

NOKIA

IP700 Series Installation Guide

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1

About the IP700 Series Installation Guide

This preface provides the following information:

- About Nokia IP700 Series network security platforms
- IP700 Series documentation
- Conventions

1.1 About Nokia IP700 Series network security platforms

The Nokia IP700 Series network security platforms (NSP) appliances, also referred to as the IP700 Series appliances, add service-provider-class reliability to the proven Nokia platform. The combination of world-class routing, market-leading firewall software, high availability, and the fastest packet-forwarding rate in a single package in the industry sets a new standard for firewall and virtual private network (VPN) solutions.

Ideally suited to provide secure Internet connectivity, the IP710 and IP740 combine high-performance, high-availability IP routing with a complete implementation of the Check Point VPN-1/FireWall-1® enterprise security suite. Various network interface cards give you flexibility in making your network connections. For high availability, IP700 Series appliances allow you to *hot swap* network interface cards, power supplies, and fan trays. You can also *warm swap* hard-disk drive units.

You can manage IP700 Series appliances by using Voyager, a Nokia web-based management application, and Nokia Horizon Manager software.

With Voyager, you can manage, monitor, and configure IP700 Series appliances from any authorized location within the network by using a standard web browser. Voyager is preinstalled on the IP700 Series appliance. For information about accessing Voyager and the related reference materials, see *Using Voyager to Configure the Network Interfaces*.

The IP700 Series platform is fully supported by Nokia Horizon Manager for secure image management, including:

- OS and application upgrades and licensing
- configuration-file backup and restore
- application installation

Nokia Horizon Manager allows you to manage all your NSPs and perform image management actions on multiple platforms simultaneously.

1.2 IP700 Series documentation

The Nokia documentation set consists of *Release Notes* for the Nokia software release you are running, the *IP700 Series Installation Guide* (this document), a Voyager inline help feature, and the *Voyager Reference Guide* (online).

You can access inline help when you use Voyager. Inline help is the context-sensitive information source for Voyager.

To enable inline help for a specific subject, click the **H** button next to the subject.

Access the Voyager Reference Guide for tasks, examples, and more information by pressing the **Doc** button.

You can order Check Point documentation from Nokia or download it from the support site at <https://support.nokia.com/>.

1.3 Conventions

This section describes the conventions used in the text, examples, and instructions.

Meaning	Example
<ul style="list-style-type: none"> • Link, data entry location, menu name, option name, web page, or web-page section name • An important word or phrase, or a subtitle • Reference to a section or a document 	<ul style="list-style-type: none"> • Click the <i>Network Access and Services</i> link in the <i>Security and Access Configuration</i> section. <i>https://support.nokia.com</i> • Turn <i>Internal Clock</i> off. • For more information about the LEDs, see <i>Monitoring and replacing a power supply</i>.
<ul style="list-style-type: none"> • Button to click with your mouse 	<ul style="list-style-type: none"> • Click Config.
<ul style="list-style-type: none"> • File names, directories • Parameters, variables or commands • Screen text presented by the computer rather than text you enter yourself 	<ul style="list-style-type: none"> • <code>/image/current/kernel.</code> • Use the <code>setenv</code> command to set a particular variable. <code>bootwait</code> • The following prompt appears: <code>BOOTMGR[0] ></code>
<ul style="list-style-type: none"> • Literal text that you enter on the screen 	<ul style="list-style-type: none"> • Enter the following: <code>rm /config/active</code>



Warning

Shows critical information that, if ignored, could cause injuries to you or to other people, damage to your equipment, or a potential security breach.



Caution

Addresses actions that cause damage to equipment, compromise the system, or would cause data loss.

Note

Calls special attention to important information.

2 Overview of the IP700 Series appliance

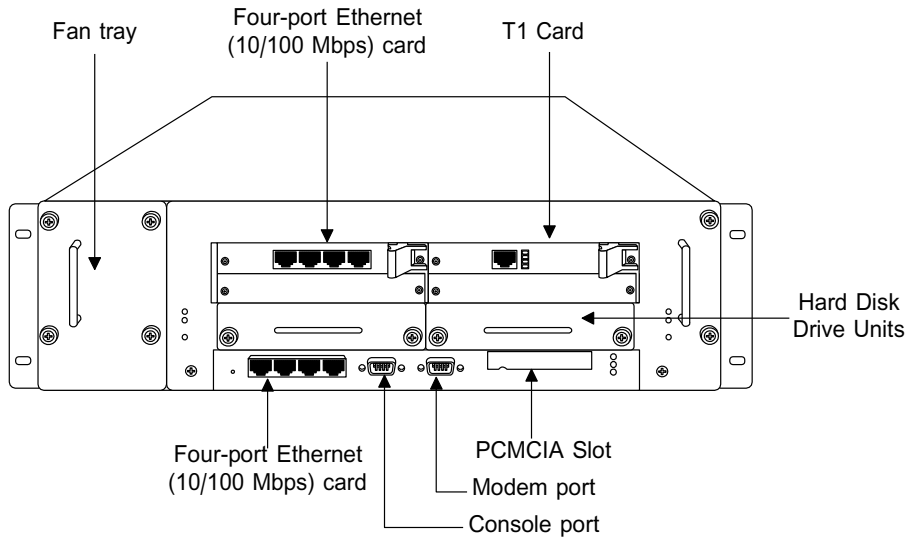
2.1 About the IP700 Series platform

The Nokia IP700 Series platform combines the power of IPSO software with your choice of applications. Each IP700 Series appliance consists of components in three primary categories:

- Nokia hardware
- Selected network interface cards
- Designated software applications

The following diagram shows component locations in a sample configuration.

Front View



Rear View

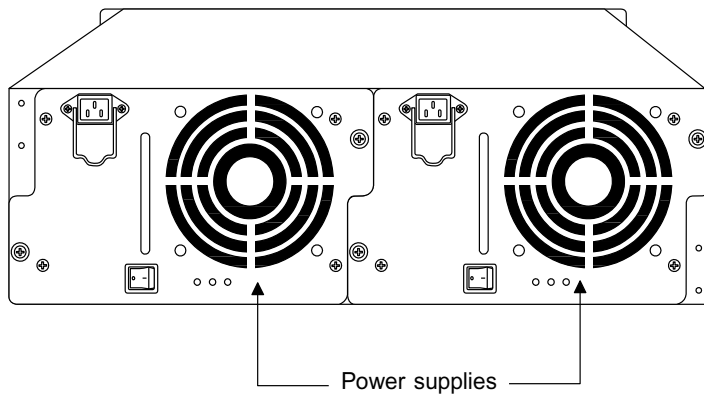


Figure 1. IP700 Series component locations, a sample configuration

The IP700 Series appliance can support two power supplies. In addition, the IP700 Series appliance can house two disk drive units. With two disk drive units installed, you can implement disk mirroring. For information about disk mirroring, see *Disk Mirroring*.

The IP700 Series appliance includes four compact PCI (cPCI) expansion slots and two disk drive slots. The disk drive units occupy one or two disk drive slots. The four expansion slots support the cPCI network interface cards listed in the following table.

Table 1. Supported network interface cards

Interface	Serial Card	LAN Card	WAN Card	For more information, see section:
Four-port Ethernet (10 Mbps or 100 Mbps)		X		<i>Connecting to Ethernet Devices</i>
Dual-port V.35 or X.21	X			<i>Connecting to V.35 or X.21 devices</i>
Single-port E1 with built-in channel service unit/data service unit (CSU/DSU)	X			<i>Connecting to E1 (built-in CSU/DSU) devices</i>
Single-port T1 with built-in channel service unit/data service unit (CSU/DSU)	X			<i>Connecting to T1 (built-in CSU/DSU) devices</i>
Single-port mode (ATM)			X	<i>Connecting to ATM devices</i>
Single-port Gigabit Ethernet		X		<i>Connecting to Gigabit Ethernet devices</i>
Dual-port Gigabit Ethernet		X		<i>Connecting to Gigabit Ethernet devices</i>

The IP700 Series appliance also includes a PCMCIA slot that supports PCMCIA modems.

Note

Nokia products support only Nokia cards. The Nokia Customer Support Department supports Nokia cards purchased either from Nokia Inc. or approved resellers. Contact Nokia for sales or reseller information.

2.2 Site requirements

Before you install the IP700 Series appliance, ensure that your computer room or wiring closet conforms to the environmental specifications listed in Appendix A, *Technical specifications for the IP700 Series appliance*.



Warning

Using controls, making adjustments in performance, or following procedures that are not described in this document can result in hazardous radiation exposure.



Warning

An explosion can occur if the battery is incorrectly placed. Replace only with the same or equivalent type battery recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.



Warning

To reduce the risk of fire, electric shock, and injury when you use telephone equipment, follow basic safety precautions. Do not use the product near water.



Caution

Do not place objects over the ventilation holes on the IP700 Series appliance. The components might overheat and become damaged.

**Caution**

For IP700 Series appliances intended for shipment outside of the United States, the cord might be optional. If a cord is not provided, use a power cord rated at 6A, 250V, maximum 15 feet long, made of HAR cordage and IEC fittings approved by the country of end use.

3

Installing the IP700 Series appliance

This chapter describes how to install the Nokia IP700 Series appliance, configure the system, connect it to your network, and monitor it. See these topics for instructions to perform the tasks necessary for installing or maintaining your appliance:

- Using DHCP to configure the appliance
- Using the console connection to configure the appliance
- Connecting power and turning the power on
- Connecting to the console
- Monitoring the appliance



Caution

Protect your IP700 Series appliance and other electronic equipment from static discharge by making sure you are properly grounded before you touch any electronic components.

IPSO version requirements

To run an IP710 appliance, you must use IPSO v3.5 or higher. To run an IP740 appliance, you must use IPSO v3.4 or higher.

3.1 Using DHCP to configure the appliance

You can use the built-in dynamic host configuration protocol (DHCP) client to configure the system instead of using a console connection. This feature allows a properly configured DHCP server to provide your IP700 Series appliance with the host name, IP address, and default route. You can then use Voyager to reconfigure any of these settings. Once you do so, Voyager preserves the modified settings.

Note

DHCP is not used if configuration information is already on the appliance.

The DHCP server automatically sets the administrative password of the IP700 Series appliance to `password`. To use DHCP to configure your system, follow the instructions provided in the following topics:

- Configure the DHCP server
- Run the DHCP client on the IP700 Series appliance

Configure the DHCP server

Before the DHCP server can provide an IP address to the IP700 Series appliance, you must first map the server to the appliance by providing the following:

- A host name you choose for the IP700 Series appliance
- The IP700 Series appliance serial number or the static MAC address of the IP700 Series appliance NIC the DHCP server communicates with.

The minimum IP address lease required is one year.

Note

Either the DHCP server must be on the same network as your Nokia IP700 Series appliance, or DHCP/BOOTP relay must be configured on the intermediate routers.

Following is an example of relevant DHCP configuration information:

```
ddns-update-style ad-hoc;
subnet 10.1.1.0 netmask 255.255.255.0 {

# default gateway
option routers 10.1.1.1;
option subnet-mask
255.255.255.0;

option time-offset -8;
option domain-name-servers
24.5.207.179;

range dynamic-bootp 10.1.1.20 10.1.1.100;
default-lease-time -1;
max-lease-time -1;

host IP710fixed {
# (optional) MAC address of the requesting
NIC
hardware ethernet 00:a0:8e:20:00:61;

# serial number of the box
option dhcp-client-identifier "123456";

fixed-address 10.1.1.11;
option host-name "IP710";
```

Run the DHCP client on the IP700 Series appliance

Note

Do not perform this procedure unless you have configured an appropriate DHCP server with configuration information for your IP700 Series appliance.

1. Connect a NIC in your IP700 Series appliance to your network.
If you specify a MAC address in the DHCP configuration information, you must connect the NIC that has that address.
2. Turn the system on.
The DHCP client program in the IP700 Series appliance is started automatically and the DHCP server provides the appropriate configuration information. (This can require five to ten minutes.)
3. From a computer on the same network, ping the IP address that you configured the DHCP server to provide to the IP700 Series appliance.
When you receive replies from ping, you can use Nokia Network Voyager to connect to the system.

4. Connect to the IP700 Series appliance using Voyager and modify the system configuration, as appropriate. To connect using Voyager, enter the IP address or host name of the system in your browser address field.

Using the console connection to configure the appliance

If you use a console connection (a direct serial connection to the console port) to configure your IP700 Series appliance, you are prompted for the appropriate configuration settings the first time you turn it on. The first prompt asks you to supply a host name. If you wait more than approximately 30 seconds before you type anything in response to the host name prompt, the DHCP client program starts automatically, and the system might be provided a host name and IP address that is unknown to you. (This could happen if there is a DHCP server on your network that is configured to supply configuration information to any system that requests it.)

In this situation, you will not be able to connect to the IP700 Series appliance over the network (because you do not know the appliance IP address or host name). To resolve the problem, follow these steps:

1. Establish a console connection to the system.
2. Enter the following:
rm /config/active
or
mv /config/active /config/active.old
3. Reboot the IP700 Series appliance.
4. Respond to the configuration prompts in a timely manner.

3.2 Connecting power and turning the power on

Note

The IP700 Series appliance power supplies automatically detect the input voltage (115VAC [90 to 132] or 220VAC [180 to 264]) and configure themselves appropriately.

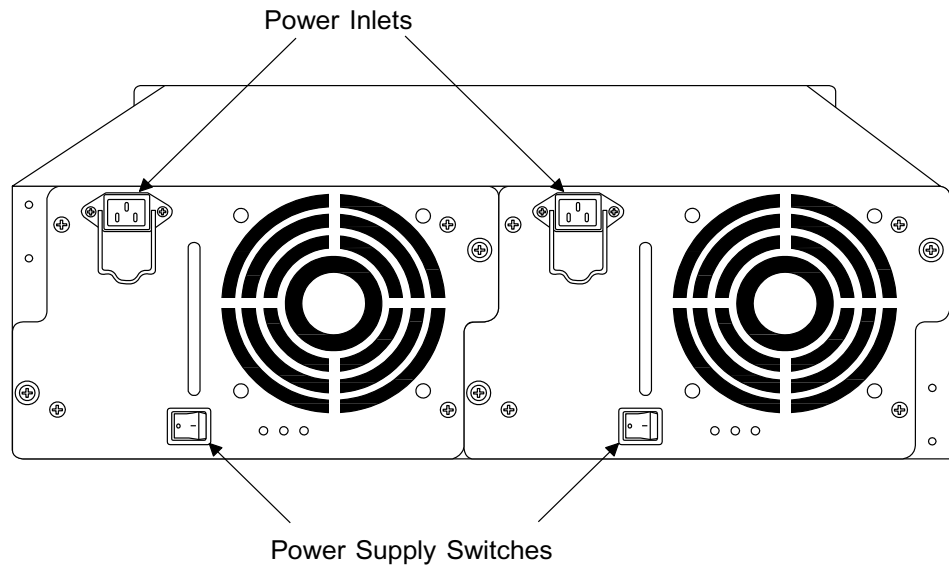


Figure 2. IP700 Series back panel view

Perform the following steps for each power supply:

1. Connect the power cord securely into the power socket on the back of the IP700 Series appliance.
Plug the other end of the cord into a three-wire grounded power strip or wall outlet. If you are using two power supplies, a typical method of connecting them is to plug one into an uninterruptable power supply and the other into a wall outlet. Either power supply can safely power the IP700 Series appliance.
2. Press the switch on the power supply to activate the IP700 Series appliance.
The power supply fans are on when the power supply switch is turned on. Verify that the power supply fans are running after you press the switch.
You can check the LEDs on the back of each power supply to ensure that they are both operating correctly. Most importantly, only the left LED (Power OK) should be illuminated on each power supply. For more information about the LEDs, see *Monitoring and replacing a power supply*.
3. If the power supply fans are not running, check the power supply cord to make sure it is properly connected. If the fans are still not running after this check, contact technical support.

3.3 Connecting to the console

The IP700 Series appliance requires a serial console connection for initial configuration and occasional maintenance (cable included). The console port on the IP700 Series appliance provides the following:

- RS-232 data terminal equipment (DTE) interface (cable included)
- 8 data bits
- No parity
- 1 stop bit
- 9600 bps

Once you initialize the system, the console connection is no longer required.

Note

If you used DHCP to configure the system, you can skip these instructions.

To connect to the console, follow these steps:

1. Select a console from the following list:
 - Any standard VT100-compatible terminal
 - A DOS or Windows computer or laptop running a terminal emulation program
 - A UNIX workstation
 2. Connect a null-modem cable (console cable) to the local console port on the front panel of the IP700 Series appliance.
-

Note

Use the left port; the right port is an auxiliary modem port.

Note

If you connect the console port to a data communications equipment (DCE) device, use a straight-through cable.

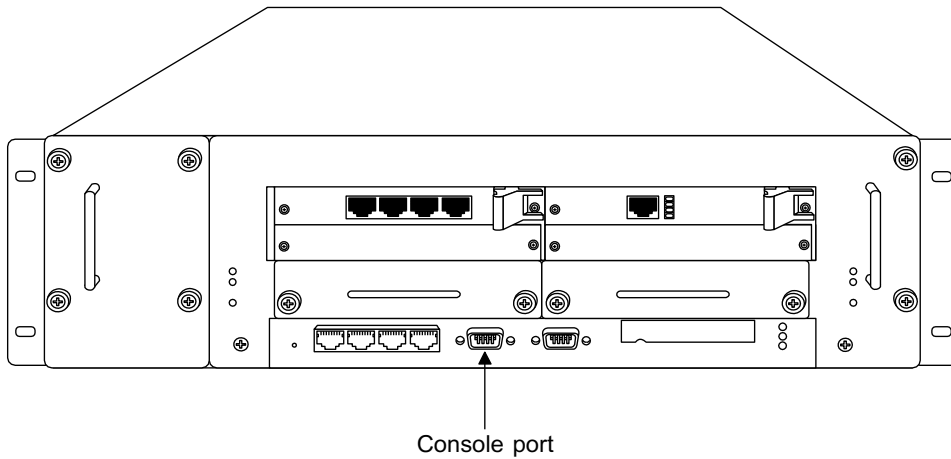


Figure 3. Location of the console port in IP700 Series

The following figure provides pin assignment information for console and modem-port connections.

Pin#	Assignment	Input/Output
1	DCD	Input
2	RXD	Input
3	TXD	Output
4	DTR	Output
5	GND	
6	DSR	Input
7	RTS	Output
8	CTS	Input
9	DTR	Output

3. Connect the other end of the cable to the VT100 console, computer, or laptop running a terminal emulation program.

4. Press **Return**. The following prompt appears:

```
BOOTMGR[ 0] >
```

The prompt remains on the screen for about five seconds.

Note

See Chapter *Using the boot manager* for information about the boot manager.

5. After some miscellaneous output appears, the following prompt appears:

```
Hostname?
```

Do not type anything at the prompt yet. Chapter *Configuring and monitoring the IP700 Series appliance* contains software configuration instructions.

Note

If the hostname message does not appear on the console, check the console port and console display connections to ensure that the serial cable is completely plugged in at both ends.

3.4 Monitoring the appliance

You can monitor the IP700 Series appliance and many of the installed components by checking their various status LEDs. The primary status LEDs are located on the front panel of the appliance, as shown in the following figure.

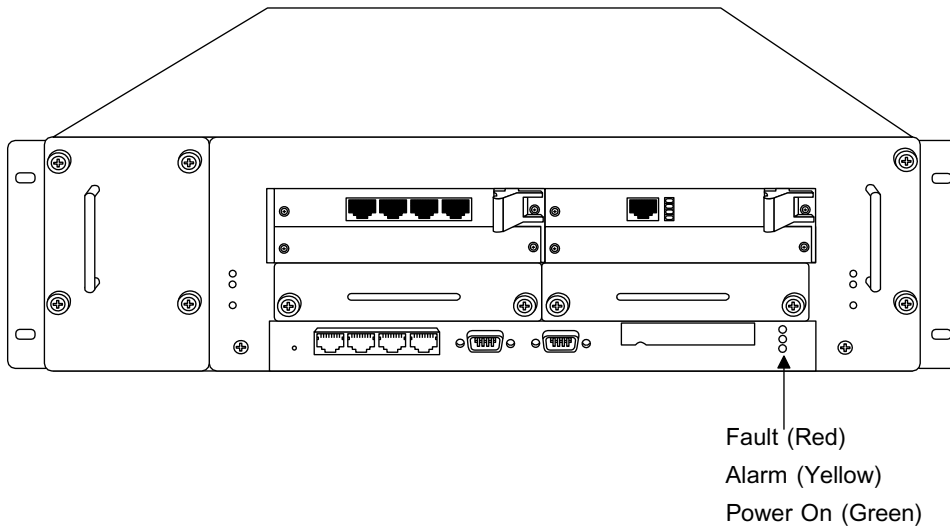


Figure 4. Location of the appliance status LEDs in IP700 Series

You can find the secondary status LEDs in the locations listed in the following table. To find information about these status LEDs, refer to the sections shown in the table.

Table 2. Locations of the secondary status LEDs

Ethernet cards	See <i>Connecting to Ethernet devices</i> .
E1 cards	See <i>Connecting to E1 (built-in CSU/DSU) devices</i> .
T1 cards	See <i>Connecting to T1 (built-in CSU/DSU) devices</i> .
ATM cards	See <i>Connecting to ATM devices</i> .
Gigabit Ethernet cards	See <i>Connecting to Gigabit Ethernet devices</i> .
Hard-disk drive unit	See <i>Monitoring and replacing a hard-disk drive</i> .
Power supplies	See <i>Monitoring and replacing a power supply</i> .

4

Installing, monitoring, and replacing components

Your IP700 Series appliance might come with its network interface cards (NICs) preinstalled. However, if you need to add or replace a NIC, this chapter provides instructions on how to do so, including tasks related to installing, monitoring, and replacing components associated with your IP700 Series appliance:

- Network interface card preinstallation considerations
- Installing a new network interface card
- Monitoring network interface cards
- Removing a network interface card
- Replacing a network interface card
- Installing a PCMCIA modem
- Monitoring and replacing a hard-disk drive unit
- Replacing the fan tray
- Monitoring and replacing a power supply
- Upgrading the memory



Caution

Protect your IP700 Series appliance and other electronic equipment from static discharge by making sure you are properly grounded before touching any electronic components.



Caution

When you are handling a card, take care not to damage the EMI shield on the top edge of the face plate.

4.1 Network interface card preinstallation considerations

The IP700 Series platform connects to installed network interface cards through two cPCI busses (bus A and bus B). As the following figure shows, slots 1 and 2 are connected to bus A, and slots 3 and 4 are connected to bus B.

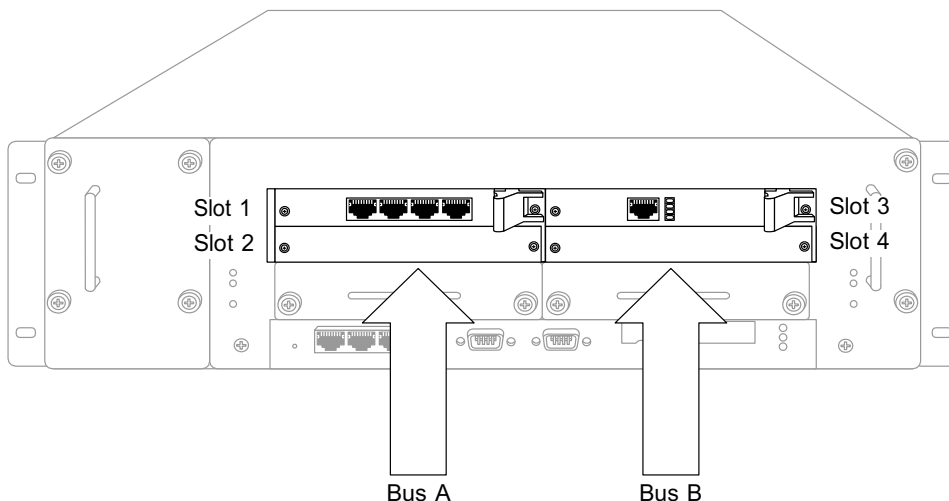


Figure 5. Locations of network interface card buses in IP700 Series

In the IP740, each cPCI bus is independently capable of running at 66 MHz, but it can run at 33 MHz under certain circumstances. Accordingly, you can use any compatible card in any slot, but certain configurations might not provide optimum performance.

In the IP710, each cPCI bus runs only at 33 MHz.

This section provides answers to the following questions, which should help you obtain the best performance from your cards:

- Under what circumstances do the cPCI busses change speed?
- How do I determine the maximum running speed of my cards?
- How do I configure my IP700 Series appliance for optimum performance?

Circumstances under which the cPCI busses change speed in the IP740

The bus speed is determined at boot time. Cards that run at 66 MHz can also run at 33 MHz; the current bus speed determines the card speed. Until you reboot the appliance, the bus speed is set to the speed of the slowest card connected to the bus.

