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600 Technology Park Drive
Billerica, MA 01821-4130

Installing the Contivity 1600

NORTEL NETWORKS™

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Statement of conditions

USA requirements only

Federal Communications Commission (FCC) Compliance Notice: Radio Frequency Notice

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

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

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

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

European requirements only

EN 55 022 statement

This is to certify that the Nortel Networks Contivity 1600 is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN 55 022 Class B (CISPR 22).

Compliance is dependent upon the use of shielded Contivity 1600.

EC Declaration of Conformity

This product conforms (or these products conform) to the provisions of Council Directive 89/336/EEC and 73/23/EEC.

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Taiwan requirements

Bureau of Standards, Metrology and Inspection (BSMI) Statement

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Canada requirements only

Canadian Department of Communications Radio Interference Regulations

This digital apparatus (Contivity 1600) does not exceed the Class B limits for radio-noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Règlement sur le brouillage radioélectrique du ministère des Communications

Cet appareil numérique (Contivity 1600) respecte les limites de bruits radioélectriques visant les appareils numériques de classe B prescrites dans le Règlement sur le brouillage radioélectrique du ministère des Communications du Canada.

Canada CS-03 rules and regulations

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 the 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.

Notice: For equipment using loopstart lines, please note that the Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5. The REN is located on the "FCC Rules Part 68" label located on the bracket of the module, or on the back of the unit.

Canada CS-03 -- règles et règlements

Avis: L'étiquette d'Industrie Canada identifie le matériel homologué. Cette étiquette certifie que le matériel est conforme aux normes de protection, d'exploitation et de sécurité des réseaux de télécommunications, comme le prescrivent les documents concernant les exigences techniques relatives au matériel terminal. Le Ministère n'assure toutefois pas que le matériel fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunication. Le matériel doit également être installé en suivant une méthode acceptée de raccordement. L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empêche pas la dégradation du service dans certaines situations.

Les réparations de matériel homologué doivent être coordonnées par un représentant désigné par le fournisseur. L'entreprise de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur ou à cause de mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette précaution est particulièrement importante dans les régions rurales.

Avertissement: L'utilisateur ne doit pas tenter de faire ces raccordements lui-même; il doit avoir recours à un service d'inspection des installations électriques, ou à un électricien, selon le cas.

Avis: Veuillez prendre note que pour tout appareillage supportant des lignes de type "loopstart," l'indice d'équivalence de la sonnerie (IES) assigné à chaque dispositif terminal indique le nombre maximal de terminaux qui peuvent être raccordés à une interface. La terminaison d'une interface téléphonique peut consister en une combinaison de quelques dispositifs, à la seule condition que la somme d'indices d'équivalence de la sonnerie de tous les dispositifs n'excède pas 5. Le REN figure sur l'étiquette "FCC Rules Part 68" située sur le support du module ou à l'arrière de l'unité.

This equipment complies with Part 68 of FCC Rules. All direct connections to telephone network lines must be made using standard plugs and jacks compliant with FCC Part 68. Please note the following:

1. You are required to request service from the telephone company before you connect the unit to a network. When you request service, you must provide the telephone company with the following data:
   - When you request T1 Service, you must provide the telephone company with
     - The Facility Interface Code
       Provide the telephone company with all the codes below:
       - 04DU9-BN (1.544 MB, D4 framing format)
       - 04DU9-DN (1.544 MB, D4 framing format with B8ZF coding)
       - 04DU9-1KN (1.544 MB, ESF framing format)
       - 04DU9-1SN (1.544 MB, ESF framing format with B8ZF coding)
       - 04DU9-1ZN (1.544 MB, ANSI ESF and ZBTSI without line power)

