 2B	T	
15	TXCA	pair 3A	Y	
12	TXCB	pair 3B	AA	
17	RXCA	pair 4A	V	
9	RXCB	pair 4B	X	
24	SCTEA	pair 5A	U	
11	SCTEB	pair 5B	W	
4	RTSA	pair 6A	C	
19	RTSB	pair 6B	no conn	Note 1

**Table 26** V.35 cable pinouts (continued)

Standard-wired end 28-pin male	Signal name	Pair number and conductor	Special-wired end 34-pin male	Notes
5	CTSA	pair 7A	D	
13	CTSB	pair 7B	no conn	Note 1
6	DSRA	pair 8A	E	
22	DSRB	pair 8B	J	
20	DTRA	pair 9A	H	
23	DTRB	pair 9B	no conn	Note 1
8	DCDA	pair 10A	F	
10	DCDB	pair 10B	no conn	Note 1
18	LL	pair 11A	L	
21	RL	pair 11B	N	
25	TM	pair 12A	NN	
26	M0<-SIGNAL GROUND	pair 12B	B	Note 2
27	M1<-SIGNAL GROUND	pair 13A	B	Note 2
28	M2	pair 13B	no conn	Note 1
1	SHIELD	pair 14A	A	Notes 3,4
7	SIGNAL GROUND	pair 14B	B	Notes 2,4

The following notes apply to the single V.35 DTE cable:

1. The term "no conn" means the wire is not connected to a pin in the 34-pin connector.
2. Wires 12B, 13A, and 14B connect to pin B in the 34-pin connector.
3. At each end, the cable shield and connector shell must connect respectively to pin A of the 34-pin connector and pin 1 of the standard 28-pin connector.
4. Do not connect Shield to Signal Ground because these are separate signals.

Table 27 provides the X.21 cable pinouts. (The pair suffix A or B refers to an individual wire within a twisted pair.)

**Table 27** X.21 cable pinouts

Standard-wired end 28-pin male	Signal name	Pair number and conductor	Standard-wired end 15-pin male	Notes
2	TXDA	pair 1A	2	
14	TXDB	pair 1B	9	
3	RXDA	pair 2A	4	
16	RXDB	pair 2B	11	
15	TXCA	pair 3A	6	
12	TXCB	pair 3B	13	
17	RXCA	pair 4A	pair 5A	Note 1
9	RXCB	pair 4B	pair 5B	Note 1
24	SCTEA	pair 5A	pair 4A	Note 1
11	SCTEB	pair 5B	pair 4B	Note 1
4	RTSA	pair 6A	3	
19	RTSB	pair 6B	10	
5	CTSA	pair 7A	5	
13	CTSB	pair 7B	12	
6	DSRA	pair 8A	no conn	Note 2
22	DSRB	pair 8B	no conn	Note 2
20	DTRA	pair 9A	no conn	Note 2
23	DTRB	pair 9B	no conn	Note 2
8	DCDA	pair 10A	no conn	Note 2
10	DCDB	pair 10B	no conn	Note 2
18	LL	pair 11A	no conn	Note 2
21	RL	pair 11B	no conn	Note 2
25	TM	pair 12A	no conn	Note 2
26	M0	pair 12B	no conn	Note 2
27	M1	pair 13A	no conn	Note 2
28	M2<-SIGNAL GROUND	pair 13B	8	Note 3

**Table 27** X.21 cable pinouts (continued)

<b>Standard-wired end 28-pin male</b>	<b>Signal name</b>	<b>Pair number and conductor</b>	<b>Standard-wired end 15-pin male</b>	<b>Notes</b>
1	SHIELD	pair 14A	1	Note 4,5
7	SIGNAL GROUND	pair 14B	8	Note 3,5

The following notes apply to the single X.21 cable:

1. Wires of pair 4 connect to wires of pair 5, but not to any pins in the DA-15.
2. The term "no conn" means the wire is not connected to a pin in the 15-pin connector.
3. Wires 13B and 14B connect to pin 8 in the 15-pin connector.
4. At each end, the cable shield and connector shell must connect to pin 1 of the connector.
5. Do not interconnect Shield to Signal Ground because these are separate signals.

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