For example, if the bus is running at 66 MHz and you insert a 33-MHz card, the bus continues running at 66 MHz, and the 33-MHz card stays offline (although it is visible using Voyager). If you hot-swap the 66-MHz card, it continues running at 66 MHz. When you reboot the appliance, both the 66-MHz card and the 33-MHz card run at 33 MHz, because the bus detected the 33-MHz card.

Operating speeds of network interface cards used with the IP700 Series platforms

The following 66-MHz and 33-MHz cards are available from Nokia.

Table 3. Operating speeds of NICs used with IP700 Series platforms

Network interface card	Operating speed of IP710	Operating speed of IP740
10/100 Mbps Ethernet	33 MHz	66 MHz (or 33 MHz)
Gigabit Ethernet	33 MHz	66 MHz (or 33 MHz)
V.35	33 MHz	33 MHz
X.21	33 MHz	33 MHz
E1	33 MHz	33 MHz
T1	33 MHz	33 MHz
ATM	33 MHz	33 MHz

Configuration guidelines for the IP740

To maximize the performance of your system, observe the following guidelines.

Load balancing considerations

When you configure an IP740 appliance with only 66-MHz cards installed, keep both busses balanced by distributing the card-speed requirements across both busses.

Balancing the busses is especially important if you are installing more than one Gigabit Ethernet card. For example, if you install the first Gigabit Ethernet card in slot 1, then your second card should go in slot 3, your third in slot 2, and so on. However, if either of your busses is running at 33 MHz, try to keep all Gigabit Ethernet cards on the faster bus to attain optimum performance from those cards.

Preferred slot assignments for 33-MHz cards

If you install a 33-MHz card in one of the IP740 appliance slots, that bus runs at 33 MHz. Therefore, if possible, confine your 33-MHz cards to one bus. As a result, the second bus continues to run at 66 MHz.

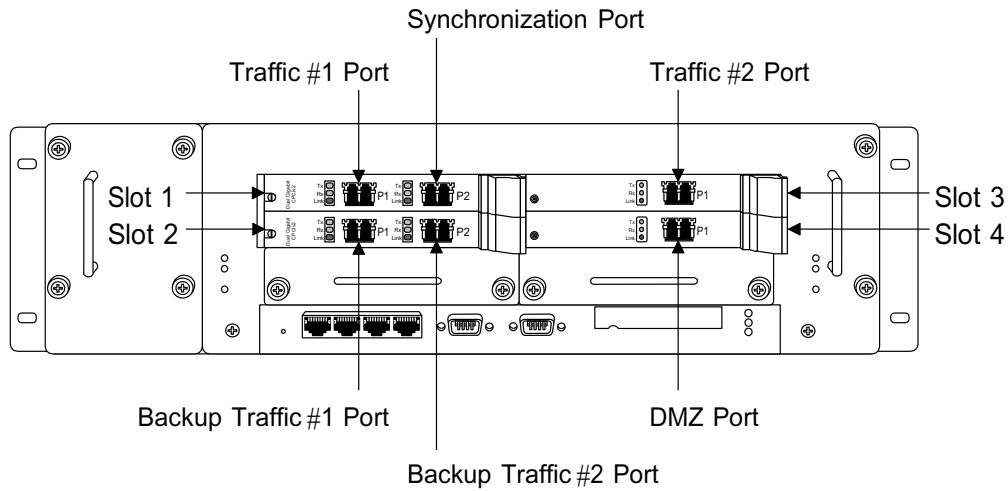
If you install more than two 33-MHz cards, both busses run at 33 MHz. Therefore, you can choose any slot for those cards without affecting the two bus speeds.

Setting up Gigabit Ethernet NICs for high availability with a DMZ

You can use two IP700 Series appliances with six available Gigabit Ethernet ports each (for a total of twelve ports) to provide a high-availability firewall with a DMZ subnet. All twelve ports can be used for the necessary connections. Four of these ports are provided by two dual-port Gigabit Ethernet NICs. The remaining two ports are provided by two single-port Gigabit Ethernet NICs.

The rest of this section describes how to install and connect to the NICs using this kind of network configuration, to achieve optimum performance.

To use this type of configuration, install four Gigabit Ethernet NICs and connect to the NIC interfaces as the following figure shows.



Card Type	Slot #
dual-port Gigabit Ethernet	1
dual-port Gigabit Ethernet	2
single-port Gigabit Ethernet	3
single-port Gigabit Ethernet	4

Figure 6. Connecting to Gigabit Ethernet NICs for high availability with a DMZ port in IP700 Series

The following figure shows an example of a network configured for high availability using VRRP including a DMZ.

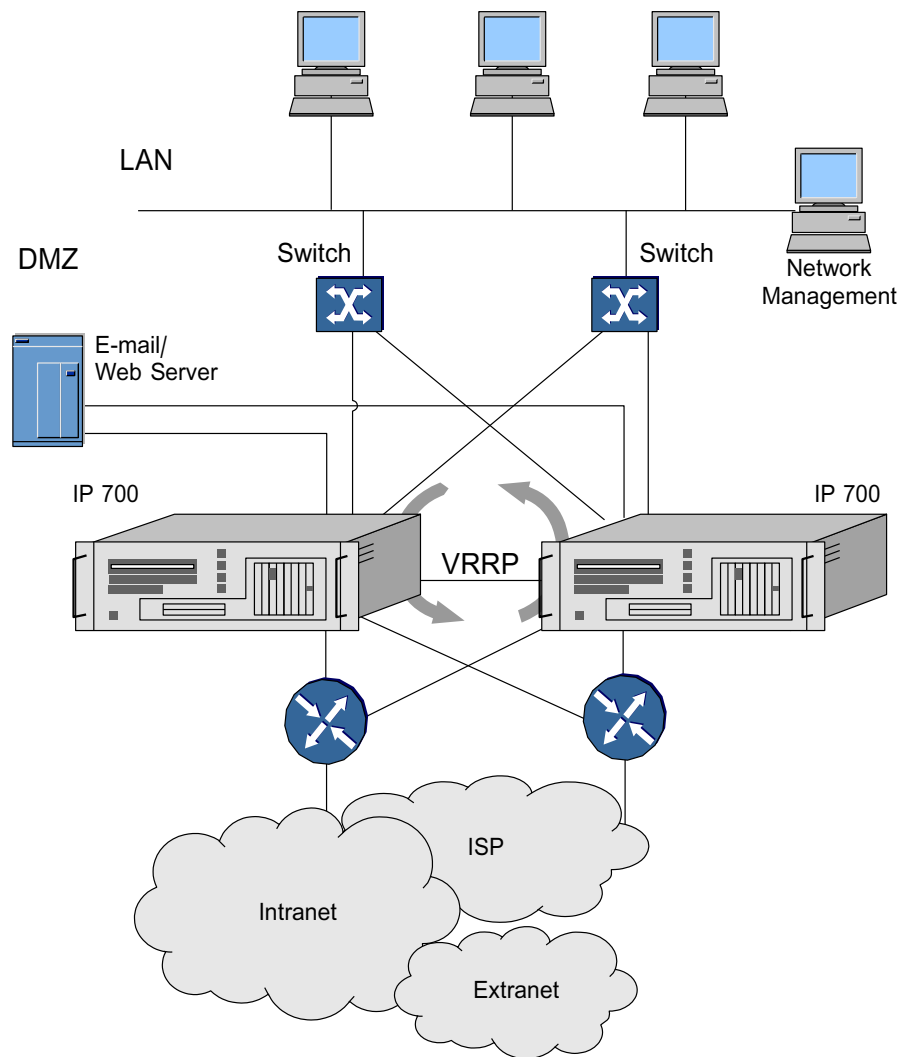


Figure 7. An example network configured for high availability with a DMZ environment

For further information about VRRP and DMZ configurations, see the *Voyager Reference Guide*.

IP740 example configurations

Hot plugging a 66-MHz card in the IP740

If you hot plug a 66-MHz card, the card is automatically brought online. If a 33-MHz card is already on that bus, the new card also runs at 33 MHz.

If no 33-MHz cards are on the bus, but the Slot Status Voyager page indicates that cards on the bus are running at 33 MHz, a 33-MHz card was previously present on that bus. Reboot your IP740 appliance to reset the bus speed to 66 MHz.

For information about how to access Voyager and the related reference materials, see *Using Voyager to configure the network interfaces*.

Hot plugging a 33-MHz card in the IP740

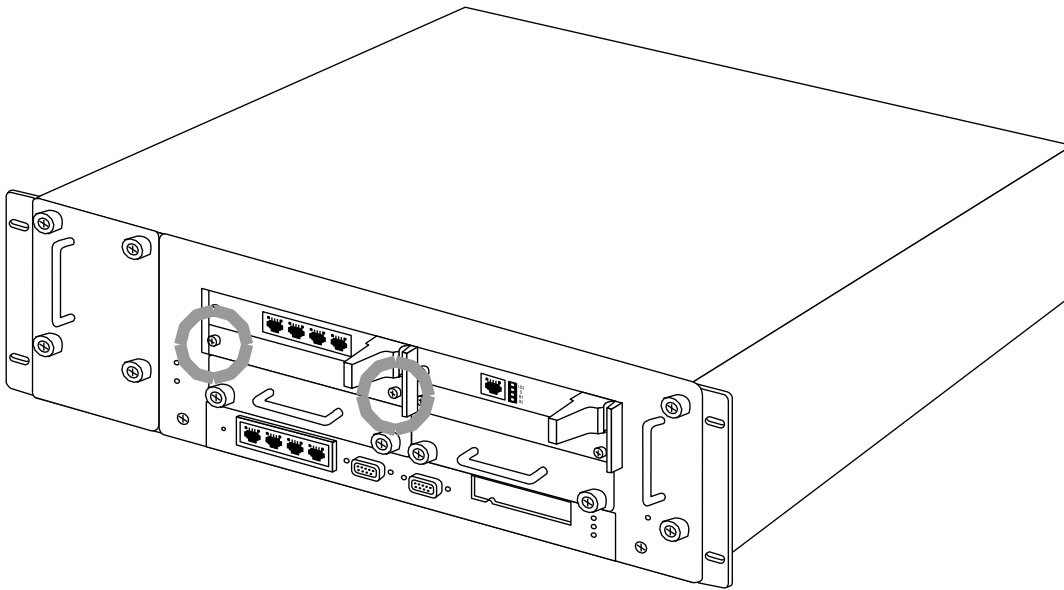
If you hot plug a 33-MHz card in any slot, the card is brought online automatically only if the bus is already running at 33 MHz.

If the bus is running at 66 MHz in the IP740 appliance, you must reboot after you insert the card. As a result, the bus speed is set to 33 MHz, and the card is brought online.

4.2 Installing a new network interface card

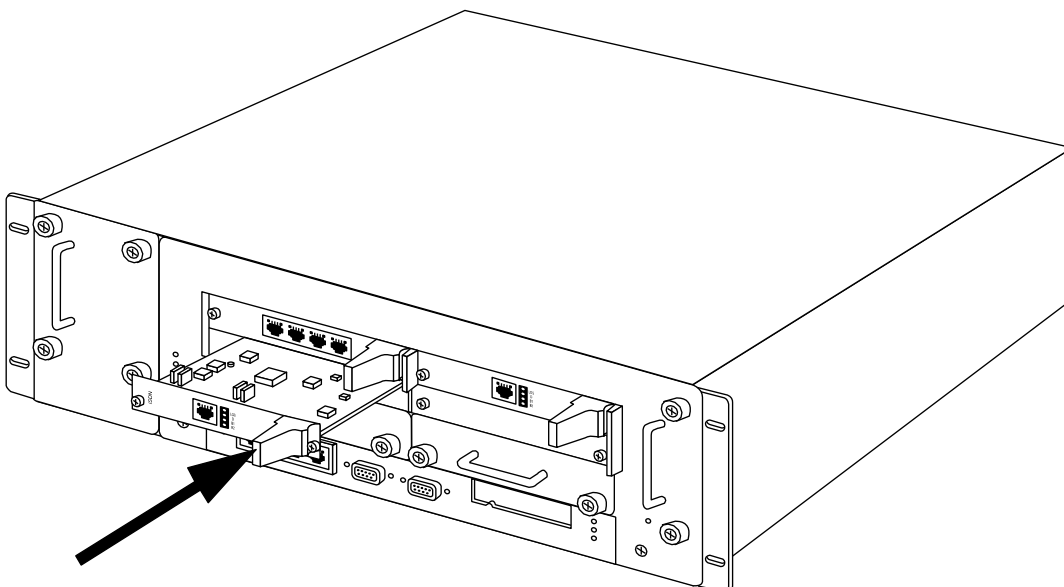
The following procedure applies to all network interface cards:

1. See Section *Network interface card preinstallation considerations*.
2. Use a screwdriver to remove the retaining screws that hold the blank panel in place.



3. Remove the blank panel.
4. Insert the new card.

Push it gently into place. Take care to make sure that the card edge is completely seated into the connector inside the IP700 Series appliance. If the card has an ejector, you can use it to assist in the final seating of the card.



5. Screw the retaining screws into place.
The IP700 Series appliance detects the card.
6. Use Voyager to configure and activate the logical and physical interfaces on the card.
For information about how to access Voyager and the related reference materials, see Section *Using Voyager to configure the network interfaces*.

4.3 Monitoring network interface cards

The following table lists the network interface cards that include LEDs on their front panels for monitoring purposes.

Table 4. Network interface cards that include LEDs

Ethernet	For information about the LEDs, see <i>Connecting to Ethernet Devices</i> .
E1	For information about the LEDs, see <i>Connecting to E1 (built-in CSU/DSU) devices</i> .
T1	For information about the LEDs, see <i>Connecting to T1 (built-in CSU/DSU) devices</i> .
ATM	For information about the LEDs, see <i>Connecting to ATM devices</i> .
Gigabit Ethernet	For information about the LEDs, see <i>Connecting to Gigabit Ethernet devices</i> .

4.4 Removing a network interface card

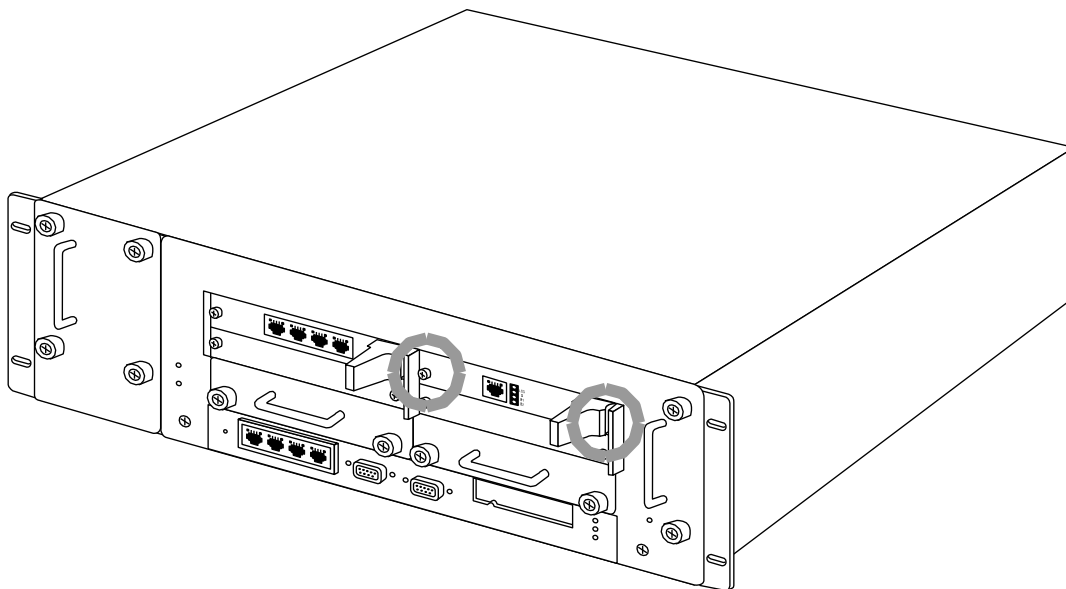
The following procedure applies to all network interface cards:

1. Use Voyager to perform the following:
 - a. Deactivate all of the logical interfaces on the card.
 - b. Deactivate all of the physical interfaces on the card.

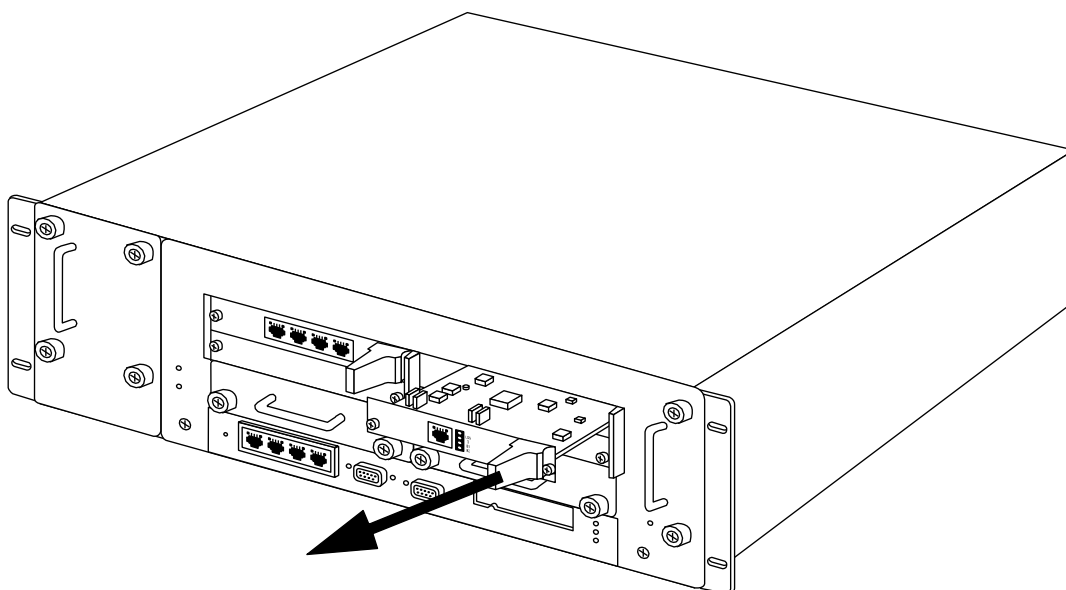
If you do not deactivate these interfaces before you remove the card, you might have to reinstall the card before you can deactivate the logical and physical interfaces.

For information about how to access Voyager and the related reference materials, see *Using Voyager to configure the network interfaces*.

2. Use a screwdriver to remove the retaining screws that hold the card.



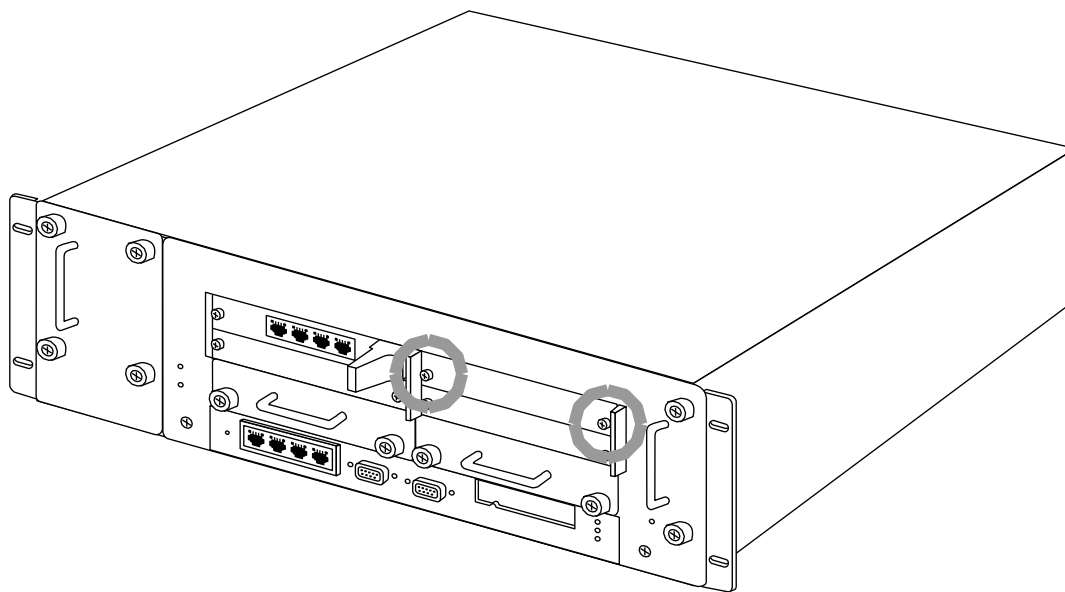
3. Gently pull the card forward from the card slot.
If the card has an ejector, use it to assist you in removing the card from the slot.



4. Cover the empty slot with a blank panel and screw the retaining screws into place.

Note

The blank panel goes in only one way, with the EMI fingers up.



4.5 Replacing a network interface card

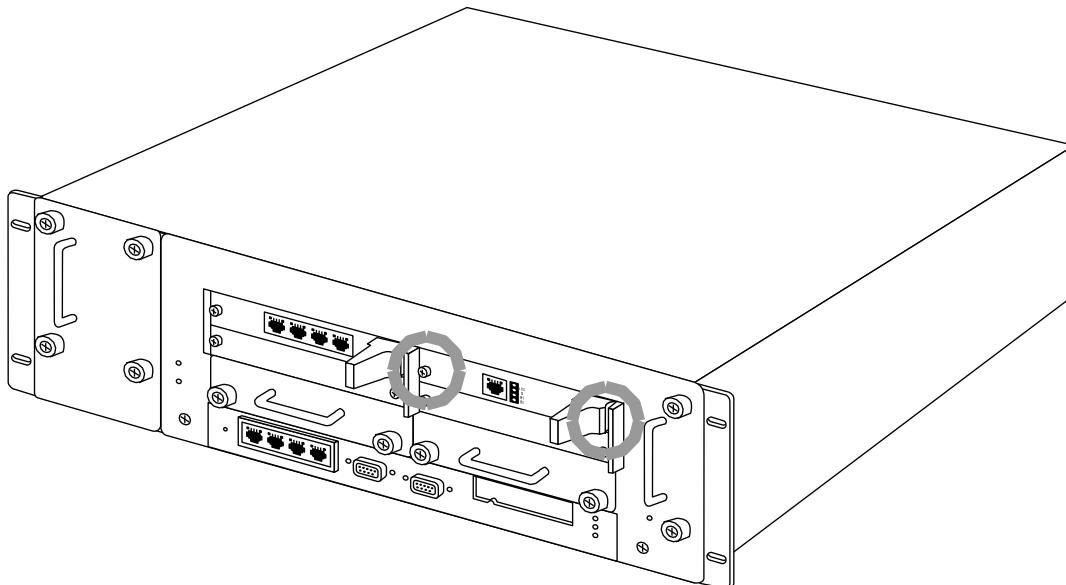
You can replace a network interface card with the following card types:

- A different type (for example, replace an Ethernet card with a T1 card).
- A similar type (for example, replace an Ethernet card with another Ethernet card).

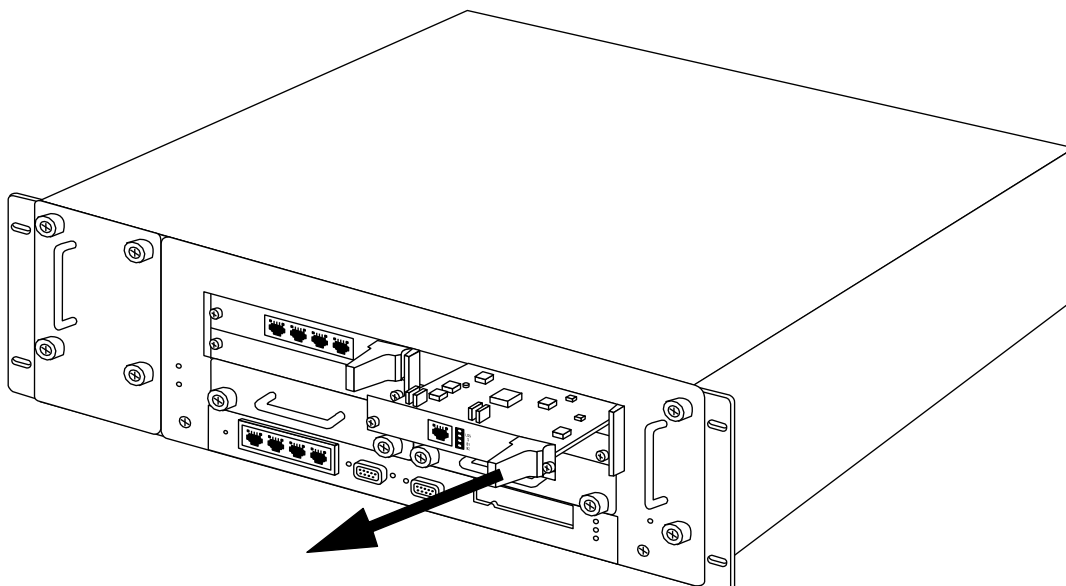
The two cards do not need to be made by the same manufacturer. They only need to contain interfaces of the same type.