       The telephone company will select the code it has available.
     - The Service Order Code(s) (SOC): 6.0Y
     - The required Universal Service Order Code (USOC) jack: RJ48C
   - When you request ISDN "U" Interface Service, you must provide the telephone company with
     - The Facility Interface Code: 02IS5
     - The Service Order Code(s) (SOC): 6.0F
     - The required Universal Service Order Code (USOC) jack: RJ49C
   - When you request ISDN "S/T" Interface Service, you must provide the telephone company with
     - The Service Order Code(s) (SOC): 6.0P
     - The make, model number, and FCC Registration number of the NT1

     Note: ISDN S/T cannot be directly connected to the network.
   - When you request Primary Rate ISDN Service, you must provide the telephone company with
     - The Facility Interface Code: 04DU9-1SN (1.544 MB, ESF framing format with B8ZF coding)
     - The Service Order Code(s) (SOC): 6.0Y
     - The required Universal Service Order Code (USOC) jack: RJ48C
2. Your telephone company may make changes to its facilities, equipment, operations, or procedures that could affect the proper functioning of your equipment. The telephone company will notify you in advance of such changes to give you an opportunity to maintain uninterrupted telephone service.
3. If the unit causes harm to the telephone network, the telephone company may temporarily discontinue your service. If possible, they will notify you in advance, but if advance notice is not practical, you will be notified as soon as possible and will be informed of your right to file a complaint with the FCC.
4. If you experience trouble with the unit, please contact the Nortel Networks Technical Solutions Center in your area for service or repairs. Repairs should be performed only by service personnel authorized by Nortel Networks.

United States	1-800-2LANWAN
Valbonne, France	33-4-92-96-69-68
Sydney, Australia	61-2-9927-8800
Tokyo, Japan	81-3-5740-1700
5. You are required to notify the telephone company when you disconnect the unit from the network.

This equipment complies with Part 68 of FCC Rules. All direct connections to telephone network lines must be made using standard plugs and jacks compliant with FCC Part 68. Please note the following:

1. You are required to request service from the telephone company before you connect the unit to a network. When you request service, you must provide the telephone company with the following data:
   - When you request T1 Service, you must provide the telephone company with
     - The Facility Interface Code

       Provide the telephone company with all the codes below:

       – 04DU9-BN (1.544 MB, D4 framing format)
       – 04DU9-DN (1.544 MB, D4 framing format with B8ZF coding)
       – 04DU9-1KN (1.544 MB, ESF framing format)
       – 04DU9-1SN (1.544 MB, ESF framing format with B8ZF coding)
       – 04DU9-1ZN (1.544 MB, ANSI ESF and ZBTSI without line power)

       The telephone company will select the code it has available.
     - The Service Order Code(s) (SOC): 6.0F
     - The required Universal Service Order Code (USOC) jack: RJ48C
   - When you request 56K/64K Service, you must provide the telephone company with
     - The Facility Interface Code: 04DU5-56/64
     - The Service Order Code(s) (SOC): 6.0F
     - The required Universal Service Order Code (USOC) jack: RJ48S
   - When you request V.34 Service, you must provide the telephone company with
     - The required Universal Service Order Code (USOC) jack: RJ11C
     - The make, model number, Ringer Equivalence Number (REN), and FCC Registration number of the unit

       The REN helps you determine the number of devices you can connect to your telephone line and still have all of those devices ring when your number is called. In most, but not all, areas, the sum of the RENs of all devices should not exceed 5.0. To be certain of the number of devices you can connect to your line, you should call your local telephone company to determine the maximum REN for your calling area. This equipment must not be used on party lines or coin lines.
   - When you request ISDN “U” Interface Service, you must provide the telephone company with
     - The Facility Interface Code: 02IS5
     - The Service Order Code(s) (SOC): 6.0F
     - The required Universal Service Order Code (USOC) jack: RJ49C

- When you request ISDN "S/T" Interface Service, you must provide the telephone company with
  - The Service Order Code(s) (SOC): 6.0N
  - The make, model number, and FCC Registration number of the NT1