The following procedure applies to all network interface cards:

1. See *Network interface card preinstallation considerations*.
2. Use a screwdriver to remove the retaining screws that hold the card.

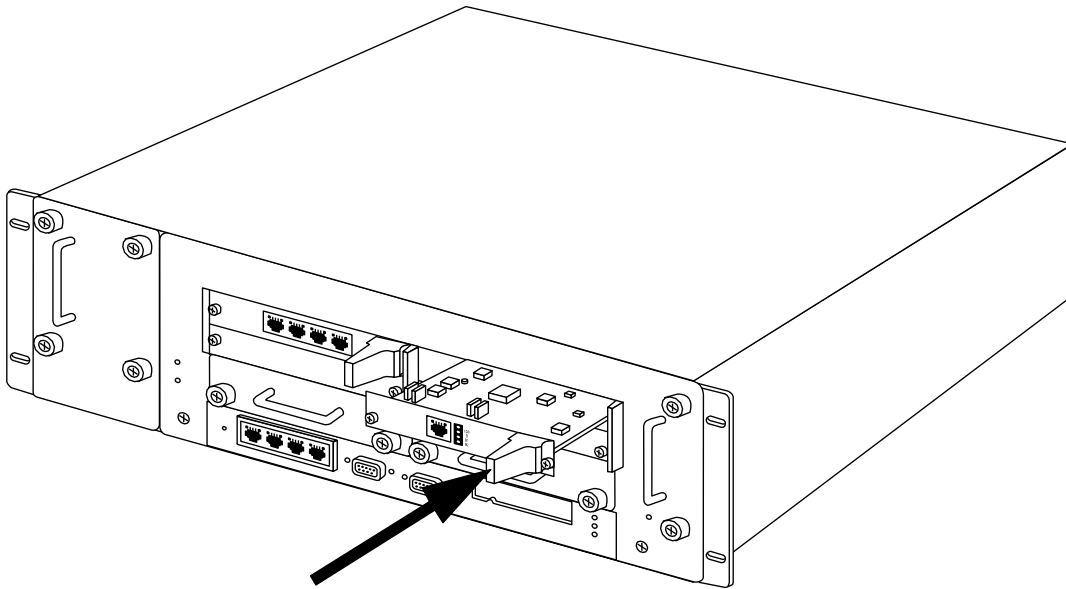


3. Gently pull the card forward from the card slot.
If the card has an ejector, use it to assist you in removing the card from the slot.



4. Insert the new card.

Push it gently into place. Make sure that the card edge is completely seated into the connector inside the IP700 Series appliance. If the card has an ejector, you can use it to assist in the final seating of the card.



5. Screw the retaining screws into place.

The IP700 Series appliance detects the card.

6. If you replaced the card with a card of a different type, use Voyager to delete the interface configuration for the old card and configure and activate the logical and physical interfaces on the new card.

For information about accessing Voyager and the related reference materials, see *Using Voyager to configure the network interfaces.*

4.6 Installing a PCMCIA modem

The IP700 Series appliance supports a Nokia-approved PCMCIA modem card that allows you to set the country code through Voyager. For information about the country codes, see the Voyager Reference Guide.

To use a modem with the IP700 Series appliance, use the following procedures:

1. If the modem is not factory installed, insert the Nokia-approved PCMCIA modem into either the top or bottom PCMCIA slot until the modem clicks into place.
The modem and the ejector on the left of the slot protrude from the unit. The appliance automatically recognizes the modem.
2. Whether or not the modem is factory installed, connect the modem to a phone line.
Use a cable that is appropriate for the modem and for the telephone system in the country in which you will use the device.
To access this feature, click **Config** on the home page in Voyager and then click the *Network Access and Services* link in the *Security and Access Configuration* section.

For information about accessing Voyager and the related reference materials, see *Using Voyager to configure the network interfaces*.

4.7 Monitoring and replacing a hard-disk drive unit

The IP700 Series appliance includes one or two hard-disk drive units, which you can remove and replace. The following figure shows a disk drive unit. The status LEDs and *Enable/Disable* switches are indicated by the gray circle.

Back up your disk files to a remote system on a regular basis. For the procedure for backing up and restoring files, see the *IPSO Getting Started Guide* and *Release Notes*. In addition, when you are changing disk drive units, make sure that you insert the new disk drive unit into slot A (the left-hand slot shown in the following figure).

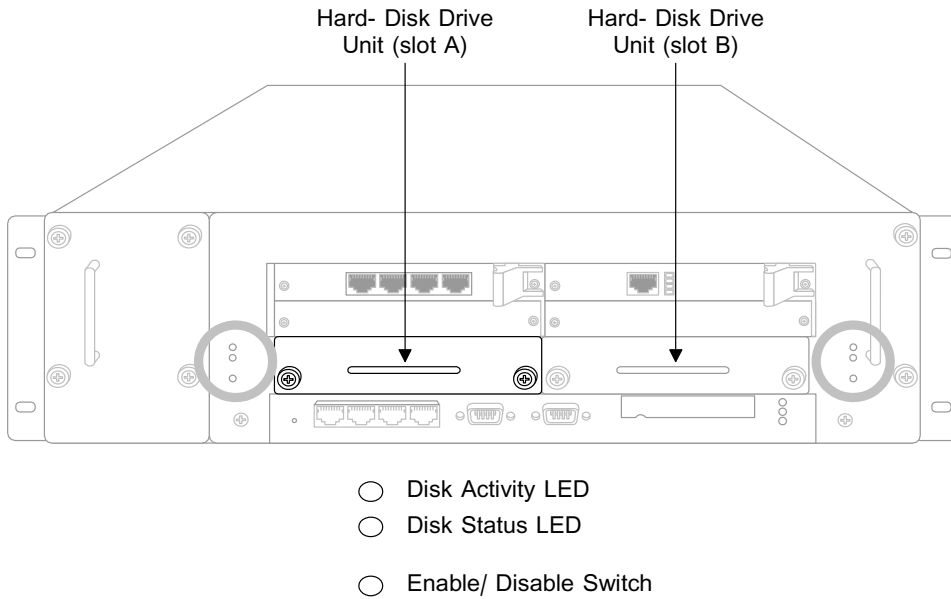


Figure 8. Hard-disk drive units, status LEDs, and enable/disable switch locations in IP700 Series

Monitoring a hard-disk drive unit

The disk drive unit has two LEDs associated with it, one for disk activity and one for disk status, as shown in the preceding figure. These LEDs are located to the left of the unit. They provide the following information:

LED	LED status	Condition
Disk activity	Off	No current disk drive unit activity
	Blinking green	Current disk drive unit activity

LED	LED status	Condition
Disk status	Constant red	The disk drive unit is turned on but is malfunctioning
	Constant green	The disk drive unit is turned on and functioning
	Off	One of the following: <ul style="list-style-type: none"> • The disk drive unit failed its test and was turned off • No disk drive unit is installed • The Enable/Disable switch was pressed, which caused the disk drive unit to be turned off. For the location of the Enable/Disable switch, see <i>Removing a hard-disk drive unit</i>.
	Blinking green	One of the following: <ul style="list-style-type: none"> • The system is booting • The disk drive unit is starting up • The system is testing the disk drive unit

Disk Mirroring

The Nokia disk mirroring feature provides fault tolerance by letting the IP700 Series appliance continue working in the event of a disk drive unit failure. You can create mirror sets that consist of a source disk drive unit (which holds the active copy of the operating system) and mirror disk drive unit. The mirror disk drive unit contains a copy of all the files on the source disk drive unit, and if the source disk drive unit fails, the mirror disk drive unit immediately takes over. The IP700 Series appliance continues to operate normally.

If you have an IP700 Series appliance on which you configured disk mirroring, you can warm swap disk drive units — that is, you can replace a disk drive unit without shutting down the appliance (although you must stop all drive-unit read/write activity, as described in Section *Removing a hard-disk drive unit*. This practice allows you to replace a failed disk drive unit without interrupting service.

You can use Nokia Network Voyager, the CLI, or Lynx to create and delete mirror sets.

For more information about disk mirroring, including configuration details, see the *Voyager Reference Guide* and the *Getting Started Guide* and *Release Notes*. If you need to order a second disk drive unit, additional information is included with the unit.

Removing a hard-disk drive unit



Caution

Failing to use the following procedure when removing the hard-disk drive unit can result in damage to the unit or data loss.

To perform an orderly shut down of the operating system, follow these steps:

1. If you are removing a disk drive unit used as part of a disk mirroring implementation, the unit is installed in slot B (not slot A), and the unit is not active, you do not need to use this step to shut down the operating system. Instead, press the Enable/Disable switch next the disk drive unit and proceed to step 2 in the procedure.
 - On the Voyager home page for the appliance, click **Config**.
 - Scroll to the bottom and click **Reboot, Shut Down System**.
 - Click **Halt**.
 - Wait until the activity LED for the disk drive unit is off before proceeding to the next step.
 - Power off the appliance using the power supply switches on the back of the appliance.
On the Voyager home page for the appliance, click **Config**.
2. Scroll to the bottom and click **Reboot, Shut Down System**.
3. Click **Halt**.
4. Wait until the Activity LED for the disk drive unit is off before proceeding to the next step.
5. Turn off the appliance using the power supply switches on the back of the device.

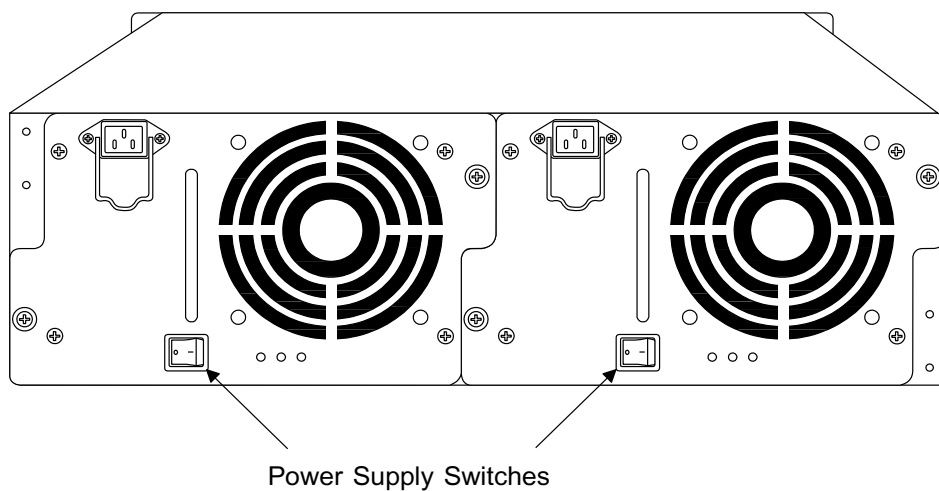
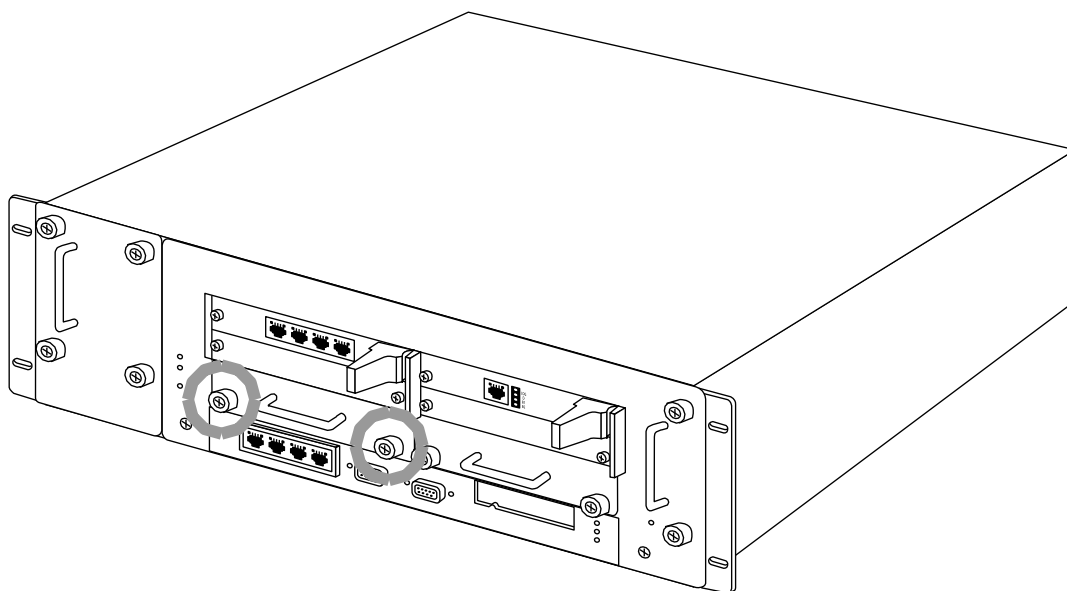
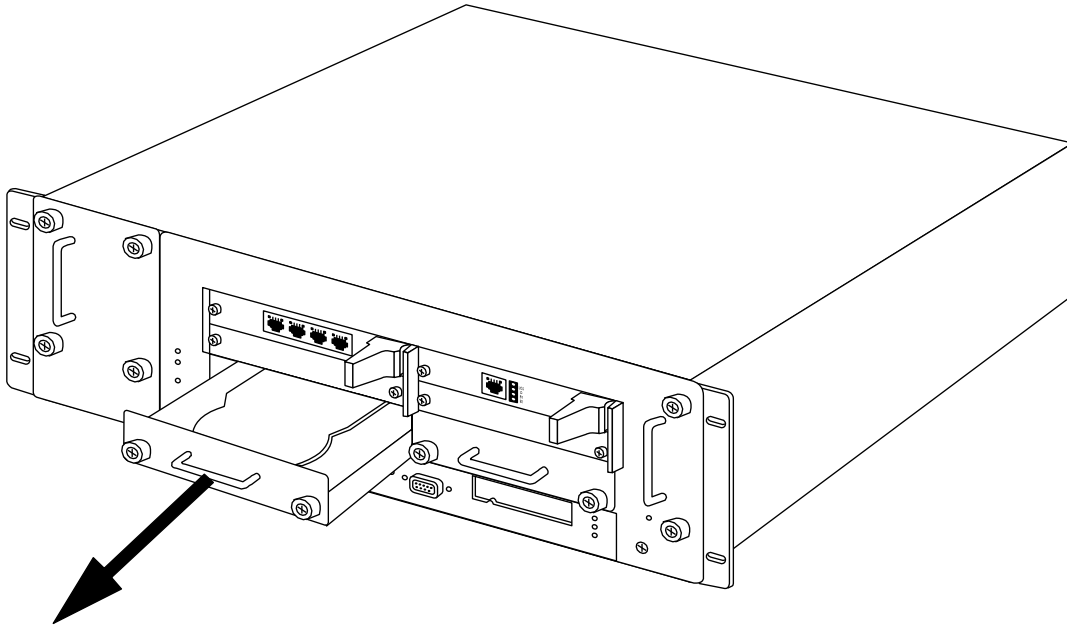


Figure 9. Power switch locations in IP700 Series

6. Wait until the Status LED for the disk drive unit is off before proceeding to the next step.
7. Use a screwdriver to remove the retaining screw holding the disk drive unit



8. Gently pull the disk drive unit forward from the card slot and remove the disk drive unit



Replacing a hard-disk drive unit

Note

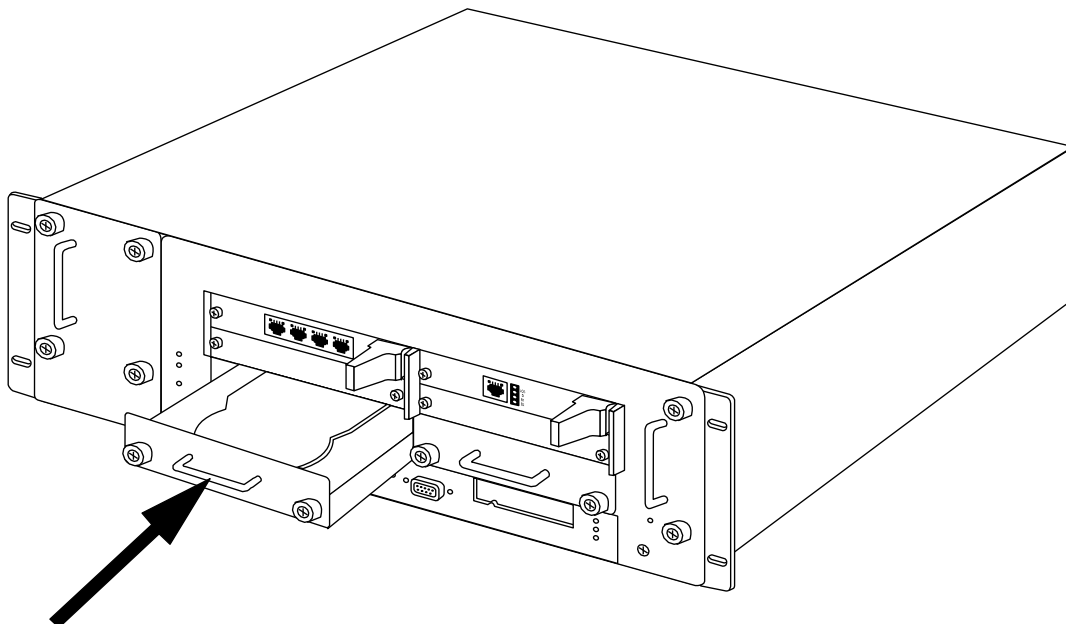
Before you can replace a hard-disk drive unit, you must load the new unit with the appropriate software. For further information, contact the appropriate Nokia customer support site.

Note

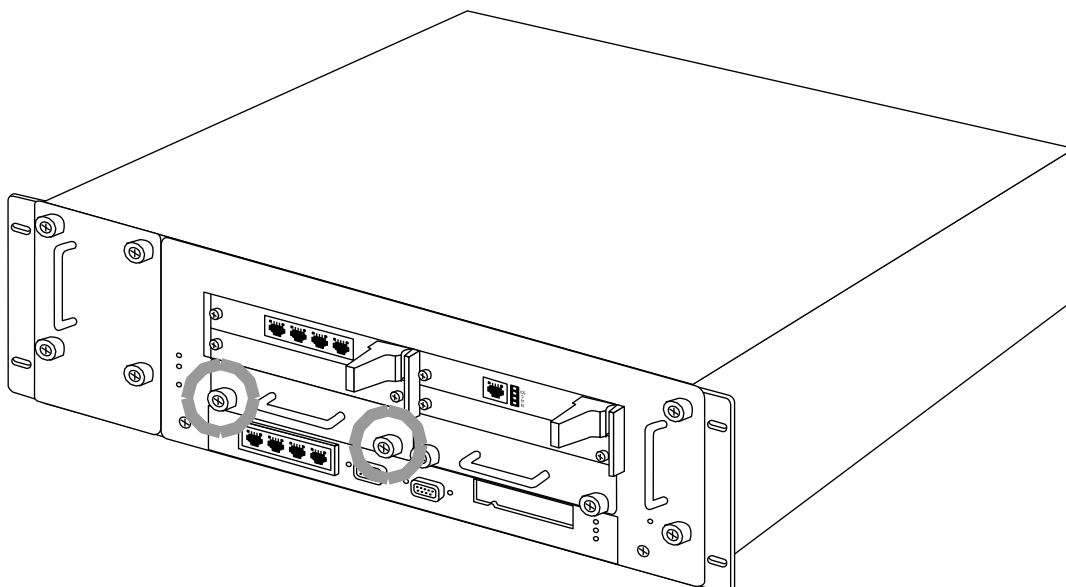
Make sure you replace the new disk drive unit in slot A, as the following figures show.

1. Insert the new disk drive unit into the open slot.
2. Push the unit gently into place.

Make sure that the card edge is completely seated into the connector inside the IP700 Series appliance.




3. Screw the retaining screws into place.



4. Switch on the IP700 Series appliance.

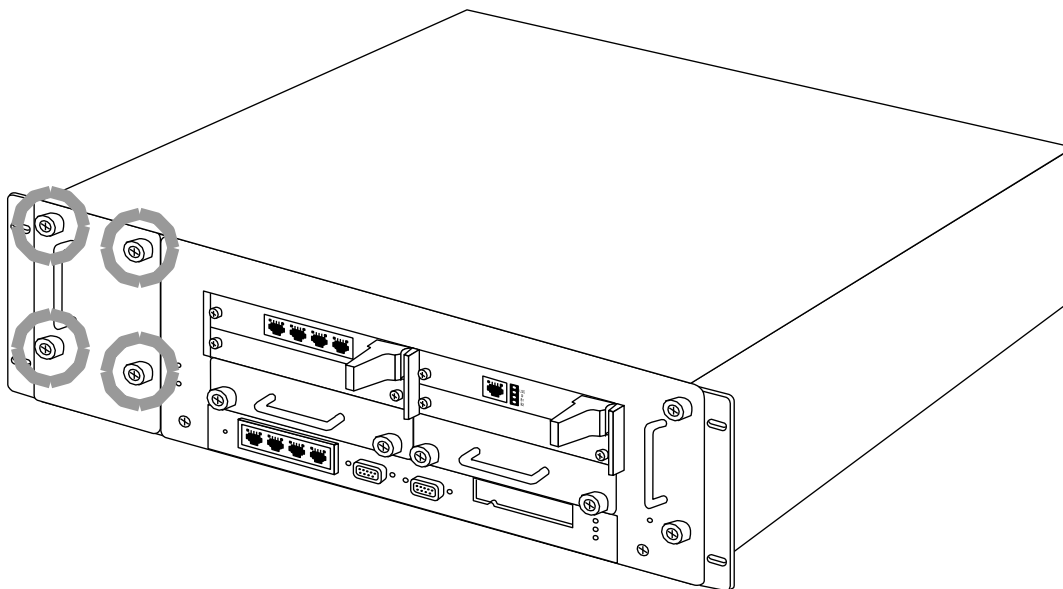
4.8 Replacing the fan tray

You can change the fan tray without turning off the IP700 Series appliance.

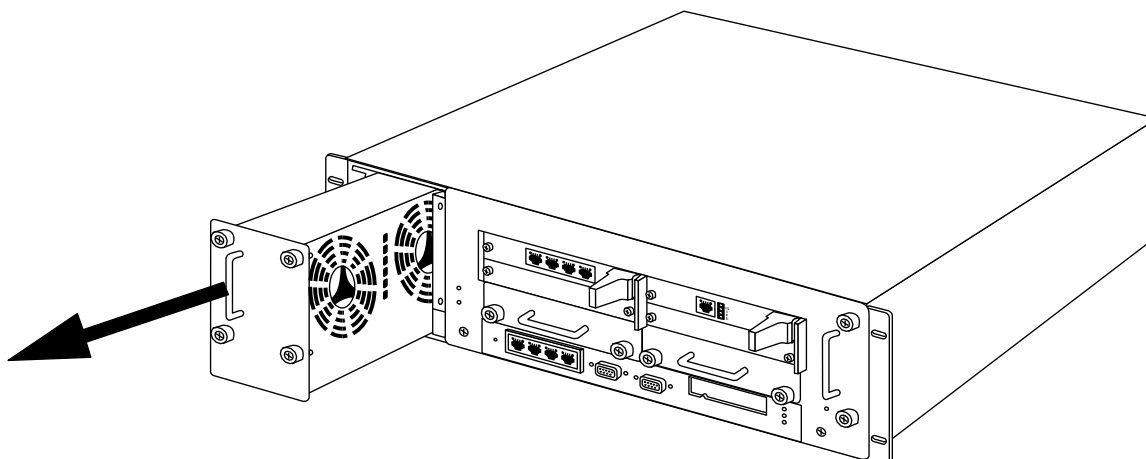
 **Caution**

Components inside the chassis can overheat if they are not cooled for even short periods of time. If you keep the power to the IP700 Series appliance on, do not allow the fan tray to remain out of the chassis for any longer than is necessary.

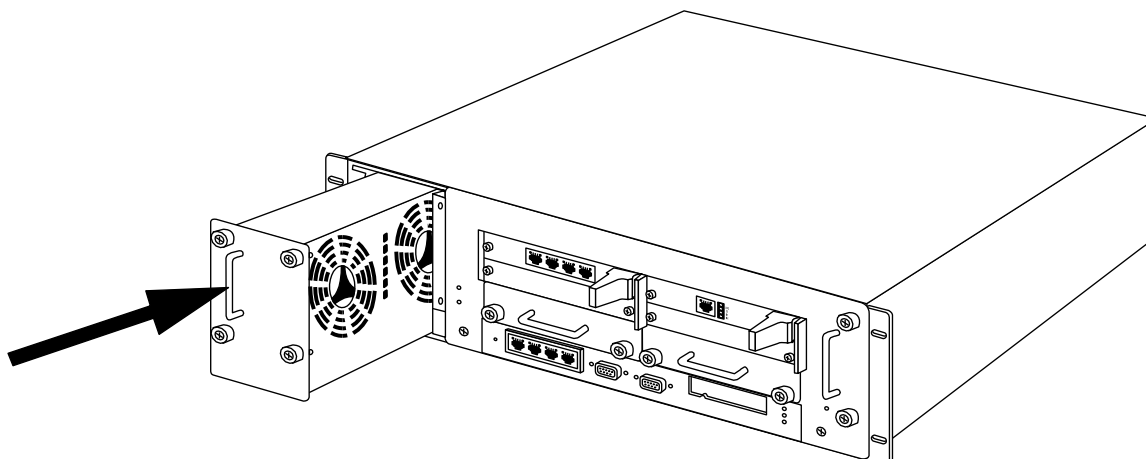
1. Unscrew the screws that hold the fan tray to the chassis.



2. Pull the fan tray forward to remove it from the chassis.



3. Slide the new fan tray into the chassis.



4. Screw in the retaining screws.

4.9 Monitoring and replacing a power supply

If the IP700 Series appliance contains two power supplies, you can replace one of the power supplies without turning off the IP700 Series appliance.

Three diagnostic LEDs are located to the right of each power switch, as shown circled in the following figure.

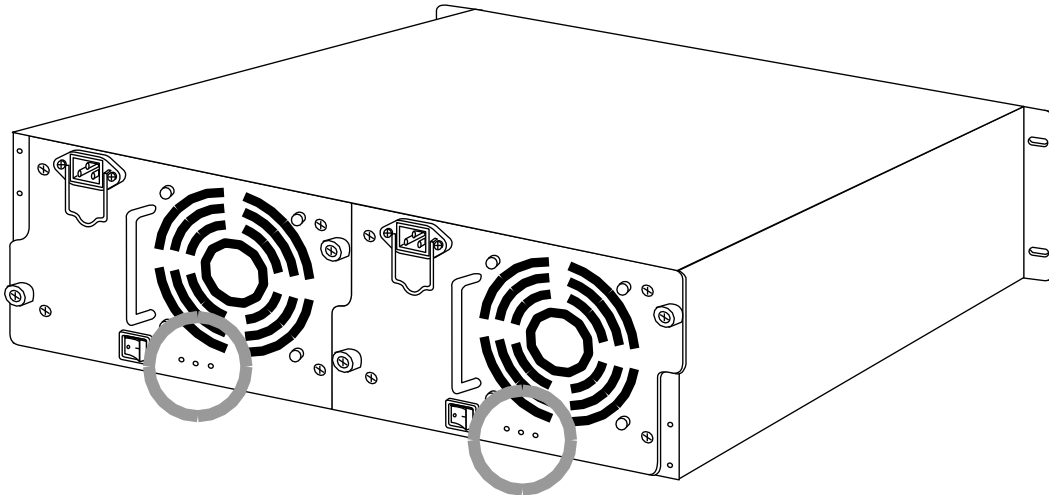


Figure 10. Power supply status LED locations in IP700 Series

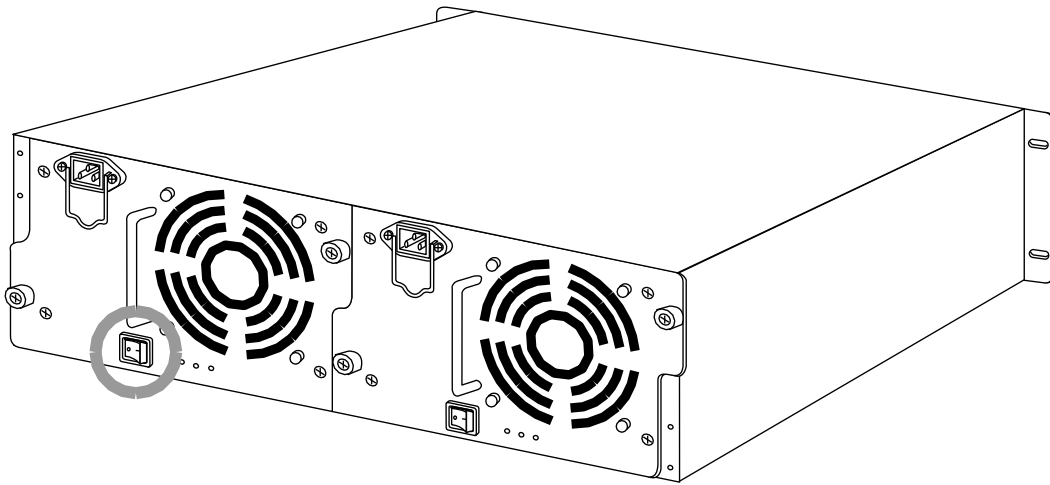
Each LED is labelled, and the information supplied by each is as follows reading from left to right.

Table 5. Meaning of LEDs

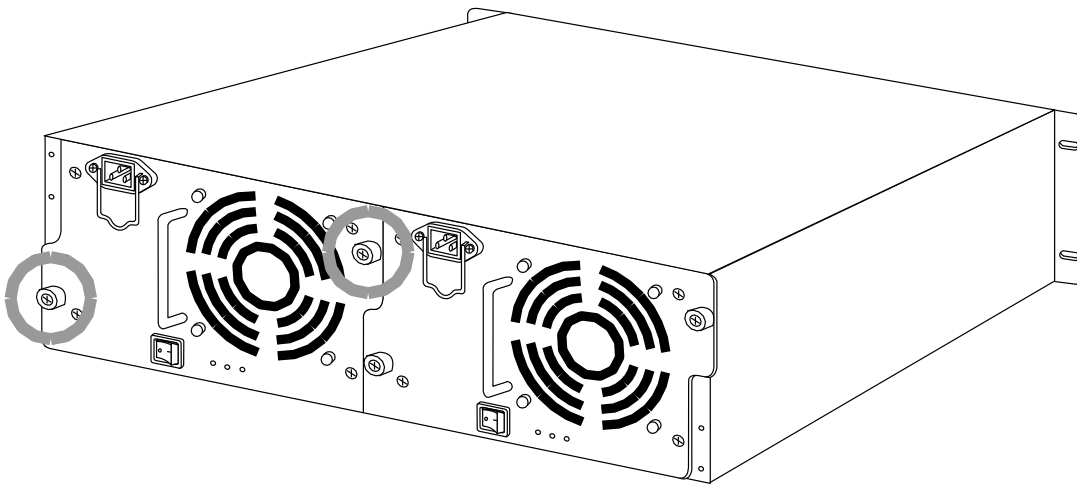
LED	Meaning
Pwr OK (green)	Performing within specifications
Fault (red)	Not performing within specifications
Over Temp (yellow)	Power supply has overheated

Access the power supply from the back of the IP700 Series appliance. To remove the power supply, follow these steps.

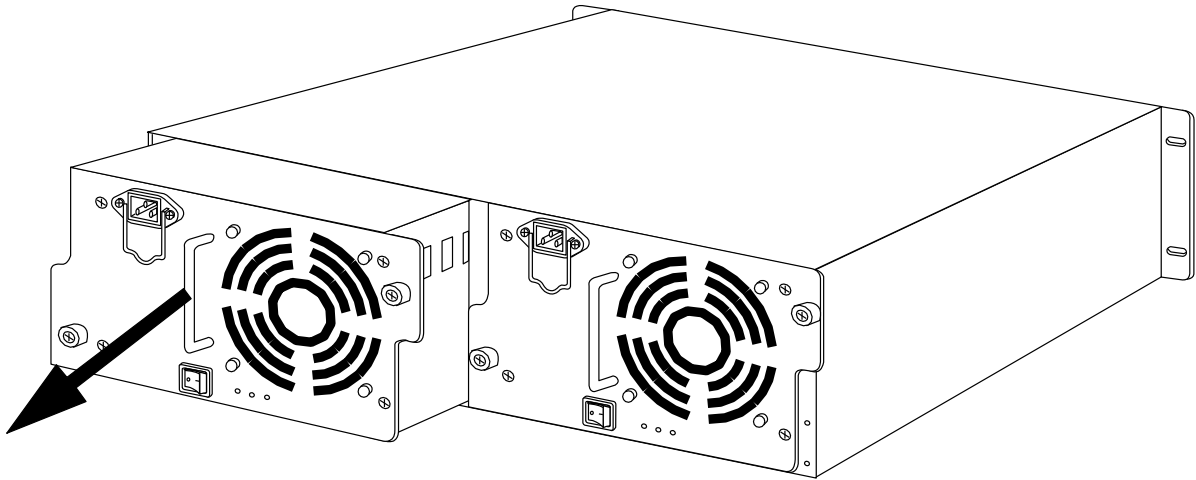
1. Deactivate the power supply you are replacing by turning off the switch on the back of the power supply.



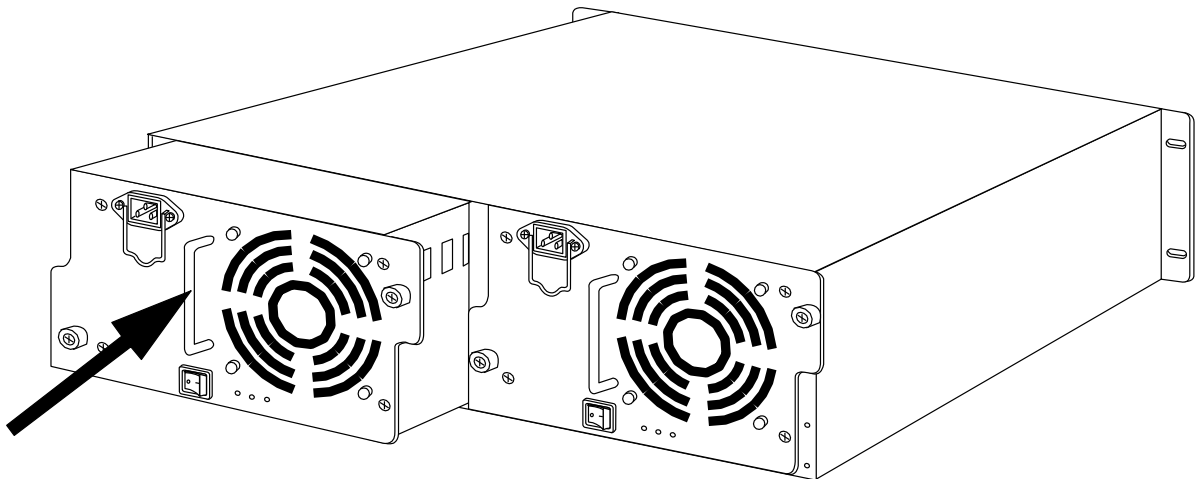
2. Unplug the power cord from the power supply.
Confirm that the cooling-fan blade assembly is no longer turning.
3. Use a screwdriver to unscrew the two screws that hold the power supply to the chassis.



4. Grasp the handle and firmly pull the power supply toward you.



5. Slide the new power supply into place.



6. Replace the retaining screws and screw them into place.
7. Reconnect the power cord.
8. Turn on the power supply switch.

4.10 Upgrading the memory

This section explains how to upgrade the memory to 1 GB from 512 MB by using either one or two Nokia-approved memory upgrade kits. Each kit includes two 256-MB DIMMs, and the number you use depends on the number and capacity of the DIMMs currently installed in your appliance.

Note

Nokia recommends that you obtain memory kits only from Nokia or authorized resellers. For further information, contact the appropriate Nokia customer support site.

The IP700 Series appliance base system contains four dual inline memory module (DIMM) sockets. The IP740 appliance base system ships with either 512 MB of RAM or 1 GB of RAM, provided by two or four 256 MB DIMMs respectively. The IP710 appliance ships with 512 MB of RAM that is provided by two 256-MB DIMMs.

You can increase the RAM to 1 GB by installing a 256-MB DIMM into each of the two remaining sockets.



Caution

When upgrading memory on the IP740, use only Nokia-approved 256-MB DIMMs. Be sure a DIMM is installed in each of the four sockets. The only valid memory configurations are 512 MB and 1 GB.

Before you begin

To upgrade your appliance memory, you need the following:

- Physical access to the appliance
- A Phillips-head screwdriver
- The appropriate number of Nokia memory upgrade kits, each of which includes two 256-MB Dual Inline Memory Modules (DIMMs)
- Access to the appliance through Voyager or Lynx

Accessing DIMM sockets



Warning

To minimize the risk of electric shock, before you open the IP700 Series appliance, be sure to turn off power to the appliance.



Caution

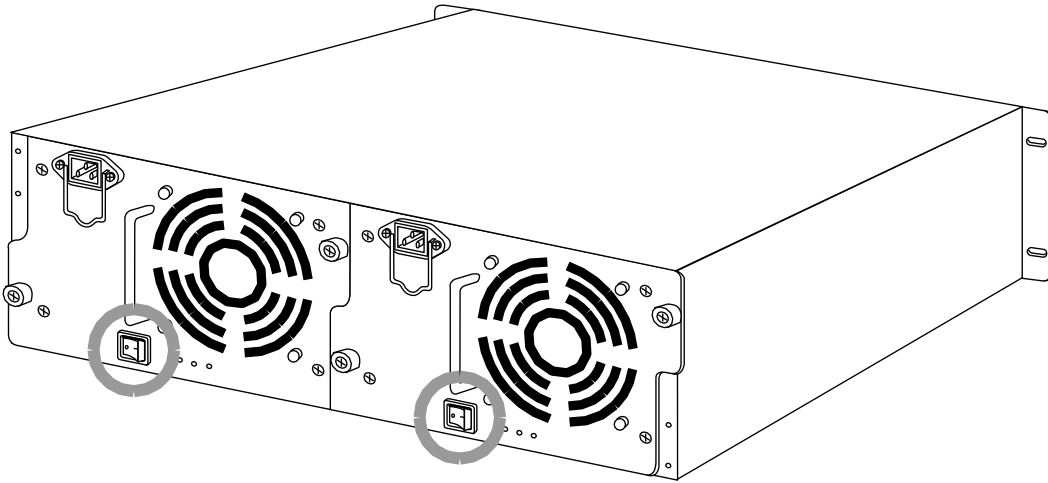
To protect the IP700 Series appliance and protect memory modules from electric static discharge (ESD), ensure that you are properly grounded before you touch these components.

Preinstallation steps

Before you access the DIMM sockets, perform the following steps:

1. See how much RAM is currently installed in your appliance by viewing the main page for the appliance using either Voyager or Lynx
2. Use Voyager or Lynx to perform an orderly shutdown of the IP700 Series appliance. For detailed information about using Voyager for this purpose, see *Using Voyager to configure the network interfaces*.
3. Turn off both power switches on the rear of the appliance and remove both power cords from the power supplies.

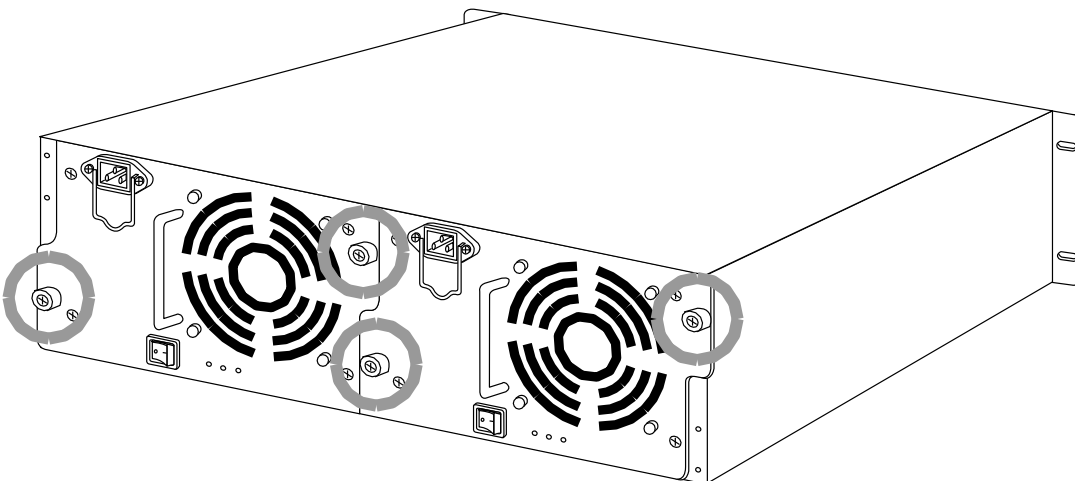
Confirm that the two cooling-fan blade assemblies are no longer turning.



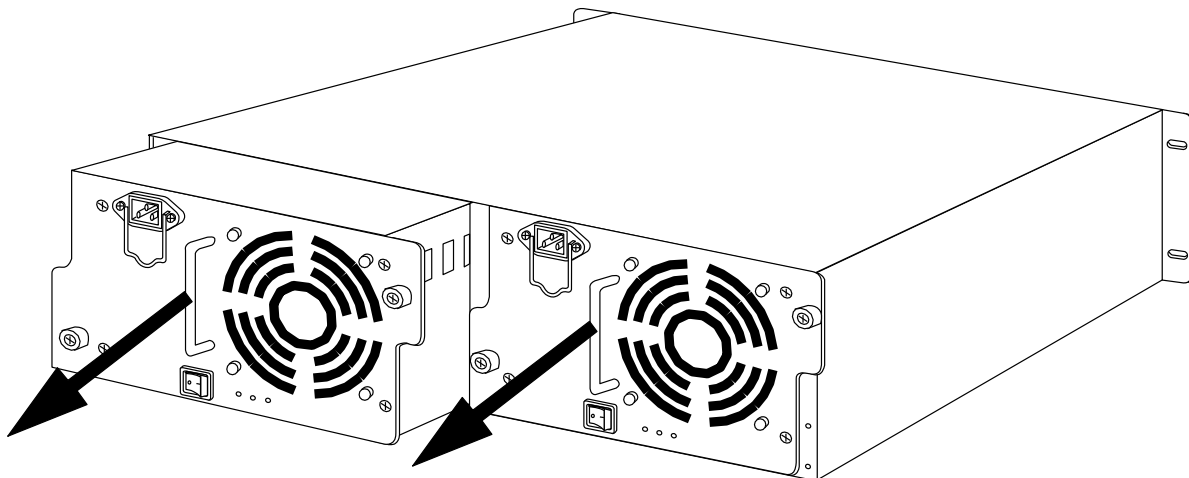
Accessing and removing the existing DIMMs

To install the memory upgrade kit, use the following procedure.

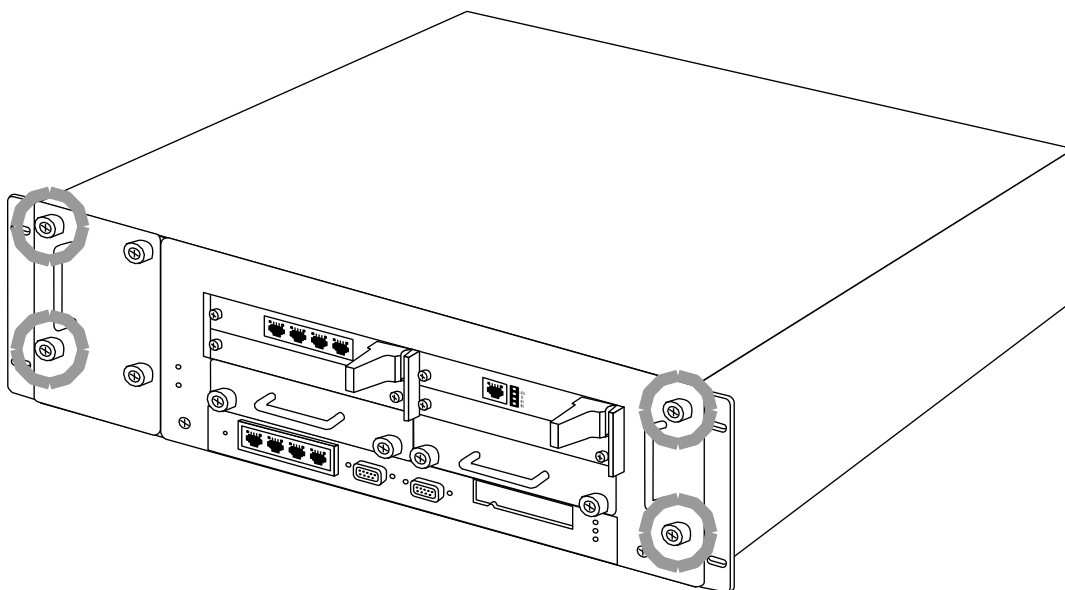
1. Remove the two power supplies as follows (removing the power supplies allows you to disengage the motherboard chassis assembly from its connectors and prevents the front panel from being damaged as the chassis assembly is pulled out).
 - a. Use a screwdriver to unscrew the two screws that secure each power supply to the chassis.



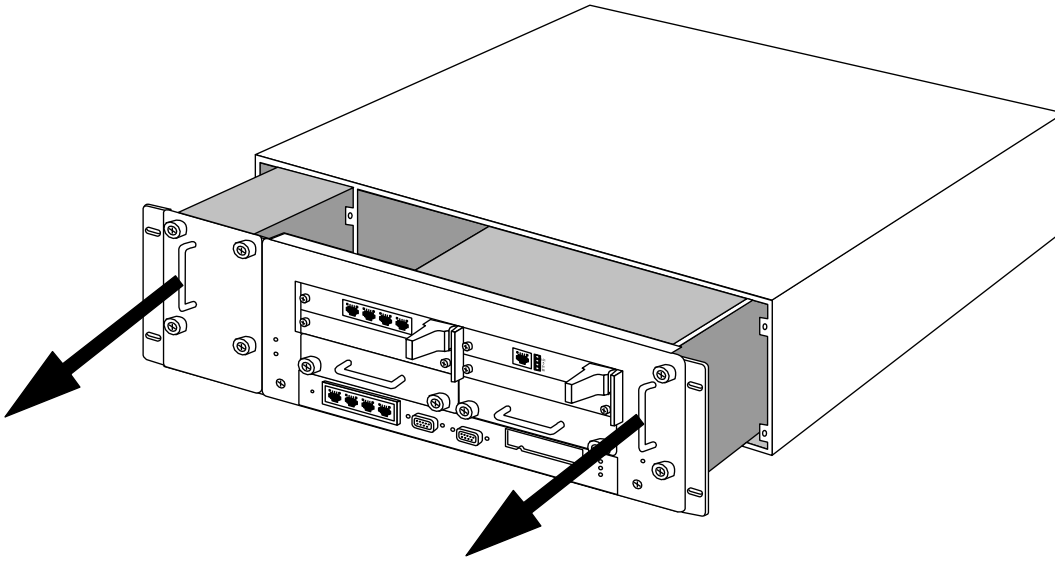
- b. Grasp each power-supply handle and firmly pull each power supply toward you.



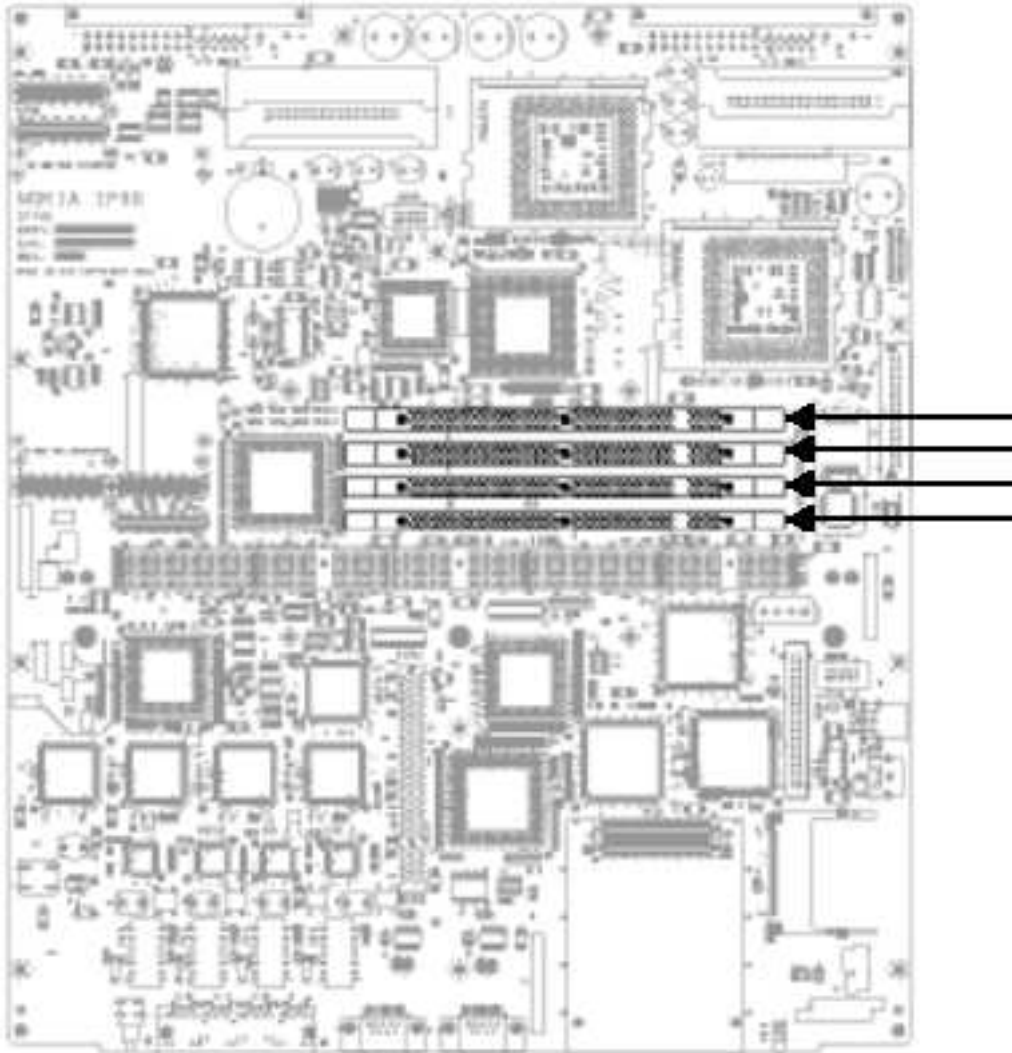
2. Loosen the four front-panel thumbscrews indicated in the following figure.