    Note: ISDN S/T cannot be directly connected to the network.
- When you request Primary Rate ISDN Service, you must provide the telephone company with
  - The Facility Interface Code: 04DU9-1SN (1.544 MB, ESF framing format with B8ZF coding)
  - The Service Order Code(s) (SOC): 6.0F
  - The required Universal Service Order Code (USOC) jack: RJ48C

2. Your telephone company may make changes to its facilities, equipment, operations, or procedures that could affect the proper functioning of your equipment. The telephone company will notify you in advance of such changes to give you an opportunity to maintain uninterrupted telephone service.
3. If the unit causes harm to the telephone network, the telephone company may temporarily discontinue your service. If possible, they will notify you in advance, but if advance notice is not practical, you will be notified as soon as possible and will be informed of your right to file a complaint with the FCC.
4. If you experience trouble with the unit, please contact the Nortel Networks Technical Solutions Center in your area for service or repairs. Repairs should be performed only by service personnel authorized by Nortel Networks.

United States	1-800-2LANWAN
Valbonne, France	33-4-92-96-69-68
Sydney, Australia	61-2-9927-8800
Tokyo, Japan	81-3-5740-1700

5. You are required to notify the telephone company when you disconnect the unit from the network.

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Contents

Preface 19

Conventions 19
Documentation 19
Related publications 20
Text conventions 21
Acronyms 22
Hard-copy technical manuals 23
User interface help button 24
How to get help 24
Nortel Networks Customer Service 25

Chapter 1
Introducing the Contivity 1600 27

Overview 27
Components list 30

Chapter 2
Cabling and LEDS 31

Connecting the cables 32
Power cord requirements 32
Current rating 32
Wall outlet connector 32
Power supply connector 32
Cord length and flexibility 32
Connecting the switch's cables 33
LAN interface connections 34
Dual V.35 WAN interface (optional) 35
Single WAN interface V.35 or X.21 (optional) 37
Single V.35 WAN Interface 37

T1 CSU/DSU WAN interface 40
Serial interface cable 42
Understanding the LEDs 43
Front panel LEDs 43
Private LAN LEDs 44
V.35/X.21 single LEDs 45
Public LAN LEDs 47

Chapter 3
Rack Mounting 49

Rack-mount shelf installation procedure 50
Attaching a shelf for a rack-mounted installation 50
Desktop operation 53

Chapter 4
Changing Hardware Configurations. 55

Removing the front bezel 57
Removing the front bezel and the top cover 58
System board 61
Installing option cards 62
Installing additional DIMMs 67

Chapter 5
Using the Recovery Diskette. 71

Appendix A
Specifications. 77

Index 79

Figures

Figure 1 An intranet and the internet make up an extranet 28
Figure 2 Front view of the Contivity 1600 29
Figure 3 Back view of the Contivity 1600 33
Figure 4 10/100BASE-TX pinouts 34
Figure 5 Dual V35 interface 35
Figure 6 Single V.35/X.21 WAN interface 37
Figure 7 T1 CSU/DSU interface 40
Figure 8 Front panel LEDs 43
Figure 9 Private LAN port LEDs 44
Figure 10 Single V.35/X.21LEDs 45
Figure 11 T1 CSU/DSU LEDs 46
Figure 12 10/100BASE-TX LAN LEDs 47
Figure 13 Installing a shelf for a chassis rack mount 50
Figure 14 Removing the front bezel 51
Figure 15 Replacing the front bezel 52
Figure 16 Attaching rubber feet to the bottom of the chassis 53
Figure 17 Back view of the Contivity 1600 with cables 55
Figure 18 Removing the power cord 56
Figure 19 Removing the front bezel 57
Figure 20 Removing the power cable 58
Figure 21 Removing the Contivity 1600 front bezel 59
Figure 22 Removing the top cover 60
Figure 23 Contivity 1600 system board 61
Figure 24 Removing the power cord 62
Figure 25 Removing the front bezel 63
Figure 26 Removing the top cover 64
Figure 27 Installing LAN or WAN option cards 65
Figure 28 Installing option cards 66
Figure 29 Removing the power cord 67
Figure 30 Removing the front bezel 68