3. Slide the chassis assembly forward to expose the motherboard components, as the following figure shows.



The DIMM sockets are located at the right of the IP700 mother board, as you look at the appliance from the front, as the following figure shows.



Front of Motherboard

Figure 11. DIMM socket locations in the IP700 Series motherboard

Installing the new DIMMs in the IP700 Series appliance

You can upgrade the memory of the IP700 Series appliance to 1 GB by inserting two additional 256 MB DIMMs.

For each DIMM you remove from your IP700 series appliance, perform the following procedure.

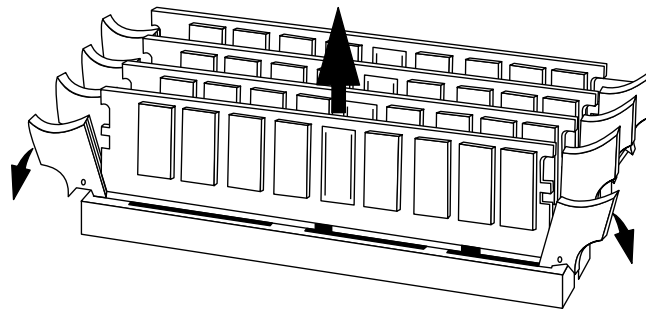
Note

The figures show these steps for the DIMM socket closest to the front of the appliance.

Note

If your appliance has four 128-MB DIMMs, remove the four 128-MB DIMMs and install a 256-MB DIMM into each of the four sockets. This requires two memory kits.

1. Press the two retaining clips outward and carefully pull each DIMM upward as the following figure shows.
You might need to pull opposite ends of the DIMM alternately to gradually free it from the contact pins.



Note

IP700 Series appliances use interleaved memory and work in pairs. Therefore, two DIMMs would not be installed in adjacent DIMM sockets.

2. Press the new DIMM into the socket until it clicks into place, as the following figure shows.
The top of the DIMM is smooth. The bottom edge of the DIMM has two keyed sets of contacts, which mate with two key slots on the socket. Be sure the two keys and slots line up.

The retaining clips move into the lock position as you press the DIMM into place.

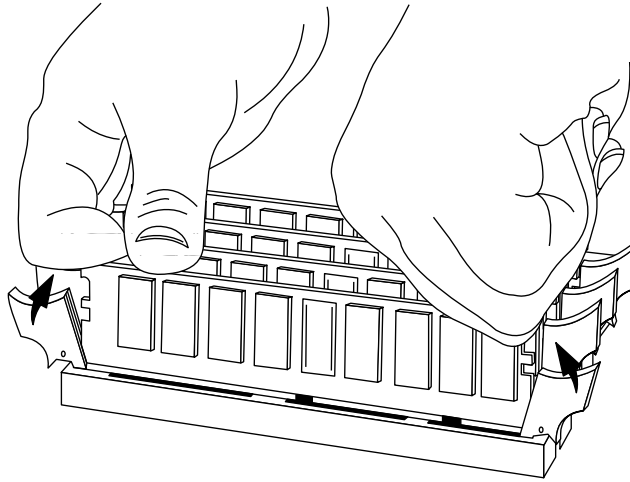
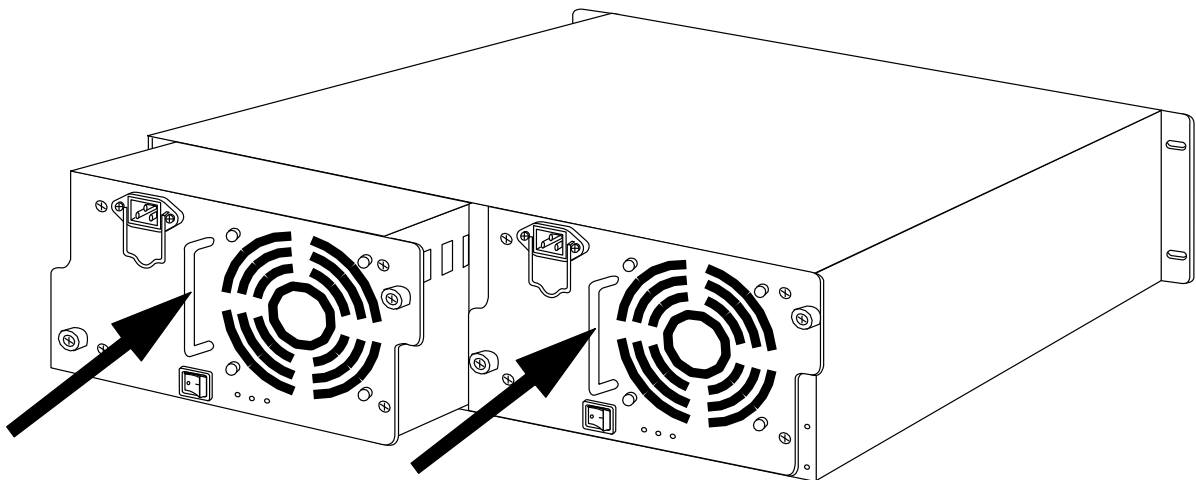


Figure 12. Pressing DIMMs into DIMM sockets in IP700 Series

Final installation steps

After you install the DIMMs, perform the following procedure:

1. Slide the chassis assembly back into the appliance and resecure the four thumbscrews.
2. Slide the two power supplies into place.



3. Replace the retaining screws and screw them into place.
4. Reattach the power cords.
5. Turn on the power.
The appliance automatically recognizes the new memory configuration.
You can verify this from the Voyager or Lynx interface.

5

Configuring and monitoring the IP700 Series appliance

System startup consists of the following steps:

- Entering the hostname
- Entering the passwords
- Entering the browser type
- Entering initial interface information
- Confirming new system setup summary
- Using Voyager to configure the network interfaces

The first time you turn the power on for the IP700 Series appliance, the system-startup procedure runs. Using the system-startup procedure, you assign a hostname to the appliance and assign a password to the admin account. Then you configure the initial interface you use to establish a network connection to the appliance.

When you have network connectivity, complete the configuration using the Web-based Voyager configuration program. For information about using Voyager, see the *Voyager Reference Guide* and the Voyager inline help, both of which you can access from the Voyager interface. For information about accessing Voyager and the related reference materials, see *Using Voyager to configure the network interfaces*

5.1 Entering the hostname

System startup first requests a hostname for the IP700 Series appliance. Alphanumeric characters (0 to 9, a to z), dashes (-), and dots (.) are permitted. The maximum length of a hostname is 64 characters.

At the `Hostname?` prompt, enter the full host name, including the domain of the IP700 Series appliance, then confirm your entry.

5.2 Entering the passwords

System startup prompts you to enter a password for the *admin* account. The *admin* account has read and write permissions on the IP700 Series appliance. Passwords are case sensitive.

5.3 Entering the browser type

System startup prompts you to select the browser type you plan to use to complete your configuration, as follows:

```
You can configure your Nokia system in two ways.
```

```
1) configure an interface and use our Web-based  
Voyager via remote browser
```

```
2) VT100-based Lynx browser
```

```
Please enter a choice [1-2, q]:
```

Type the number corresponding to the browser you want to use for this interface.

Option **1** (recommended) enables you to use a remote graphical browser and Voyager to configure your network.

Select option **1** if the IP700 Series appliance is connected to a network and you have access to a host machine that can run Netscape Navigator, version 4.0 or later, or Microsoft Internet Explorer, version 4.0 or later. You can also use a laptop connected to the Ethernet interface with a local address. If you select **1**, continue with *Entering Initial Interface Information*.

Select option **2** (Lynx) if the host for your browser cannot be reached from the IP700 Series appliance by using a default route (you do not have a host that can communicate with the appliance by using one of the interfaces), and you cannot supply a default appliance address. Lynx is an ASCII-based browser that runs on the existing serial-port console connection. Lynx browser software is supplied as part of the standard IPSO software on the appliance.

If you choose to use Lynx, you are asked whether you want to start Lynx now. Type **Y** (yes) to start Lynx.

Note

You can start Lynx any time by entering **lynx** at the command prompt.

5.4 Entering initial interface information

1. Select an interface you want to use to access the IP700 Series appliance from the host that runs your browser. System startup searches for all of the connected interfaces and displays a list of the physical IDs that it finds.

A system startup example screen follows:

```
Select an interface from the following for
configuration:
```

```
1) eth-s1p1
```

```
2) eth-s1p2
```

```
3) ser-s2p1
```

```
4) atm-s3p1
```

```
5) quit this menu
```

```
Enter choice [1-5]:
```

To select an interface, type the number adjacent to the physical IDs that appear. Your selection determines the interface you use to access the IP700 Series appliance for configuration tasks.

Note

A physical ID identifies the network interface card type (`nic-type`) and provides information about its slot number (`slot-num`) and port number (`port-num`).

The physical ID syntax is:

```
nic-type-sslot-numpport-num
```

For example, the physical ID of a serial card in slot 1, port 1 would be:

```
ser-s1p1
```

Similarly, the physical ID of an Ethernet card connected to port 2 of a multiport card installed in slot 4 would be:

```
eth-s4p2
```

2. Enter the IP address for the interface you selected in step 1. If you selected an Ethernet, fibre distributed data interface (FDDI) interface, enter the IP address and mask length (in bits). For example:

192.0.0.1/25

If you selected an asynchronous transfer mode (ATM) or serial interface, enter the local and remote IP addresses. For example:

192.0.0.93

192.0.0.94

3. Enter the system default route information.
If you selected an Ethernet, FDDI interface, enter the IP address of the system-default IP700 Series appliance.
If you selected an ATM or serial interface, the default route automatically sets the remote address of the interface.
4. Enter the hardware configuration information for the interface you selected in step 1.

If you selected an Ethernet interface, enter:

- An interface speed (100 Mbps or 10 Mbps)
- The interface duplex (full or half)

If you selected an FDDI interface, enter the interface duplex (full or half).

If you selected an ATM interface, specify the virtual circuit identifier (VCI) for the permanent virtual circuit to use.

If you selected a T1 interface, enter:

- The T1 encoding (AMI or B8ZS)
- The T1 framing (D4 or ESF)
- Enable ANSI FDL messages (Y/N)
- The DS0 timeslots (fractional T1 only)
- The DS0 timeslots (64 Kbps or 56 Kbps)
- The serial datalink (Cisco HDLC, PPP, or frame relay)
- The serial datalink configuration parameters, just as you do if you select a serial interface

If you selected a V.35 or X.21 serial interface, enter:

- The appropriate serial datalink (Cisco HDLC, PPP, or frame relay)
- Serial datalink configuration parameters, just as you do if you selected a serial interface

5. If you selected a serial interface, enter the configuration for the selected serial datalink protocol.
If you selected Cisco HDLC, enter the CHDLC keepalive interval (use 0 to disable keepalive).

If you selected PPP, specify the PPP keepalive interval.

If you selected frame relay, specify:

- The channel data-link connection identifier (DLCI) for the interface
- The frame relay LMI type (ANSI, CCITT, or frame relay Consortium)
- The interface type (DTE or DCE)
- The frame relay keepalive interval

6. Entering modem-configuration information

If your appliance contains an internal modem or if an external modem is connected to one of the appliance serial ports, you are prompted to specify the following configuration information:

- Enable logins on the modem (Y/N)
- Enable automatic dial-back for incoming calls on the modem (Y/N)
- If enabled, a number for the dial-back feature

In Voyager, see *Configuration: Security and Access Configuration: Network Access and Services: Modem Configuration*. Additional configuration in Voyager is required to set up the modem.

5.5 Confirming new system setup summary

Confirm the setup summary (type **Y**), or type **N** to make different selections. Selecting **Y** allows you to use the quit option (**4** in this example) to exit system startup.

5.6 Using Voyager to configure the network interfaces

Use the following information to configure the network interfaces for your Ethernet card. Resources for additional information about using Voyager are also provided in this section.

Opening Voyager

Start Netscape Navigator or Microsoft Internet Explorer on the host you will use to complete configuration of the IP700 Series appliance. In the *Location* or *Address* field, enter the IP address of the initial interface you configured on the appliance. You are prompted to enter the admin username and the password you entered earlier (see *Entering the passwords*).

Note

If the username pop-up menu does not appear, you might not have a network connection between the host and your IP700 Series appliance. Confirm the information you entered during the initial configuration and check that all cables are firmly connected.

Accessing Voyager reference information

The following reference information is available to you as you use the Voyager system: *Voyager Reference Guide* and Voyager inline help.

You can access both information sources from the Voyager interface, as the following figure shows.

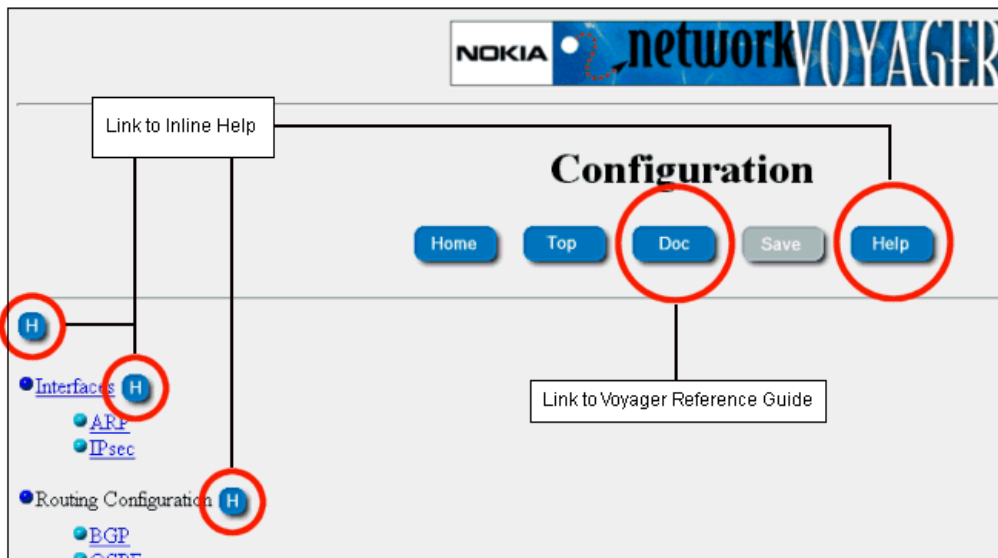


Figure 13. An example of how to access Voyager reference information

Voyager Reference Guide

The *Voyager Reference Guide* is the reference source for Voyager. To access this source, click **Doc**.

You can also access the *Voyager Reference Guide* at the Nokia support site (<https://support.nokia.com>) or on the CD that was delivered with your system (see `doc\voyager_guide.pdf`). Alternatively, you can order a printed copy.

Voyager Inline Help

You can access inline help when you are using Voyager. Inline help is the context-sensitive information source for Voyager.

To enable inline help for a specific subject, click the **H** button next to the subject. You can also click **Help** at the top of the Voyager window to get inline help for the entire Voyager window. To turn off inline help, click **Close**.

Voyager naming conventions

The following table provides names used in Voyager for the physical and logical names for each of the supported interfaces.

Interface	Physical Name	Logical Name
Four-port Ethernet (10 Mbps or 100 Mbps)	<code>eth-sslotport</code>	<code>eth-sslotportchannel</code>
Dual-port V.35 or X.21	<code>ser-sslotport</code>	<code>ser-sslotportchannel</code>
Single-port E1 with built-in channel service unit/data service unit (CSU/DSU)	<code>ser-sslotp1</code>	<code>ser-sslotp1channel</code>
Single-port T1 with built-in CSU/DSU	<code>ser-sslotp1</code>	<code>ser-sslotp1channel</code>
Single-port ATM	<code>atm-sslotp1</code>	<code>atm-sslotp1channel</code>
Single-port Gigabit Ethernet	<code>eth-sslotp1</code>	<code>eth-sslotp1channel</code>
Dual-port Gigabit Ethernet	<code>eth-sslotport</code> where port is 1 or 2 depending on which port on the card you are accessing.	<code>eth-sslotportchannel</code> where port is 1 or 2 depending on which port on the card you are accessing.

Using Voyager to monitor the IP700 Series appliance

After you install and configure your IP700 Series appliance, you can use Voyager to monitor its operation. Click **Monitor** from the Voyager home page to access the monitoring functions.

6

Connecting to the network

This chapter describes how to connect your IP700 Series appliance to other network devices through network interface cards and how to maintain those and other appliance components. These tasks are as follows:

- Connecting to Ethernet devices
- Connecting to V.35 or X.21 devices
- Connecting to E1 (built-in CSU/DSU) devices
- Connecting to T1 (built-in CSU/DSU) devices
- Connecting to ATM devices
- Connecting to Gigabit Ethernet devices
- Connecting to a modem



Warning

When you are handling a card, take care not to damage the EMI shield on the top edge of the face plate.



Caution

Protect your IP700 Series appliance and other electronic equipment from static discharge by making sure you are properly grounded before you touch any electronic components

Note

The IP700 series platform supports only *cPCI v2* compatible interface cards. Accordingly, E1, T1, ATM, and V.35/X.21 cards marked *cPCI v2* are the only versions of those cards that function properly in IP700 Series appliances.

Most NIC cards developed for earlier Nokia IP platforms are *cPCI v1* compatible and do not work in the IP740. The only exceptions are the Gigabit Ethernet card and the newest of the quad ethernet cards.

6.1 Connecting to Ethernet devices

Every IP700 Series appliance has four dual-mode 10-Mbps and 100- Mbps ports. Additionally, the appliance supports Nokia-approved, four-port UTP5 dual-mode 10-Mbps and 100-Mbps Ethernet cards. The card supports the following features:

- Hot swappability
- Tracing through tcpdump

You can configure and monitor Ethernet interfaces with Voyager, the Web-based configuration and monitoring program. Specifically, you set the port speed and full-duplex or half-duplex mode through Voyager. For information about how to access Voyager and the related reference materials, see *Using Voyager to configure the network interfaces*.

Built-in Ethernet ports

The following figure shows the layout of the built-in Ethernet ports and LEDs.

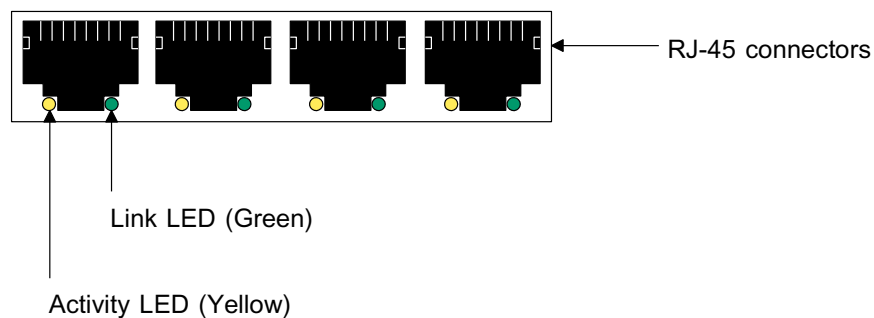


Figure 14. Built-in Ethernet interface front panel details

Front panel details

The following figure shows the front panel layout of a typical Ethernet card.

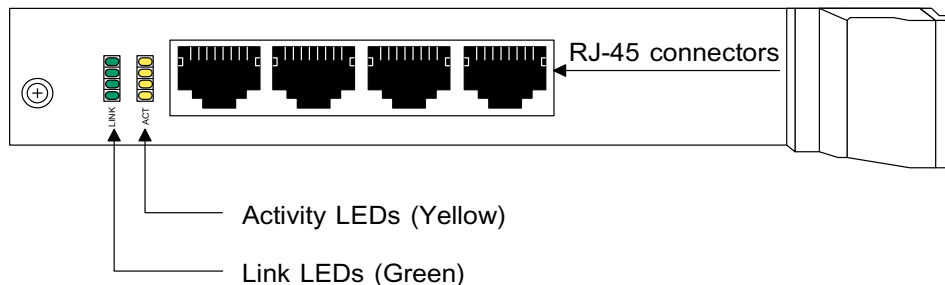


Figure 15. Typical four-port Ethernet network interface card front panel details

Note

Although Nokia distributes two versions of the quad-port Ethernet cards, only one is compatible with the IP700 Series platform. The connector on the back of the correct quad-port Ethernet card runs across the entire width of the card, while the connector on the back of the incompatible quad-port Ethernet card runs only halfway across the width of the card.

Hardware setup

When you specify that an Ethernet NIC is to be included with your IP700 Series appliance, the board is installed before the appliance is delivered to you.

Connectors and cables

The Ethernet connectors on the appliance and on the card are RJ-45. To connect to a 10-Mbps or 100-Mbps hub, use a straight-through RJ-45 cable. To connect directly to a host, use an RJ-45 crossover cable wired as the following figure shows.

You can order appropriate adapter cables separately. You can also order additional cables from a cable vendor of your choice.



Caution

Cables connecting to any of the Ethernet ports must use a minimum of 26-AWG wire.

In the following figures, the RJ-45 cable output connector is numbered from right to left, with the copper tabs facing up and toward you.

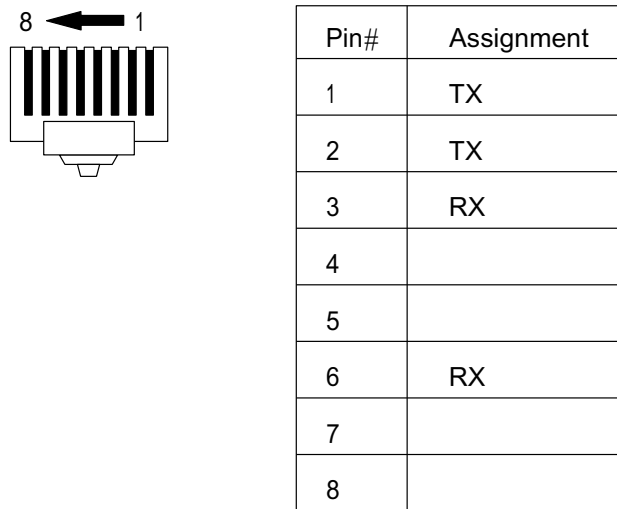


Figure 16. Output connector for the Ethernet cable

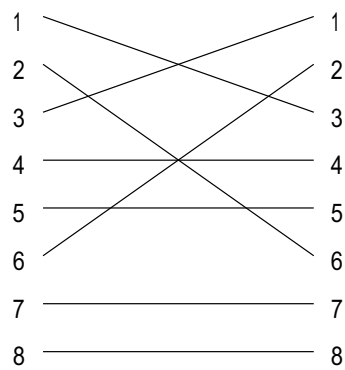


Figure 17. Ethernet crossover-cable pin connections

Note

After the power is turned on, the Ethernet link LEDs on both the IP700 Series appliance and on the remote equipment light up to indicate the connection. As data is transmitted, the activity LEDs on the appliance are illuminated.

6.2 Connecting to V.35 or X.21 devices

The IP700 Series appliance supports Nokia-approved, dual-port V.35 and X.21 cards. The cards support the following features:

- Line speed to full T1 and E1
- Hot swappability
- Tracing through tcpdump
- Conformance with RFC 1661 (PPP), 1662 (PPP in HDLC-like framing), 1332 (PPP-IPCP), 1490 (frame relay), and Cisco HDLC

You can configure and monitor V.35 and X.21 interfaces with Voyager, the Web-based configuration and monitoring program. For information about how to access Voyager and the related reference materials, see *Using Voyager to configure the network interfaces*.

Front panel details

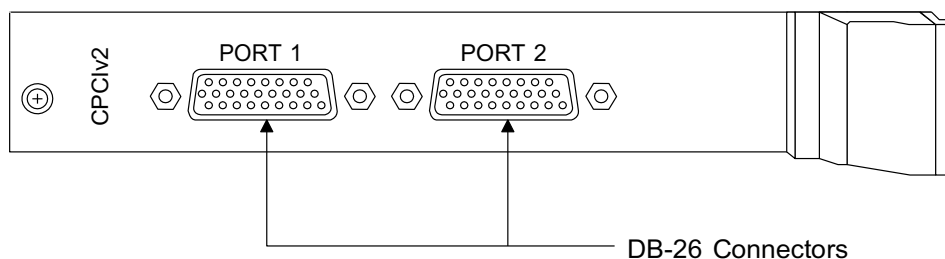


Figure 18. Typical dual-port V.35 or X.21 network interface card front panel details

Note

V.35 or X.21 cards marked *cPCI v2* are the only versions of this card that function properly in IP700 Series appliances.

Hardware setup

When you specify that a V.35 or X.21 NIC is to be included with your IP700 Series appliance, the board is installed before the appliance is delivered to you. You can also order V.35 or X.21 NICs separately after an IP700 Series appliance is delivered to you.

In most cases, you connect the card to a CSU/DSU. If you are connecting the card to a CSU/DSU, and the CSU/DSU can provide a clock, select external clock (the default value) in the physical configuration section in the Voyager configuration program. If the CSU/DSU cannot supply a clock, select internal clock and set the clock speed in Voyager. You can, however, connect the card directly to a frame relay switch or to a platform serial port on a Cisco network application. You can also connect the card directly to any appliance with a DCE serial port.

Connectors and cables

The connector on the card is a V.35 or X.21. To connect the card to a CSU/DSU, use a straight-through V.35 or X.21 cable. To connect the card directly to a Cisco network application platform, use a Cisco DCE cable. You can order appropriate adapter cables separately.

To determine the type of interface (V.35 or X.21), look at the connector on the front panel of the card. The following figures show the physical configuration for each connector type.

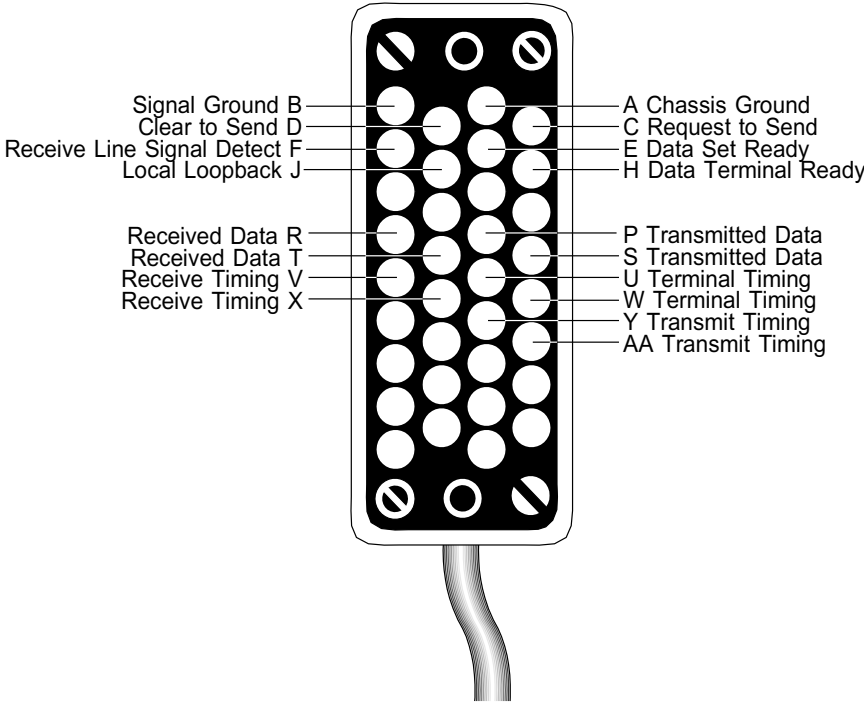


Figure 19. Output connector for the V.35 cable

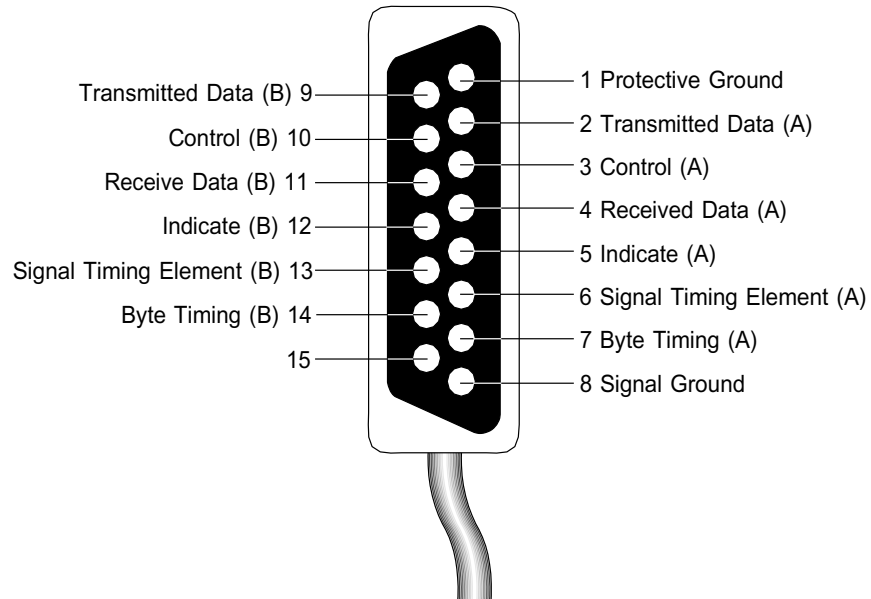


Figure 20. Output connector for the X.21 cable

6.3 Connecting to E1 (built-in CSU/DSU) devices

The IP700 Series appliance supports Nokia-approved, single-port E1 cards. The card supports the following features:

- Direct, high-speed access for network connections over leased lines
- Operation at 2.048 Mbps (with onboard HDLC and Frame controllers support)
- Up to 24 channels per card
- Built-in CSU/DSU
- Line speed to full E1
- Hot swappability
- Tracing through tcpdump
- Conformance with RFC 1661 (PPP), 1662 (PPP in HDLC-like framing), 1332 (PPP-IPCP), and Cisco HDLC
- Compliance with ITUT G703

You can configure and monitor E1 interfaces with Voyager, the Web-based configuration and monitoring program. For information about how to access Voyager and the related reference materials, see *Using Voyager to configure the network interfaces*.

Front panel details

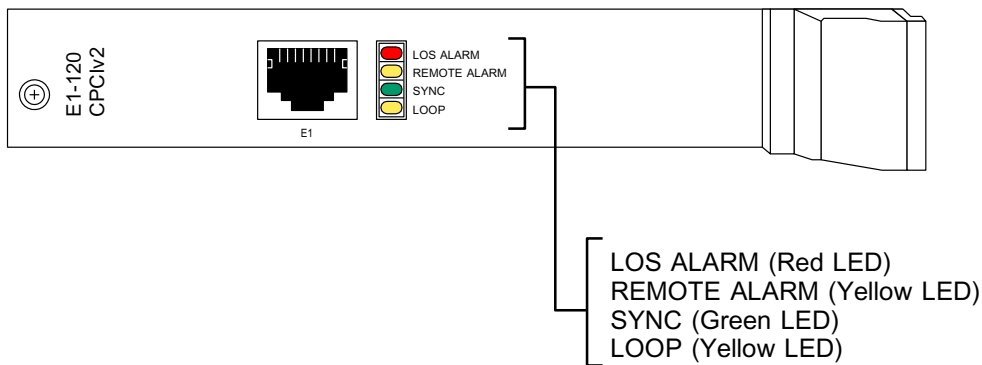


Figure 21. Typical E1 network interface card front panel details

Note

E1 cards marked *cPCI v2* are the only versions of this card that function properly in IP700 Series appliances.

Hardware setup

When you specify that an E1 card is to be part of your IP700 Series appliance, the board is installed before the appliance is delivered to you. In most cases, you connect the card to a E1 service provider. You can, however, connect the card directly to another CSU/DSU.

Connectors and cables

The connector on the card is an RJ-48. To connect the card to an E1 service, use a straight-through RJ-48 cable. To connect the card to another CSU/DSU, use an RJ-48 crossover cable wired as the following figure shows.

You can order appropriate adapter cables separately. You can order additional cables from a cable vendor of your choice.



Caution

Cables connecting to the E1 card must use a minimum of 26-AWG wire.

In the following figures, the RJ-48 cable output connector is numbered from right to left, with the copper tabs facing up and toward you.

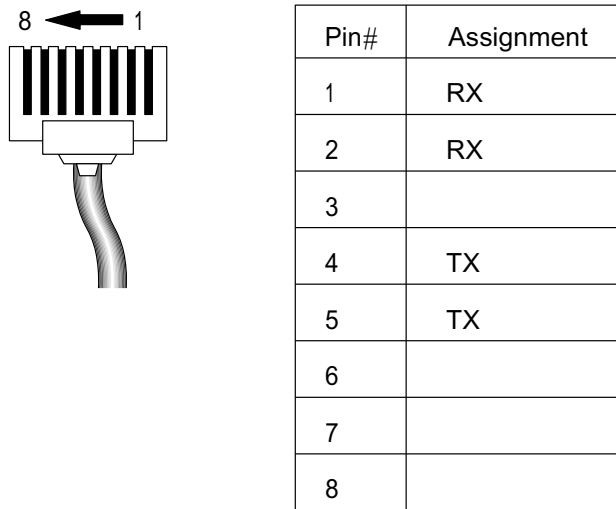


Figure 22. Output connector for the E1 cable

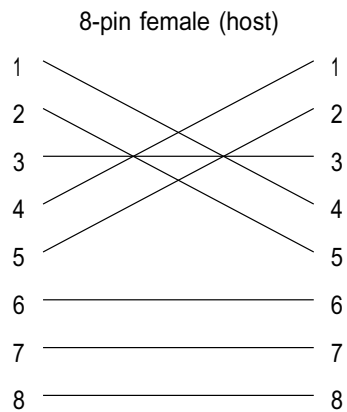


Figure 23. E1 crossover cable pin connections

6.4 Connecting to T1 (built-in CSU/DSU) devices

The IP700 Series appliance supports Nokia-approved, single-port T1 cards.

The T1 cards provide the following features:

- Built-in CSU/DSU for lengthy and short operations
- Line speed to full T1
- High-speed access for network connections over leased lines
- Built-in HDLC and Frame controllers, which allow operation at 1.544 Mbps
- Up to 24 channels per card (IPSO supports only fractional channels)
- Fractional T1
- Tracing through tcpdump
- Conformance with RFC 1661 (PPP), 1662 (PPP in HDLC-like framing), 1332 (PPP-IPCP), 1490 (frame relay), RFC 1406 (DS1 MIB support), and Cisco HDLC
- Compliance with ANSI T1.403

You can configure and monitor T1 interfaces with Voyager, the Web-based configuration and monitoring program. For information about how to access Voyager and the related reference materials, see *Using Voyager to configure the network interfaces*.

Front panel details

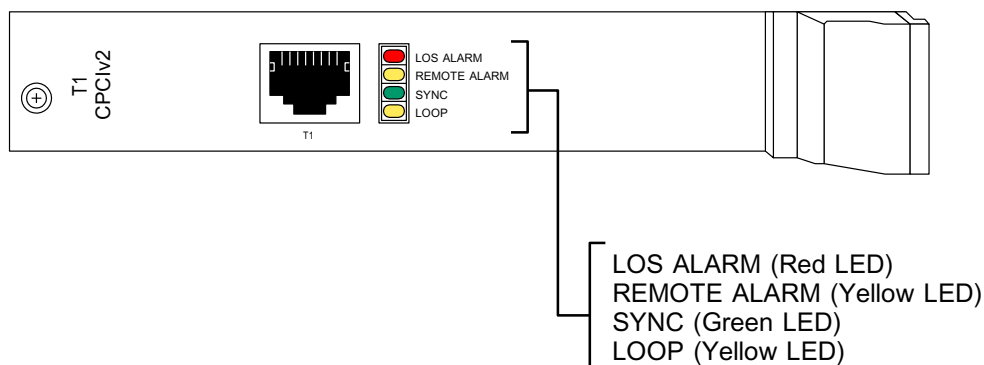


Figure 24. Typical Nokia T1 network interface card front panel details

Note

T1 cards marked cPCI v2 are the only versions of this card that function properly in IP700 Series appliances.

Hardware setup

When you specify that a T1 NIC is to be included with your IP700 Series appliance, the board is installed before the appliance is delivered to you.

In most cases, you connect the card to a T1 service provider. You can, however, connect the card directly to another CSU/DSU.

Connectors and cables

The connector on the card is an RJ-48. To connect the card to a T1 device, use a straight-through RJ-48 cable. To connect the card to another CSU/ DSU, use an RJ-48 crossover cable wired as the following figure shows.

You can order appropriate adapter cables separately. You can also order additional cables from a cable vendor of your choice.



Caution

Cables connecting to the T1 card must use a minimum of 26- AWG wire.

In the following figures, the RJ-48 cable output connector is numbered from right to left, with the copper tabs facing up and toward you.

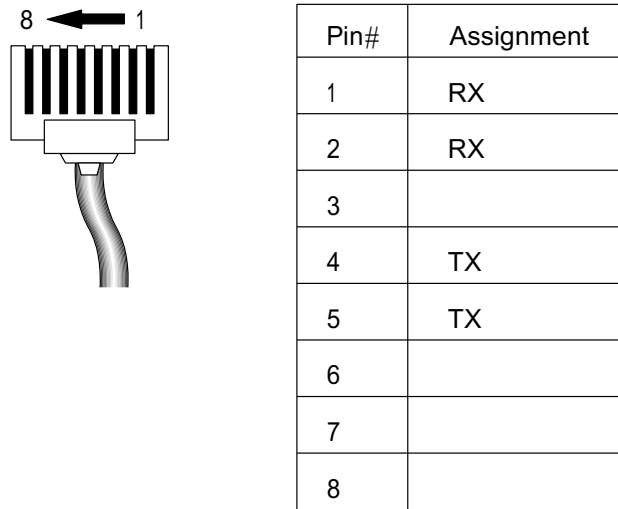


Figure 25. Output connector for the T1 cable

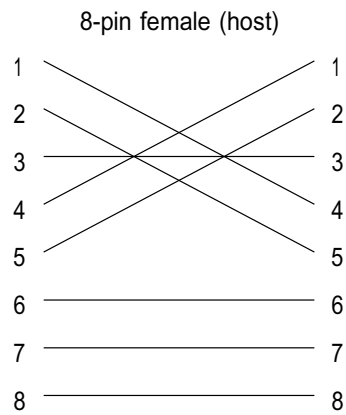


Figure 26. T1 crossover cable pin connections

6.5 Connecting to ATM devices

The IP700 Series appliance supports Nokia-approved ATM cards. The card supports the following features:

- Hot swappability
- Tracing through tcpdump
- Conformance with RFC 1483 for a default MTU value of 9180 bytes

You can configure and monitor ATM interfaces with Voyager, the Web-based configuration and monitoring program. For information about how to access Voyager and the related reference materials, see *Using Voyager to configure the network interfaces*.

Front panel details

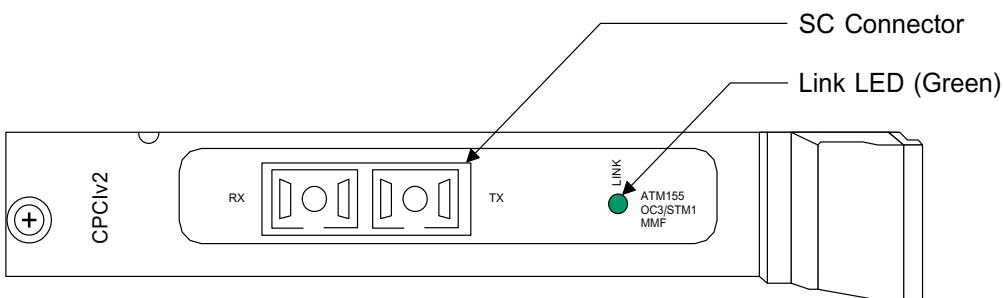


Figure 27. Typical ATM network interface card front panel details

Note

ATM cards marked *cPCI v2* are the only versions of this card that function properly in IP700 Series appliances.

Hardware setup

When you specify that an ATM NIC is to be included with your IP700 Series appliance, the board is installed before the appliance is delivered to you.

Connectors and cables

To connect the card to an ATM device, use a multimode, fibre-optic cable with an SC output connector.

You can order appropriate adapter cables separately. You can also order additional cables from a cable vendor of your choice.

6.6 Connecting to Gigabit Ethernet devices

The IP700 Series platforms support Nokia-approved, single-port and dual-port Gigabit Ethernet cards. The cards provide the following features:

- High bandwidth
- Operation at 32- or 64-bit, 33-or 66 MHz
- Full-duplex mode operation at 1 Gbps (no half-duplex support)
- Hardware- and software-based auto negotiation
- Hot swappability
- Tracing through tcpdump
- Compliance with PCI Industrial Computer Manufacturers Group (PICMG) cPCI specification version 2
- Compliance with IEEE 802.3z Gigabit Ethernet specification

The IP700 Series appliances can accommodate one or more Gigabit Ethernet NICs.

You can configure and monitor Gigabit Ethernet interfaces with Voyager, the web based configuration and monitoring program. See *Using Voyager to configure the network interfaces* for information about accessing Voyager and locating relevant reference materials.

IPSO version requirement

To use a dual-port Gigabit Ethernet NIC with your appliance, you must run IPSO 3.5 or later.

Front panel details of a single-port Gigabit Ethernet interface card

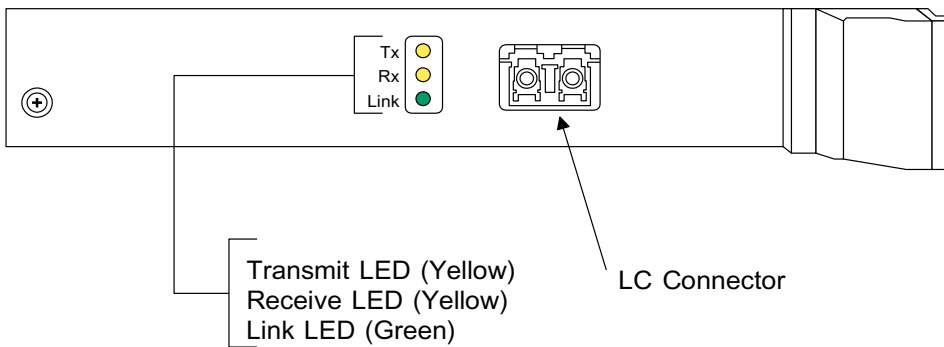


Figure 28. Single-port Gigabit Ethernet network interface card front panel details

Front panel details of a dual-port Gigabit Ethernet card

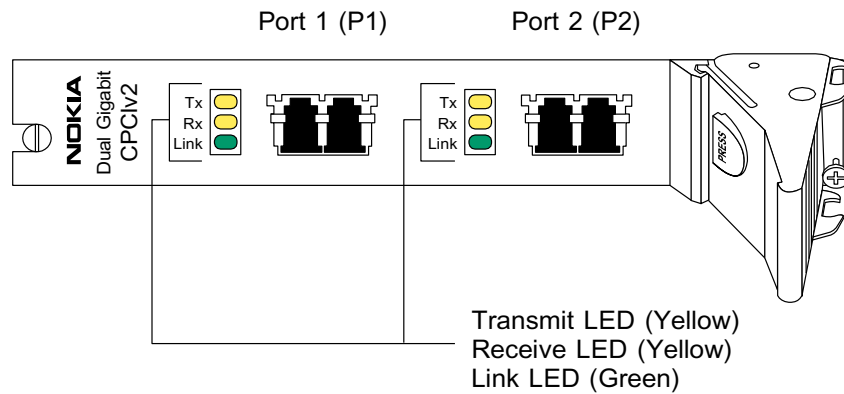


Figure 29. Dual-port Gigabit Ethernet network interface card front panel details

Hardware setup

When you specify that a Gigabit Ethernet NIC is to be included with your IP700 Series appliance, the board is installed before the appliance is delivered to you. You connect the card to compatible network components using appropriate interface cables as described in the following section.

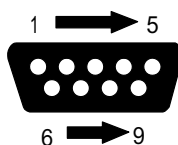
Connectors and cables

To connect the card to other network components, use a multimode, fibre-optic cable with an LC connector for each card interface. The destination end of the cable can be either LC or SC, depending on the type of connector required for the destination Gigabit Ethernet device. You can also use an LC-to-LC cable for loopback purposes.

An LC-to-SC cable is included with single-port Gigabit Ethernet NICs, and two LC-to-SC cables are included with dual-port Gigabit Ethernet NICs. You can order additional cables from a cable vendor of your choice.

6.7 Connecting to a modem

The following figure provides pin assignment information for modem connections.



Pin#	Input/Output	To DB25 Cable Out	To DB9 Cable Out
1 (DCD)	Input	8 (DCD)	7 (RTS) 8 (CTS)
2 (RXD)	Input	2 (TXD)	3 (TXD)
3 (TXD)	Output	3 (RXD)	2 (RXD)
4 (DTR)	Output	20 (DTR)	6 (DSR) 9 (RI)
5 (GND)		7 (GND)	5 (GND)
6 (DSR)	Input	6 (DSR)	4 (DTR)
7 (RTS)	Output	4 (RTS)	1 (DCD)
8 (CTS)	Input	5 (CTS)	1 (DCD)
9 (RI)	Output	22 (RI)	4 (DTR)

Figure 30. Pin assignments for modem connections

7

Installing the Nokia encryption accelerator card

This chapter contains information about the Nokia encryption accelerator card for the IP700 series appliance. The card provides high-speed cryptographic processing that enhances performance. The accelerator card comes in a cPCI format for the IP700 series appliances.

Note

When you specify that a Nokia accelerator card is to be included with a Nokia appliance, the card is installed before the appliance is delivered to you.

The accelerator card has no external cable connection ports and requires no cables.

Note

The encryption accelerator card functions only with IPSO 3.4.1 or greater and with Check Point VPN-1 FireWall 4.1 SP4 or greater.

The accelerator card software package is part of IPSO 3.4.1, so the appliance automatically detects and configures the card. See these topic for tasks related to installing the encryption accelerator card:

- Installing the encryption accelerator card
- Enabling the encryption accelerator card

7.1 Installing the encryption accelerator card

When you specify that a Nokia encryption accelerator card is to be included with an IP700 series appliance, the card is installed before the appliance is delivered to you. If you purchase an accelerator card separately, use the following information to install the card.

What you need

Before you install the card, you need:

- Physical access to the unit
- A Phillips-head screwdriver
- Four screws (included in packaging)
- A disposable wrist strap (included in packaging)

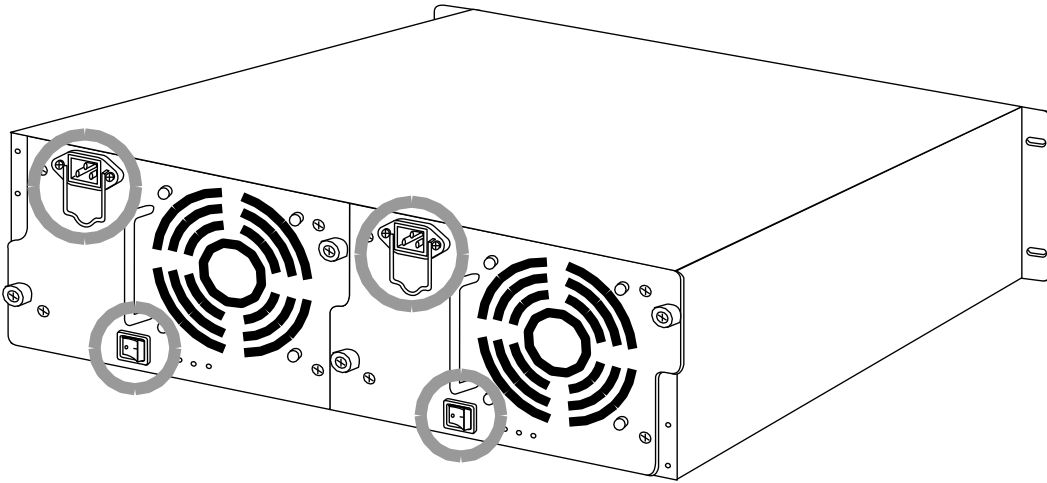


Warning

To help guard against electrostatic discharge, follow the instructions on the wrist strap envelope before you handle the accelerator card or open the appliance.

Before you install the card, perform the following tasks:

1. Use Voyager or Lynx to shut down the appliance.
2. Turn off both power switches on the rear of the appliance and remove both power cords from the power supplies.
3. Confirm that the two cooling-fan blade assemblies are no longer turning.