Figure 31 Removing the top cover 69
Figure 32 Installing memory 70
Figure 33 The Recovery Diskette display 72

Tables

Table 1 Components and accessories of a Contivity 1600 30
Table 2 DB28S-to-V.35 cable pinouts 36
Table 3 V.35 cable pinouts 38
Table 4 X.21 cable pinouts 39
Table 5 T1 CSU/DSU cable pinouts 41
Table 6 Multiple DB9 and DB25 connector pinouts 42
Table 7 LAN port LED indicators 44
Table 8 Single V.35/X.21 LED indicators 45
Table 9 T1 CSU/DSU LED indicators 46
Table 10 10/100BASE-TX LAN LED card indicators 47
Table 11 Physical specifications and operating environment 77

Preface

This guide takes you through the tasks necessary to get your Nortel Networks™ Contivity 1600™ up and running. Topics include:

- Introducing the Contivity 1600
- Cabling and LEDs
- Rack mounting
- Changing hardware configurations
- Using the recovery diskette

Complete details for configuring and monitoring the switch are in *Configuring the Contivity VPN Switch*.

Conventions

This guide refers to the Contivity 1600, or the Contivity switch. It assumes that you are familiar with Web browsers and their general operation.

Documentation

This document uses the following conventions to distinguish among notes of varying importance.

Note: *Take notice*. Notes contain helpful suggestions or references to materials contained in this document.

Caution: *Be careful*. In this situation, you might do something that could result in damage to the equipment or loss of data.

Warning: *Danger.* You are in a situation that could cause bodily injury. Before working on equipment, beware of the hazards involved with electrical circuitry and standard practices for preventing accidents, such as disconnecting equipment from its power source.

Related publications

The following list shows the associated documentation that you will need to configure and manage the switch and describes the document's objectives.

- *Contivity VPN Switch Release Notes* provide the latest information, including known problems, workarounds, and special considerations.
- *Configuring the Contivity VPN Switch* (included on the CD) provides complete details to configure, monitor, and troubleshoot the switch. *Reference for the Contivity VPN Switch* describes details for the fields on the User Interface screens.
- *Installing the Contivity VPN Client* provides information on installing the client, creating custom icons, and using certificates on a client.
- *Reference for the Contivity VPN Switch Command Line Interface* describes the commands that you can use from the command line interface.
- *Managing the Contivity Stateful Firewall* describes firewall concepts, how to configure and monitor the firewall, and the firewall commands that you can use from the command line interface.

Text conventions

This guide uses the following text conventions:

angle brackets (< >)	Indicate that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command. Example: If the command syntax is `ping <ip_address>`, you enter `ping 192.32.10.12`
`bold Courier text`	Indicates command names, options, and text that you need to enter. Example: Use the **`dinfo`** command. Example: Enter **`show ip`** {**`alerts`**|**`routes`**}.
braces ({ })	Indicate required elements in syntax descriptions where there is more than one option. You must choose only one of the options. Do not type the braces when entering the command. Example: If the command syntax is `show ip {alerts|routes}`, you must enter either `show ip alerts` or `show ip routes`, but not both.
brackets ([ ])	Indicate optional elements in syntax descriptions. Do not type the brackets when entering the command. Example: If the command syntax is `show ip interface [-alerts]`, you can enter either `show ip interface` or `show ip interface -alerts`.
ellipsis points (. . .)	Indicate that you repeat the last element of the command as needed. Example: If the command syntax is `ethernet/2/1 [<parameter> <value>]...`, you enter `ethernet/2/1` and as many parameter-value pairs as needed.

italic text	Indicates new terms, book titles, and variables in command syntax descriptions. Where a variable is two or more words, the words are connected by an underscore. Example: If the command syntax is `show at <valid_route>`, *`valid_route`* is one variable and you substitute one value for it.
`plain Courier text`	Indicates command syntax and system output, for example, prompts and system messages. Example: `Set Trap Monitor Filters`
separator (->)	Shows menu paths. Example: Protocols > IP identifies the IP option on the Protocols menu.
vertical line (|)	Separates choices for command keywords and arguments. Enter only one of the choices. Do not type the vertical line when entering the command. Example: If the command syntax is `show ip {alerts|routes}`, you enter either `show ip alerts` or `show ip routes`, but not both.

Acronyms

This guide uses the following acronyms:

AUI	attachment unit interface
BootP	Bootstrap Protocol
BRI	basic rate interface
CSMA/CD	carrier sense multiple access/collision detection
DLCMI	Data Link Control Management Interface
HDLC	High-level Data Link Control
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization

ITU-T	International Telecommunication Union-Telecommunication Standardization Sector (formerly CCITT)
MAC	media accountants control
MAU	media access unit
MDI-X	medium dependent interface crossover
NBMA	nonbroadcast multi-access
OSPF	Open Shortest Path First
PPP	Point-to-Point Protocol
SMDS	Switched Multimegabit Data Service
SNMP	Simple Network Management Protocol
STP	shielded twisted pair
TPE	twisted pair Ethernet

Hard-copy technical manuals

You can print selected technical manuals and release notes free, directly from the Internet. Go to the www25.nortelnetworks.com/library/tpubs/ URL. Find the product for which you need documentation. Then locate the specific category and model or version for your hardware or software product. Use Adobe Acrobat Reader to open the manuals and release notes, search for the sections you need, and print them on most standard printers. Go to Adobe Systems at the www.adobe.com URL to download a free copy of the Adobe Acrobat Reader.

You can purchase selected documentation sets, CDs, and technical publications through the Internet at the www1.fatbrain.com/documentation/nortel/ URL.

User interface help button

Click the Help button that is located in the upper right of displays to learn about fields on a given page. Where appropriate, the information provides cause and effect of an action; otherwise, it might offer troubleshoot

How to get help

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

Nortel Networks Customer Service

If you purchased a Nortel Networks service program, contact one of the following Nortel Networks Technical Solutions Centers:

Technical Solutions Center	Telephone
EMEA	(33) (4) 92-966-968
North America	(800) 2LANWAN or (800) 252-6926
Asia Pacific	(61) (2) 9927-8800
China	(800) 810-5000

An Express Routing Code (ERC) is available for many Nortel Networks products and services. When you use an ERC, your call is routed to a technical support person who specializes in supporting that product or service. To locate an ERC for your product or service, go to the www12.nortelnetworks.com/ URL and click ERC at the bottom of the page.