Installing the encryption accelerator card

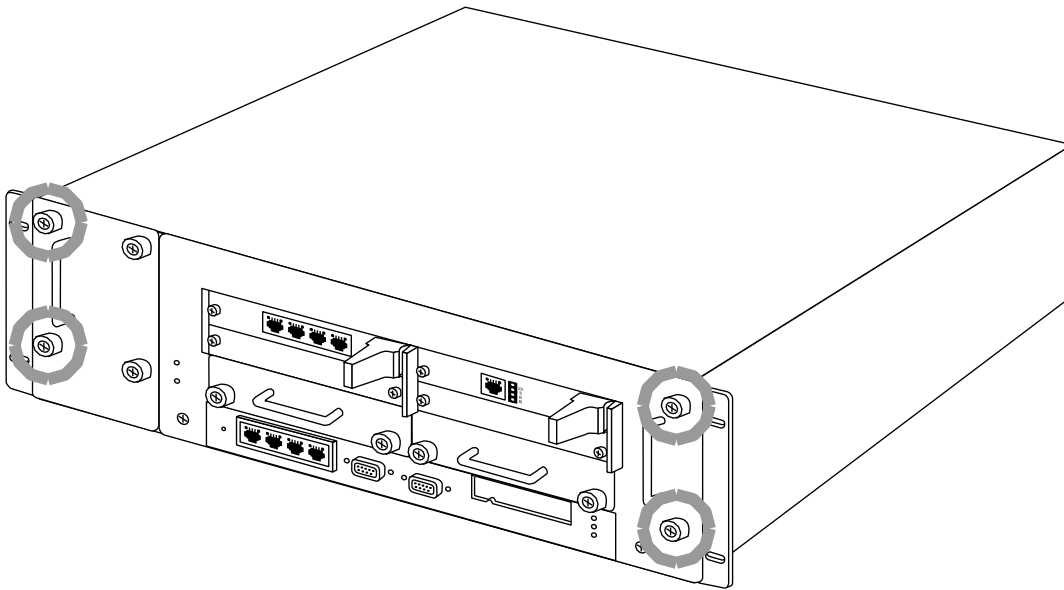


Warning

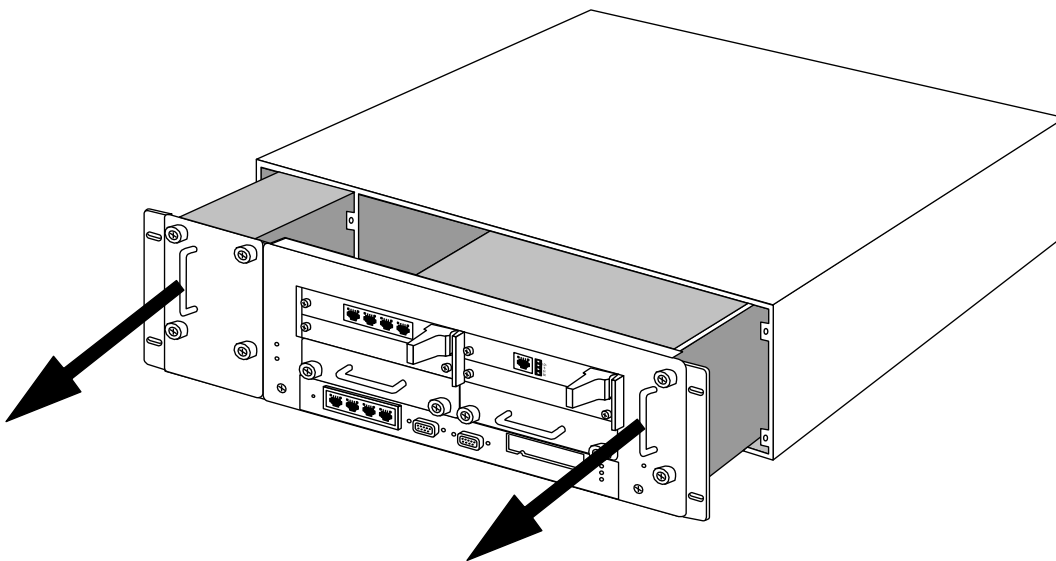
Before you open the appliance, be sure to disconnect power to the unit to minimize the risk of electrical shock.

Use the following procedure to install the accelerator card.


1. Loosen the four front-panel thumbscrews indicated in the following figure.



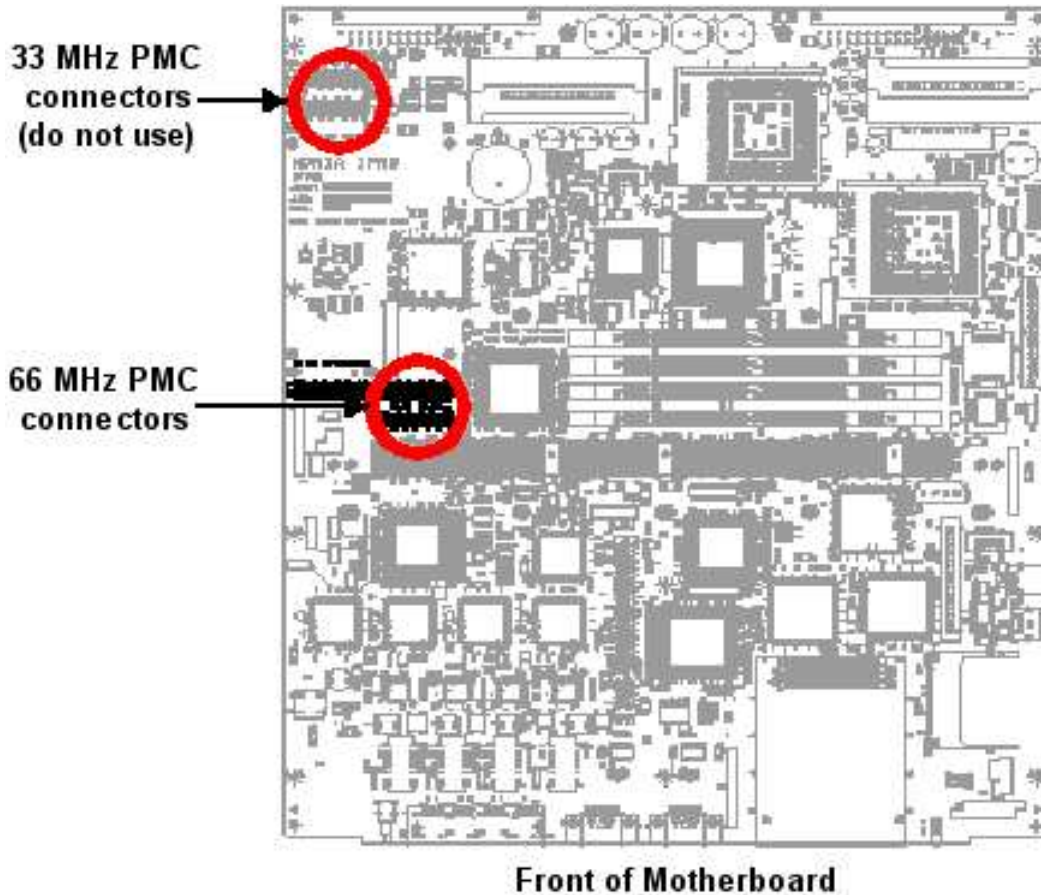
2. Slide the chassis assembly forward to expose the motherboard components, as the following figure shows.



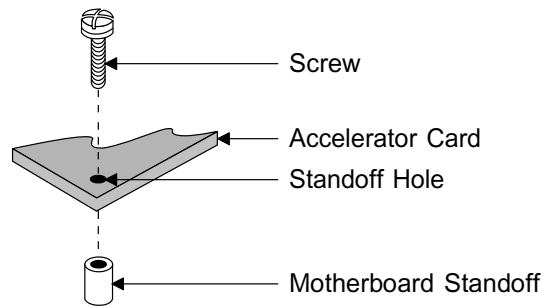
3. Locate the 66-MHz PMC connectors on the motherboard.

 **Caution**

Two 33-MHz connectors are also located on the motherboard. Do not use the 33-MHz connectors, as using them impairs performance.



4. Position the male PMC connectors on the card over the female PMC connectors on the motherboard.
The two sets of connectors should be aligned with each other. The four screw holes and four standoffs should also be aligned with one another.
5. Push down on the card until it is properly seated on the motherboard.
6. Place the screws through the standoff holes on the card and into the standoffs on the motherboard



7. Turn each screw clockwise so that the card is attached to the standoffs. Do not tighten completely.
8. Make sure that all four standoff connections are properly aligned.
9. To secure the connections, tighten the screws firmly, but do not tighten too much.

Final installation steps

After you install the accelerator card, perform the following procedure:

1. Slide the chassis assembly back into the appliance and resecure the four thumbscrews.
2. Reattach the power cords.
3. Turn on the power.
4. Enable the card.

For more information, see *Enabling the Encryption Accelerator Card*.

7.2 Enabling the encryption accelerator card

After you install an encryption accelerator card, use Voyager to enable it. The encryption accelerator card link does not appear in Voyager until the card is installed.

Note

You cannot enable the accelerator card before you install it. The options in Voyager for enabling the card do not appear until it is installed.

The way you enable the card depends on whether you create virtual private network (VPN) tunnels with Voyager or with Check Point software.

If you use Voyager to create a VPN tunnel, see *Enabling the accelerator card for an IPSO VPN*. If you use Check Point software to create a VPN tunnel, see *Enabling the accelerator card for a Check Point VPN*.

Enabling the accelerator card for an IPSO VPN

1. Start Nokia Network Voyager for your appliance.
2. On the Voyager home page, click **Config**.
3. Under Interfaces, click **IPSec**.
4. Scroll down and click *IPSec Advanced Configuration*.
5. At *Hardware Device Configuration*, click **On**.
6. Click **Apply** to enable the card.

Enabling the accelerator card for a Check Point VPN

1. Start Nokia Network Voyager for your appliance.
2. On the Voyager home page, click **Config**.
3. Scroll down to *Security and Access Configuration* and click *Cryptographic Hardware Acceleration*.
4. At *Hardware Device Configuration*, click **On**.
5. Click **Apply** to enable the card.

You can also monitor Nokia encryption accelerator card interfaces with Voyager. For more information about accessing Voyager and locating relevant reference materials, see the *Voyager Reference Guide*.

8

Using the boot manager

The IP700 Series platform incorporates a boot manager in a flash disk to control the boot-up process. The boot manager allows you to perform a number of tasks, including the following:

- Booting from alternate kernels, which might reside on non-default devices or directories
- Installing new versions of IPSO (the operating system)
- Obtaining system information
- Performing various housekeeping tasks

The boot manager provides commands that allow you to boot from a specified kernel, which typically resides on an appliance hard-disk drive unit. These tasks and the boot manager commands are discussed in the following sections:

- Variables
- Booting the system
- Using the boot manager to install IPSO
- Protecting the boot manager with a password
- Installing boot manager
- Upgrading boot manager

When you first receive your IP700 Series appliance, boot manager uses factory-default parameters (kernel, boot device, and so on) for the boot process. The factory defaults cause the appliance to bypass the boot manager prompt after a five-second wait. You can change these defaults to reflect your own needs, or you can use different parameters in the command line at boot time. The boot manager maintains the default values of these parameters in flash memory. You can set these values using boot manager commands.

This chapter describes the boot manager commands.

8.1 Variables

The boot manager stores a number of variables in non-volatile memory. You can set and view most variables from the boot manager prompt. The variables are:

`boot manager revision`: The version number of the boot manager. You cannot set this variable from the command line.

`autoboot`: If `autoboot` is set to `no`, the IP700 Series appliance stops at the boot manager command line during the boot process. If `autoboot` is set to `yes`, the IP700 Series appliance does not stop at the boot manager command line during the boot process. It does wait for the amount of time specified in `bootwait` for input from the keyboard. If input is received, the boot manager goes to the command line; otherwise, it proceeds with the boot up.

Factory default: `yes`.

`bootwait`: The amount of time, in seconds, the boot manager waits for input during a boot up when `autoboot` is set to `yes`.

Factory default: five seconds.

`boot-file`: The name of the file to use as the operating system kernel.

Factory default: `/image/current/kernel`.

`boot-flags`: The string of flags that is passed to the kernel.

Factory default: `-x`.

The following table lists possible boot flags.

Flag	Meaning
<code>-d</code>	Debug mode. Enters the kernel debugger as soon as possible in the kernel initialization.
<code>-s</code>	Single-user mode. If the console is marked as insecure, the root password must be entered to access the manager.
<code>-v</code>	Verbose mode. Verbose during device probing and thereafter.
<code>-x</code>	Do not identify the flash disk as <code>wd0</code> . This command is always needed for the IP700 Series appliances and is automatically entered by the boot manager.

`boot-device`: The device from which the boot file loads.

Factory default: `wd0`.

Options: `wd0` (hard-disk drive unit).

Viewing variable values and other system parameters

printenv

Use the `printenv` command to view the values of variables currently stored in the boot manager nonvolatile memory. The command has the following form:

```
printenv
```

For example:

```
BOOTMGR[ 93] > printenv

Bootmgr Revision: 3.2.1,base kernel=
3.2.1-fcs1 11.24.1999-102644

autoboot: YES

bootwait: 5

boot-file: /image/current/kernel

boot-flags: -x

boot-device: wd0

BOOTMGR[ 94] >
```

showalias

Use the `showalias` command to view the values of the aliases currently stored in the boot manager nonvolatile memory. The command has the following form:

```
showalias
```

For example:

```
BOOTMGR[ 46] > showalias

The current aliases list are:

Alias 0: disk1 aliased to wd1

Alias 1: disko aliased to wd0
```

```
Alias 2: disk3 aliased to wd3
Alias 3: net1 aliased to eth-s3p1
Alias 4: net2 aliased to eth-s3p2
Alias 5: <empty>
Alias 6: <empty>
Alias 7: <empty>
BOOTMGR[ 47] >
```

sysinfo

Use the `sysinfo` command to view system information such as CPU speed, memory size, and so forth. The command has the following form:

```
sysinfo
```

For example:

```
BOOTMGR[ 1] > sysinfo

CPU 0: 1000 MHz Pentium-III w ATC

Memory: 536870912 (512M bytes)

Disk Devices:

      IO port 0x1f0 wdc0: unit 1 (wd0):
<IC35L020AVER07-0>
      20576MB (40188960 sectors),
2501 cyls, 255 heads, 63 S/T, 512 B/S
      IO port 0x1f0 wdc0: unit 0 (wd1):
<SanDisk SDCFB-8>
      8MB (15680 sectors), 15 cyls,
16 heads, 63 S/T, 512 B/S

Network Interfaces:

eth-s3p1:
flags=130 <BROADCAST,MULTICAST,PRESENT>

      ether 0:a0:8e:40:92:34 speed 1000M
full duplex

loop0: flags=10b <UP,LINK,LOOPBACK,PRESENT>

soverf0:
flags=2923flagsUP,LINK,MULTICAST,PRESENT,IPV6ONLY>
```

```
stof0: flags=2903<UP, LINK, PRESENT, IPV6ONLY>
tun0: flags=107<UP, LINK, POINTOPOINT, PRESENT>
eth1: flags=130<BROADCAST, MULTICAST, PRESENT>
ether 0:a0:8e:40:92:3e speed 10M half duplex
eth2: flags=130<BROADCAST, MULTICAST, PRESENT>
ether 0:a0:8e:40:92:3f speed 10M half duplex
eth3: flags=130<BROADCAST, MULTICAST, PRESENT>
ether 0:a0:8e:40:92:3c speed 10M half duplex
eth4: flags=130<BROADCAST, MULTICAST, PRESENT>
ether 0:a0:8e:40:92:3d speed 10M half duplex
BOOTMGR[ 2] >
```

ls

Use the `ls` command to view the contents of directories on the devices in your IP700 Series appliance. The command has the following form:

```
ls device directory
```

where **device** is the device that contains the directory you want to look at, and **directory** is the directory on that device. Both device and directory are optional. The default directory is `/image` on the `wd0` device.

For example:

```
BOOTMGR[ 2] > ls wd0 /image/current
Device wd0 Directory /image/current:
VERSION
.description
kernel
bin
cdrom
...
```

Setting the variables

setenv

Use the `setenv` command to set a particular variable. The command has the following form:

```
setenv name value
```

where **name** is the name of the variable, and **value** is the new value you want the variable to assume.

For example:

```
BOOTMGR[ 2] > setenv autoboot yes
```

sets the value of `autoboot` to be `yes`.

unsetenv

Use the `unsetenv` command to clear a particular variable. The command has the following form:

```
unsetenv name
```

where **name** is the name of the variable to be cleared.

For example:

```
BOOTMGR[ 2] > unsetenv boot-file
```

clears the `boot-file` variable.

Note

The `autoboot` variable is set to `no`, and the `bootwait` variable is set to zero (`0`) by this command.

set-defaults

Use the `set-defaults` command to set variables to their factory-default values. The command has the following form:

```
set-defaults name
```

where **name** is the name of the variable to be set to its factory default. If name is not specified, all variables are set to their factory defaults.

For example:

```
BOOTMGR[ 2] > set-defaults autoboot
```

sets the value of `autoboot` to be `yes`, the factory default.

setalias

Use the `setalias` command to set an alias. The command has the following form:

```
setalias name device
```

where **name** is the alias name, and **device** the device for which **name** is the alias.

For example:

```
BOOTMGR[ 2] > setalias disk wd0
```

sets the alias `disk` to have the value of `wd0`.

You can have a maximum of eight aliases set at one time.

unsetalias

Use the `unsetalias` command to clear an alias. The command has the following form:

```
unsetalias name
```

where **name** is the name of the alias to be cleared.

For example:

```
BOOTMGR[ 2] > unsetalias disk
```

deletes the `disk` alias from the list of aliases.

Other commands

halt

Use the `halt` command to halt the system. The command has the following form:

```
halt
```

help

Use the `help` command to display a list of the available commands. The command has the following forms:

```
help
```

```
or
```

```
?
```

8.2 Booting the system

The `boot` command lets you boot up the operating system (IPSO). It allows you to set the boot device, boot file, and boot flags from the command line.

The command has the following form:

```
boot boot-device boot-file boot-flags
```

where **boot-device** is the storage device from which the operating system loads at boot up and **boot-file** is the operating system kernel. The **boot-flags** control the operation of the command. For a list of possible boot flags see the boot flag table in *Variables*.

For example, at the boot-manager command prompt enter the following:

```
BOOTMGR[ 0] > boot wd0 /image/current/mykernel -vd
```

This command boots *mykernel* from disk *wd0* in verbose and debug mode.

You can supply all, any, or none of the arguments. If you do not supply an argument, the boot manager uses the default. It first searches its non-volatile memory to see if the corresponding default argument is specified there. If so, it uses that value; if not, it defaults to the default listed in the following table.

Argument	Default
boot-device	wd0 (the hard-disk drive unit)
boot-file	/image/current/kernel
boot-flags	-x

8.3 Using the boot manager to install IPSO

The form of the `install` command is:

```
install
```

Note

Refer to the appropriate version of release notes for complete installation procedures.

Note

A full installation using the `install` command deletes the existing database on the IP700 Series appliance.

To install a new copy of the operating system (IPSO) kernel using the boot manager, perform the following steps:

1. At the boot manager command prompt, enter:

```
BOOTMGR[ 0] >install
```

If you used the `passwd` command to protect this command with a password, the boot manager prompts you for your password before allowing you to execute the `install` command.
2. Enter the information the `install` command requests (your system IP address, the server IP address, and other information).
3. Reboot the IP700 Series appliance.

8.4 Protecting the boot manager with a password

To prevent accidental or unauthorized access to the IP700 Series appliance hard-disk drive unit, you can require that the user enter a password to access the `install` command in boot manager. Use the `passwd` command to set the password.

Note

The password you enter here is the password that gives you access to the `install` command in boot manager, not access to IPSO.

To set a password, perform the following steps:

1. At the boot-manager command prompt enter:

```
BOOTMGR[ 0] > passwd
```

The `passwd` program prompts you for your current password.
 2. If the appliance is protected by a password, enter your current password.
The program prompts you for the new password.
 3. Enter the new password.
The program prompts you to re-enter the new password for verification.
 4. Enter the new password again.
-

Note

If you forgot your password, the boot manager requires you to prove that you have physical access to the appliance before allowing you to set a new one. Perform the following steps to create a new password:

1. Turn off the power to the IP700 Series appliance.
2. Remove the hard-disk drive unit from the IP700 Series appliance.
3. Turn on the power to the IP700 Series appliance.
4. Re-execute the `passwd` command from the boot manager.
5. Enter your new password.
6. Turn off the power to the IP700 Series appliance.

7. Reinstall the hard-disk drive unit.
 8. Turn on the power to IP700 Series appliance.
-

8.5 Installing boot manager

The boot manager is installed at the factory. If you should need to reinstall the boot manager, contact the appropriate Nokia customer support site for instructions and a new boot manager. The command to install the boot manager has the following form:

```
install_bootmgr boot-device boot-file
```

where **boot-device** is the storage device to which you write the new boot manager image and from which the boot manager image loads at boot up. **Boot-file** is the new boot manager. The new boot-manager options are *cpiflash*, *cpvpnflash*, *nkipflash*, and *nkvpnflash*. Execute the `install_bootmgr` command from IPSO (the operating system), not from the boot manager.

Note

To install the new boot manager, you must be in single-user mode.

For example, to install the new boot manager, complete the following steps:

1. Start the appliance in single-user mode.
2. At the IPSO command prompt, enter:

```
/etc/install_bootmgr wd1 /etc/nkipflash
```

The command installs the new boot-manager image (*nkipflash*) into the flash device (*wd1*). The installation takes some time to complete. Do not interrupt the installation process.

8.6 Upgrading boot manager

The command to upgrade your boot manager has the following form:

```
upgrade_bootmgr boot-device boot-file
```

where **boot-device** is the storage device from which the boot manager loads at boot up and **boot-file** is the new boot-manager image. The new boot manager options are *cpipflash*, *cpvpnflash*, *nkipflash*, and *nkvpnflash*. Execute the `upgrade_bootmgr` command from IPSO (the operating system), not from the boot manager.

Note

Refer to the appropriate version of release notes for complete upgrade procedures.

Note

Upgrade support for disk drive units equal to or greater than 8.4 Gb is found in the IPSO 3.2.1 release notes.

Note

To install the new boot manager, you must be in single-user mode.

For example, to upgrade the boot manager in your IP700 Series appliance, perform the following steps:

1. Obtain the upgraded boot manager image from the appropriate Nokia customer support site.
2. Start the IP700 Series appliance in single-user mode.
3. At the IPSO command prompt, enter:

```
/etc/upgrade_bootmgr wd1 /etc/nkipflash
```

The command upgrades the boot manager with the new image (*nkipflash*), writing it into the flash device (*wd1*). The upgrade takes some time to complete. Do not interrupt the upgrade process.

9

Troubleshooting the IP700 Series appliance

This chapter provides troubleshooting tips, problems, and solutions related to IP700 Series appliance installations.

Note

To reinstall the operating system (IPSO) on your appliance, see Chapter *Using the boot manager* for instructions.

9.1 General troubleshooting information

The information in this section relates to problems that might occur that are not related to routing problems. For troubleshooting information specific to routing problems, see *Troubleshooting routing problems*.

Unable to log in to the console port—no error message

Two laptops (using terminal emulation programs) or terminals should be able to communicate back to back in the same way that the terminal communicates with the IP700 Series appliance. If this is not possible using your laptop or terminal, the problem is with the terminal or cable and not the appliance.

Cause: You do not have a console connection to the IP700 Series appliance.

Solution: For details about how to create a console connection, see *Connecting to the console*.

Cause: Not connected with a null-modem cable.

Solution: Verify that you are using a null-modem cable. For printout information, see *Connecting to the console*.

Cause: Wrong terminal settings.

Solution: Verify terminal settings: 8 data, 1 stop, no parity, 9600 bps.

Cause: Terminal set for flow control.

Solution: The IP700 Series platform does not use flow control. The terminal should be set for no flow control.

Cause: Defective IP700 Series appliance or file system.

Solution: Contact the Nokia customer support site listed in the Nokia Contact Information section at the front of this guide.

Cause: Database is corrupt.

Solution: Return to default settings according to the following instructions, or contact the Nokia customer support site listed in the Nokia Contact Information section at the front of this guide.

Login prompt appears, but password not accepted

Cause: Entered wrong password.

Solution: Obtain a valid password or set the password to a default value.

Setting the Password to a default value

You must have local serial console access to your appliance to perform the following procedure. With a keyboard and monitor directly connected to the appliance, the boot prompt does not appear, and you cannot perform this procedure.

1. Boot up in single-user mode by rebooting or power cycling the appliance. When the boot prompt appears, enter **-s** before the appliance goes into multiuser mode. You have about 10 seconds to do this.
2. After the appliance boots up, the following text appears:

```
Enter pathname of shell or RETURN for sh:
```

Press the **Enter** key.
3. Type **/etc/overpw** at the # prompt. When the response asks if you want continue, type **y**.

4. The admin password defaults to no password for admin. Continue to boot to multiuser mode.
 5. Reconfigure the password as you normally would in Lynx.
-

Note

If you are defaulting the password with IPSO 3.4 or later, blank passwords are not accepted in Voyager or Lynx. In such cases, enter the following command to use a blank password to reset the password from the command line:

```
dbpasswd admin newpassword ""
```

The two double quotation marks at the end of the command indicate a blank password.

After executing this command, the system reports that the password was not successfully changed. In fact, the password was changed and is now *newpassword*.

Finally, use the following procedure to return the entire database to its default settings and the new system-startup procedure. (For a description of new system-startup procedure, see Chapter *Configuring and monitoring the IP700 Series appliance*.)

1. Log in to the IP700 Series appliance as admin with Voyager. For information about accessing Voyager and the related reference materials, see *Using Voyager to configure the network interfaces*.
2. Log in to the IP700 Series appliance as admin with Voyager. For information about accessing Voyager and the related reference materials, see *Using Voyager to configure the network interfaces*.
3. Create the new default configuration.

Do not receive a login prompt—error messages appear

Cause: The IP700 Series appliance is defective, or the file system on the IP700 Series appliance is defective.

Solution: Contact the appropriate Nokia customer support site.

Note

Use the full installation procedure to install a new system. The new system completely replaces the contents of the hard-disk drive units and might be needed to restore or reload an IP700 Series appliance. This procedure erases any configuration database on the appliance. For the current *Release Notes*, which include full installation procedure instructions, go to the Nokia World Wide Web site support page.

Cannot connect to Voyager with the Ethernet port, but console access works

Cause: Using wrong Ethernet cable.

Solution: Use a crossover Ethernet cable if you are connecting directly to the computer. Use a straight-through cable if you are connecting to a hub. For cabling information, see *Connecting to Ethernet devices*.

Cause: Port is not configured UP.

Solution: View the port in Voyager or from Lynx and verify that the interface is configured as active.

Cause: Host port configuration is incorrect.

Solution: Check host Ethernet port settings. Verify that IP address and netmask settings are correct for the IP700 Series appliance configuration.

Cause: Wrong link speed.

Solution: Verify that the port on the host and the port on the IP700 Series appliance are set for the same speed (10 Mbps or 100 Mbps). An unblinking data and activity LED on a port is a good indication that the speed is mismatched.

Cause: Duplex setting is wrong.

Solution: Correct duplex setting.

Do not see interfaces that should be present

Cause: Local IP700 Series appliance ports do not appear.

Solution: Your card might be defective. Contact the appropriate Nokia customer support site.

Note

The problem might occur at the slot on the motherboard. Try locating the card in a different slot.

Common Ethernet problems—connectivity with attached device

Cause: No link light.

Solution: You might have used the wrong cable. Use a crossover cable between an IP700 Series appliance and a host, and a straight-through cable between an appliance and a hub.

Cause: Unblinking data and activity LED.

Solution: You might have the wrong speed set. Verify that the speeds match on each end of the Ethernet connection (10 Mbps or 100 Mbps).

Cause: Port not enabled.

Solution: Verify from the Interface page in Voyager that the interface is configured as **Active**.

Cause: High collision rate on the hub.

Solution: Disconnect connections one at a time until the problem is isolated to one computer and troubleshoot further.

Unable to ping through appliance—no connectivity between ports

This section covers connectivity issues that are isolated within an IP700 Series appliance or network.

Ping various network interfaces to pinpoint the problem. Use tcpdump to help isolate the problem. Use tcpdump to verify that a packet is leaving or entering a port. (For further information, see *To view packets running the IGMP protocol* in Chapter *Using tcpdump*.)

Cause: Interfaces not up.

Solution: Ensure that all interfaces are up and active, as described in Chapter *Configuring and monitoring the IP700 Series appliance*.

Cause: No route to network.

Solution: Check the routing table to see if a route exists to the network where the interface is located. If no route exists, see *Troubleshooting routing problems*.

Cause: Attached device does not have proper default route or routing information.

Solution: If a local computer is unable to ping through an attached appliance, the computer might contain either an invalid default route or invalid routing information.

If you are using default routes from a computer, ensure that the local interface is the default route for that computer.

Cause: ARP table has old information.

Solution: If the ARP table has an old or invalid entry for the device associated with the IP address you are attempting to ping, use Voyager to delete the invalid entry.

For information about accessing Voyager and the related reference materials, see *Using Voyager to configure the network interfaces* in Chapter *Configuring and monitoring the IP700 Series appliance*.

1. Click **Config**.
2. Click the *ARP* link in the *Interfaces* section.
3. Click the *Display or Remove Dynamic ARP Entries* link.
4. Click *Delete* for the entry you want to delete.
5. Click **Apply**.

Problems with multicast

Use tcpdump to view packets. To display packets for a specific interface, use the command `tcpdump -i interface proto igmp`. (For more information about using the tcpdump command, see Chapter *Using tcpdump*.)

Under *Routing Options* in the *Routing Configuration* section in Voyager, you can also enable several types of trace options for DVMRP. These traces are logged into `/var/tmp/ipsrd.log`.

For information about accessing Voyager and the related reference materials, see *Using Voyager to configure the network interfaces* in Chapter *Configuring and monitoring the IP700 Series appliance*.

Cause: No IP connectivity.

Solution: Verify that you have IP connectivity; ping various hosts on each network.

Cause: DVMRP is not enabled on the interfaces.

Solution: Verify that DVMRP is enabled on the interfaces in use.

Cause: Exceeding TTL on clients.

Solution: Verify that the client is set up for the proper TTL number. Many clients are set to receive local traffic only one hop away.

Problems interfacing to 1483 devices (classical IP)

Cause: Remote and local devices are not configured for the same VC and VP value.

Solution: Set remote and local devices to the same VC and VP values. Consult your 1483 device documentation.

Cause: Remote and local devices are not in the supported VC range of the network interface card.

Solution: Use `ipsetl` to determine the VC range:

```
ipsetl ifphys:logical interface:max_rxlabel
```

Cause: Encapsulation is not set to LLC/SNAP.

Solution: Set encapsulation to LLC/SNAP. Consult your 1483 device documentation.

Cause: The MTU size is not 1500.

Solution: MTU size must be 1500. Nokia does not support larger MTU sizes.

Common ATM interface problems

Cause: MMF to SMF interface

Solution: Verify that you are not trying to connect MMF to SMF. SMF cards work only with SMF interfaces.

IP700 not receiving power

Cause: Power cord is not properly plugged in.

Solution: Check cord. Make sure it is properly seated at both ends.

Cause: Power supply not providing power.

Solution: Check power source. If there is no power at the source, take appropriate action such as inserting a new fuse or resetting the circuit breaker.

IP700 does not recognize new memory configuration

Cause: DIMMs are not properly seated in DIMM sockets.

Solution: Repeat memory installation procedures. Make sure DIMMs are fully seated in sockets. Be sure DIMMs click into place.

IP700 appliance locks up after you upgrade to IPSO 3.4.1 or later with a console connection, no error messages appear, but the IP700 appliance stops responding to console and network

Cause: During the upgrade process, some of the environment variables might not have updated correctly.

Solution: You can verify what the current boot manager settings are by issuing a `printenv` command at the boot manager prompt, as the following example shows:

```
Loading boot manager ..  
  
BOOTMGR[ 0]> printenv  
  
Bootmgr Revision: 3.3,base kernel=3.4.1-fcs1  
  
02.12-2001-102644  
  
autoboot: NO  
  
bootwait: 5  
  
boot-file:  
  
boot-flags:  
  
boot-device:
```

Note that no referenced boot file or boot device appears.

Setting the boot manager to defaults causes the boot manager to determine that no environment variables are set, and it responds by importing the defaults from the binary file. To set the boot manager to defaults, issue the `set-defaults` command at the boot manager prompt as follows:

```
BOOTMGR> set-defaults
```

If you issue the `printenv` command again, the boot-file and boot-device entries are now present, as the following example shows:

```
BOOTMGR[ 2] > printenv

Bootmgr Revision: 3.3,base kernel=3.4.1-fcs1
02.12.2001-102644

autoboot: YES

bootwait: 5

boot-file: /image/current/kernel

boot-flags:

boot-device: wd0

Issue the following command to reboot your
appliance:

BOOTMGR> halt
```

Troubleshooting routing problems

Several useful tools are available to troubleshoot routing problems. One tool is the Monitor page in Voyager, with which you display routing statistics and errors. You can access this information from the command-line interface using the ICLID (IPSRD command-line interface daemon) command. An example use of the ICLID command follows.

For information about the ICLID command, see the *Voyager Reference Guide*. For information about accessing Voyager and the related reference materials, see *Using Voyager to configure the network interfaces*.

Note

Adding a question mark (?) after any command provides additional command information.

```
hostname[ admin] # iclid

hostname | IP address>

hostname | IP address> ?

exit get help quit show
```

```
hostname | IP address>
hostname | IP address> show ?
address bgp igmp iphelper
mfc rip vrrp
bootpgw igrp krt ospf
route inbound-filter
dvmp interface memory resource
version
hostname | IP address> show route ?
aggregate bgp igrp ospf
static
all direct inactive rip
summary
hostname | IP address> show route ospf
Codes: C - connected, S - static, I - IGRP, R
- RIP, B - BGP, O - OSPF
E - OSPF external, A - Aggregate, K - Kernel
Remnant H - Hidden S - Suppressed
```

The response to the preceding ICLID command is as follows:

```
0 172.16/16 via 10.1.1.225, eith-sp4p1c0,
cost 3, age 3111
```

In addition to this command, several trace options are available. You can enable these options under the routing options in Voyager. When a trace is enabled the output appears in `/var/tmp/ipsrd.log`

Common problems with OSPF

Use `tcpdump` to view routing information. To display routing updates for an interface, use the following command: `tcpdump -i interface proto ospf`. (For more information about using the `tcpdump` command, see *Filtering traffic with tcpdump* in Chapter *Using tcpdump*.)

Under routing options in Voyager, you can also enable several types of trace options for open shortest path first (OSPF). These traces are logged in `/var/tmp/ipsrd.log`.

For information about accessing Voyager and the related reference materials, see *Using Voyager to configure the network interfaces* in Chapter *Configuring and monitoring the IP700 Series appliance*.

Cause: OSPF is not configured.

Solution: Verify that OSPF is properly configured for all interfaces that are involved in OSPF routing. For more information, view *Configuring OSPF* from the *Configuring Routing* document page (press the **Doc** button) in Voyager.

Cause: OSPF hello and dead timers are not the same on each interface for a given link.

Solution: Verify that the settings at the end of each link are identical.

Cause: Attached devices do not support OSPF.

Solution: Ensure that the attached IP700 Series appliance supports OSPF. If the attached device does not support OSPF, configure it with a protocol the device supports and exchange routes with OSPF or set a default or static route.

Note

You can use ICLID to display OSPF details.

Common problems with RIP

Use tcpdump to view routing information. To display routing updates for a specific interface, use the following command: `tcpdump -i interface proto rip`. (For more information about using the tcpdump command, see Chapter *Using tcpdump*.)

Under routing options in Voyager, you can also enable several types of trace options for routing information protocol (RIP). These traces are logged in `/var/tmp/ipsrd.log`.

For information about accessing Voyager and the related reference materials, see *Using Voyager to configure the network interfaces* in Chapter *Configuring and monitoring the IP700 Series appliance*.

Cause: Inconsistent subnet mask (netmask does not match the class of IP address for RIP v1).

Solution: RIP v1 must use consistent subnet masks; change to RIP v2 or OSPF to use inconsistent subnet masks.

Cause: Number of networks exceeds the RIP limit.

Solution: RIP can span up to 16 networks. Verify that your network topology does not exceed this limit.

Common problems exchanging routes

Always enter a metric value if you are exporting routes from OSPF to RIP.

Cause: Exchanging routes is not configured correctly.

Solution: Exchanging routes involves several configuration steps. Follow the tasks in the *Voyager Reference Guide* (online documentation) to ensure that all steps are followed.

For information about accessing Voyager and the related reference materials, see *Using Voyager to configure the network interfaces*.

Cause: Routing protocol is not functioning properly.

Solution: To ensure that each routing protocol is functioning properly, see *Common problems with OSPF* and *Common problems with RIP*.

10 Using tcpdump

The IPSO software includes the tcpdump utility. Use tcpdump to view traffic on a network, much like the tcpdump or snoop programs of a UNIX workstation. Some features and commands that tcpdump uses are outlined in this section; for more information, see the man page for tcpdump.

Note

control-c stops tcpdump.

Note

Substitute either physical or logical interface names for *interface*.

10.1 tcpdump command basics

To specify an interface

```
tcpdump -i interface
```

The following command returns information for slot 1 and port 1 on an IP700 Series appliance:

```
tcpdump -i eth-s1p1c0
```

To specify an interface running a specified protocol

```
tcpdump -i interface proto protocol
```

The following command returns OSPF traffic:

```
tcpdump -i eth-s2p3c0 proto ospf
```

The following command returns IGRP traffic:

```
tcpdump -i eth-s2p1c0 proto igrp
```

To view packets running the IGMP protocol

```
tcpdump -l interface proto igmp
```

The following command returns packets passing through the specified interface:

```
tcpdump -l eth-s2p3c0 proto igmp
```

To specify an interface using a TCP/UDP application port

```
tcpdump -i interface port TCP/UDP-application-port
```

The following command returns Telnet traffic:

```
tcpdump -i eth-s1p1c0 port telnet
```

The following command also returns Telnet traffic:

```
tcpdump -i eth-s1p1c0 port 23
```

To specify an IP or UDP port

```
tcpdump -i interface <ip or udp> TCP/UDP-application-port
```

The following command returns all bootp and dhcp traffic:

```
tcpdump -i eth-s2p1c0 udp port 68
```

10.2 Filtering traffic with tcpdump

To exclude specific types of traffic

```
tcpdump -i interface <ip or udp> not  
TCP/UDP-application-port
```

The following command returns internet traffic for all ports other than port 80:

```
tcpdump -i eth-s1p1c0 not port 80
```

To delimit the size of the packet

```
tcpdump -i interface -s packet-size -vv
```

The following command returns 320 bytes of the packet:

```
tcpdump -i eth-s1p1c0 -s 320 -vv
```

The following command returns only packets with the IP address 10.10.10.1:

```
tcpdump -i eth-s1p1c0 host 10.10.10.1
```

To specify an IP address

```
tcpdump -i interface host IP-address
```

The following command returns only packets with the IP address 10.10.10.1:

```
tcpdump -i eth-s1p1c0 host 10.10.10.1
```

10.3 Saving tcpdump results to a local file

Generate a trace file by using tcpdump with the `-w` flag, which stores the packet in a local file for later viewing with tcpdump. Use this feature to email a copy of the tcpdump results to the appropriate Nokia customer support site as listed in the Nokia Contact Information section at the front of this guide.

The `-w` flag copies the first 68 bytes of every packet, unless the capture size is increased. For users running without data encryption, passwords are stored in the file.

Note

The file grows very quickly if the network being viewed is busy. Nokia recommends that you create this file on the `/var` partition.

The following command writes packets information to `tracefile`:

```
tcpdump -i eth-s1p1c0 -w /var/tmp/tracefile
```

Press **control-c** to end the capture and print the number of packets captured.

The following command returns all RIP traffic for that interface:

```
tcpdump -i eth-s1p1c0 -s 320 -vv port 520
```

Note

Port 520 is also the port used by UNIX workstations.

The following command returns all OSPF traffic on the ATM link, including LSAs and full information about routes:

```
tcpdump -i atm-s3p1c0 -s 320 -vv proto ospf
```

The following command returns all IGRP traffic connected to that interface:

```
tcpdump -i eth-s1p1c0 -s 320 -vv proto igrp
```

The following command returns all Telnet traffic connected to that interface:

```
tcpdump -i eth-s1p1c0 port 23
```

Read the trace file with the following command:

```
tcpdump -r /var/tmp/tracefile
```

Appendix A Technical specifications for the IP700 Series appliance

A.1 Technical specifications for the IP700 Series appliance

Physical

<i>Dimensions</i>	Height:	5.1 in./13 cm (3U)
	Width:	17 in./44 cm rack 19 in./48 cm rack mountable
	Depth:	21 in./53 cm
<i>Weight</i>		34 lbs./15.5 kg base system
		40 lbs./18 kg fully loaded

Environmental

<i>Temperature</i>	Operating:	5° C to 40° C / 41° F to 104° F
	Storage:	-40° C to 70° C / -40° F to 158° F
<i>Electrical</i>	Voltage	100 to 120 or 200 to 240 VAC
	Frequency:	50 or 60 Hz
	Amps:	3.5/1.5 A
<i>Pressure</i>	Maximum Altitude:	11,500 ft. / 3,500 m

NIC interfaces

	Cable Type	Cable Output Connector
Ethernet	IEEE 802.3 10BASE-T, 100BASE-TX unshielded twisted-pair, full-duplex or half-duplex RJ-45	RJ-45
V. 35	V.35 (DB-26 to V.35 adapter cable)	V. 35
X.21	X.21 (DB-26 to X.21 adapter cable)	X.21
E1 (built-in CSU/DSU)	Native E1 cable	RJ-48
T1 (built-in CSU/DSU)	Native T1 cable	RJ-48
ATM	155 Mbps SONET/SDH STS3c/STM1 multimode fibre	SC
Gigabit Ethernet	Fibre-optic cable up to 275 meters long	LC or SC

Space requirements

You can install the IP700 Series appliance in a rack or as a stand-alone item.

Rack installation

The cover of the IP700 Series appliance is designed for front-screw mounting in a 19-inch rack. Each IP700 Series appliance requires the following space in a rack:

- 5 inches (13 centimetres) of vertical space
- 21 inches (53 centimetres) behind the faceplate of the rack
- 6 inches (15 centimetres) behind the IP700 Series appliance to allow the back exit fan to move air through the appliances



Caution

Do not place objects over the ventilation holes on the IP700 Series appliance. The IP700 Series appliances might overheat and become damaged.

Stand-alone or stacked installation

If you have more than one IP700 Series appliance, you can install the IP700 Series appliances stand-alone or stacked, as follows.

- Provide sufficient clearance (6 inches / 15 centimetres) behind the IP700 Series appliances to allow the back exit fan to move air through the IP700 Series appliances.
- Do not remove the rubber feet on the IP700 Series appliances when you stack them. They prevent damage to the IP700 Series appliances and keep them from sliding against each other.
- Do not stack the IP700 Series appliances more than three high.
- Do not stand the IP700 Series appliances on their sides.

Appendix B Compliance information for the IP700 Series appliance

B.1 Compliance information for the IP700 Series appliance

This appendix contains the following compliance information:

- Declaration of conformity
- Compliance statements
- FCC notice (US)
- FCC requirements (US)
- Equipment attachment regulations (Canada)

B.1.1 Declaration of conformity

According to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name:	Nokia Inc.
Manufacturer's Address:	313 Fairchild Drive Mountain View, CA 94043-2215 USA

declares that the product

Product Name:	IP710, IP740
Model Number:	IP0740
Product Options:	All
Serial Number:	1 to 100,000
Date First Applied:	2001

conforms to the following standards

Safety:	EN60950:1992, A1, A2:1993, A3:1995, A4:1997, A11:1998 with Japanese National Deviations
	EN55024 1998, EN55022A 1998, EN61000-3-2, EN61000-3-3

Supplementary Information:

“The product complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC with Amendment 93/68/EEC.”

Nokia	Alan Hutchinson Manager Regulatory Compliance Engineering Mountain View, California March 2002
European contact:	Greg Shortell Nokia Telecommunications 2 Heathrow Blvd, 284 Bath Road Heathrow, Middlesex, UB7 ODQ England

B.1.2 Compliance statements

This hardware complies with the standards listed in this section.

<i>Emissions Standards</i>	
FCC Part 15 Subpart B Class A	USA and Canada
EN55022A (CISPR 22 Class A)	European Community (CE)
EN61000-3-2	European Community (CE)
EN61000-3-3	European Community (CE)
<i>Immunity Standards</i>	
EN50024:	European Community (CE)
EN61000-4-2	
EN61000-4-3	

EN61000-4-4	
EN61000-4-5	
EN61000-4-6	
EN61000-4-8	
EN61000-4-11	
<i>Safety Standards</i>	
UL 1950	USA
CAN/CSA 22.2 No. 950-M95	Canada
EN60950	European Community (CE) (TUV)
EN60950 w/Japanese National Deviation	Japan
<i>Telecom</i>	
T1	FCC Part 68, CS-03
V.35/X.21	I-CTR 2

B.1.3 FCC notice (US)

This device 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 in a residential installation. This device generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this device does cause harmful interference to radio or television reception, 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 computer and receiver.
- Connect the computer 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.

**Caution**

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment. !

B.1.4 FCC requirements (US)

This equipment complies with FCC rules, Part 68. On the bottom of this equipment is a label that contains, among other things, the FCC Registration Number. When you are ready to install this unit, contact your local telephone company and supply them with the following information:

Standard Jack(s) for connection to the network: RJ48

Universal Service Order Code (USOC): 6.0

Facility Interface Code (FIC): All are applicable; 04DU9-BN, 04DU9-DN, 04DU9-1KN, 04DU9-1SN

FCC ID#: See label on outside of unit or on T1 card

Should this equipment cause harm to the telephone network, the telephone company shall, where practicable, notify the customer that temporary discontinuance of service may be required; however, where prior written notice is not practicable, the telephone company may discontinue service forthwith, if such action is reasonable in the circumstances. You will be informed of your right to file a complaint with the FCC.

The telephone company may make changes in its communications facilities, equipment, and operation procedures, where such action is reasonably required in the operation of its business and is not inconsistent with the rules and regulations of the Federal Communications Commission. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

Do not attempt to repair or modify this equipment. If defective, return it to the person from whom it was purchased who will in turn arrange to return it or to have it repaired by the manufacturer. The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning. If trouble is experienced, disconnect this equipment from the telephone line to determine if it is causing the malfunction. If equipment is determined to be malfunctioning, its use shall be discontinued until the problem has been corrected.

If the terminal equipment cPCI T1 Interface causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice is not practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

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

If this equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is solved.

There are no user serviceable components or parts of the cPCI T1 interface.

B.1.5 Equipment attachment regulations (Canada)

NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations. Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.



Caution

Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Appendix C General public licensed software

C.1 General public licensed software

Nokia Corporation offers to provide machine-readable source code on industry-standard media to the recipient of the Nokia Corporation modified READLINE and GDB code for a period of three (3) years from the date of Nokia Corporation's distribution of READLINE and GDB, or until January 1, 2003, whichever is longer. Alternatively, the Nokia Corporation modified source code can be downloaded from *ftp://ftp.iprg.nokia.com/pub/GNU/*. All requests for code on media shall be accompanied by:

- Address of requester
- Check for \$25 payable to Nokia Inc.

Address all such requests to:

Director of Customer Support

Nokia Inc.

313 Fairchild Drive

Mountain View, CA 94043

All other General Public Licensed files that accompany READLINE and GDB are available at the above-mentioned FTP site or on media by request as stated above.

C.1.1 GNU GENERAL PUBLIC LICENSE

Version 2, June 1991

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Appendix D Warranty and software license

D.1 Warranty and software license

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Appendix E Abbreviations

E.1 Abbreviations

AMI	Alternate Mark revision
ARP	Address Resolution Protocol
ATM	Asynchronous Transfer Mode
CAS	Channel Associated Signalling
CCS	Common Channel Signalling
CHDLC	Cisco HDLC
cPCI	compact PCI
CRC	Cyclical Redundancy Check
CSU/DSU	Channel Service Unit/Data Service Unit
DCE	Data Communications Equipment
DHCP	Dynamic Host Configuration Protocol
DIMM	Dual Inline Memory Module
DLCI	Data-Link Connection Identifier
DTE	Data Terminal Equipment
DVMRP	Distance Vector Multicast Routing Protocol
EMI	Electromagnetic Interference
FDDI	Fibre Distributed Data Interface
FDL	Facilities Data Link
HDLC	High-Level Data Link Control
ICLID	IPSRD Command-Line Interface Daemon
IGRP	Interior-Gateway Routing Protocol
IPSec	IP Security
IPSO	Nokia (Ipsilon) Router Operating System
IPSRD	Nokia (Ipsilon) Software Routing Daemon
LLC	Logical Link Control
LMI	Local Management Interface
LSA	Link-State Advertisements
MMF	Multimode Fibre

MTU	Maximum Transfer Unit
OEM	Original Equipment Manufacturer
OSPF	Open Shortest Path First
PCI	Peripheral Component Interconnect
PCMCIA	Personal Computer Memory Card International Association
RAID	Redundant Array of Independent Disks
RIP	Routing Information Protocol
SMF	Single-Mode Fibre
SMTP	Simple Mail Transfer Protocol
TTL	Time To Live
UDP	User Datagram Protocol
UTP5	Unshielded Twisted Pair (category 5)
VC	Virtual Circuit
VCI	Virtual Circuit Identifier
VPN	Virtual Private Network