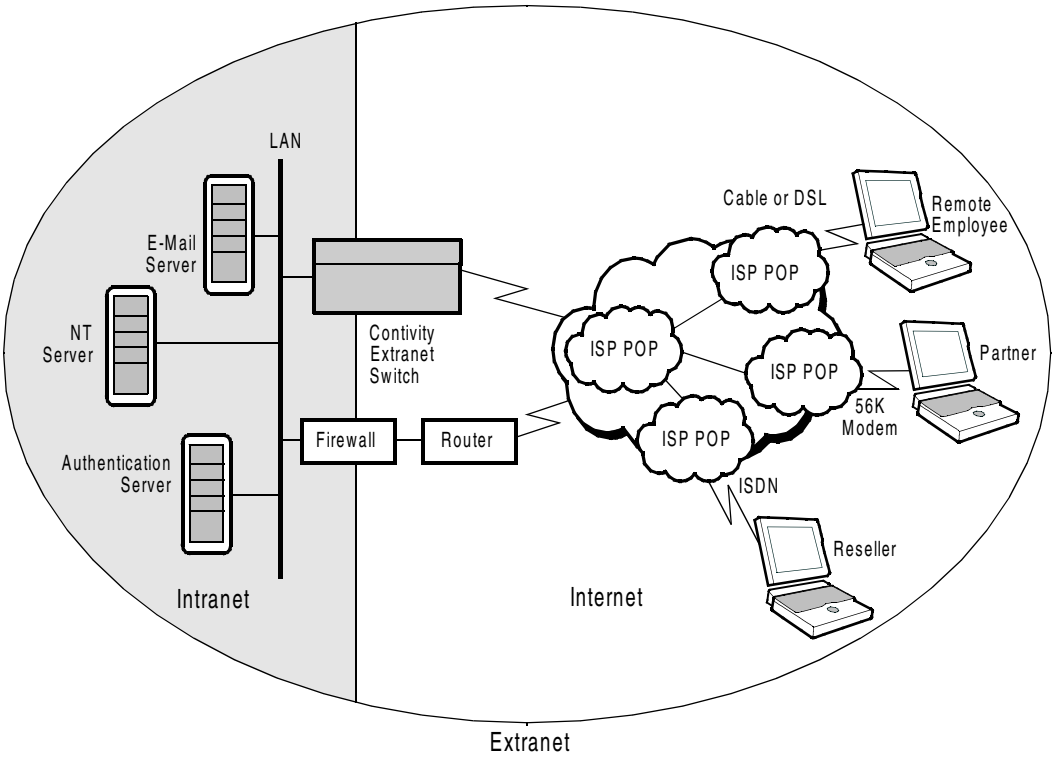
Chapter 1
Introducing the Contivity 1600

Overview

The Nortel Networks Contivity1600 provides scalable, secure, manageable extranet access for up to 200 simultaneous users across the Public Data Network (PDN).

The Contivity switch's features include the most popular tunneling protocols: IP Security (IPsec), Point-to-Point Tunneling Protocol (PPTP), Layer 2 Forwarding Tunneling Protocol (L2TP), and Layer 2 Forwarding (L2F). IPsec uses digital certificates, password-based keys, and tokens for authentication; PPTP, L2TP, and L2F use Challenge Handshake Authentication Protocol (CHAP) or Password Authentication Protocol (PAP) for authentication. The PPTP and L2TP implementations for the Contivity switch support MS-CHAP authentication with 56- to 128-bit key encryption. Figure 1 shows an intranet and an extranet.

Figure 1 An intranet and the internet make up an extranet



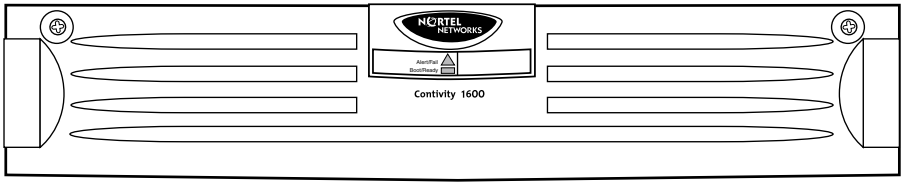
The Contivity switch provides more security than traditional remote access schemes due to the combination of authorization, authentication, privacy, and access control on a per-user basis. The IPsec protocol and related Internet Security Association and Key Management Protocol (ISAKMP) and Oakley key establishment protocol support further enhance the security offering.

For authentication and access control, the Contivity switch supports an internal or external Lightweight Directory Access Protocol (LDAP) server, and external Remote Authentication Dial-In User Service (RADIUS) servers. To restrict access, the Contivity switch uses packet filtering based on protocol ID, direction, source and destination IP addresses, source and destination ports, and TCP connection establishment.

The unique quality of service (QoS) mechanisms include call admission and packet forwarding priorities, and support for Resource ReSerVation Protocol (RSVP).

The HTML and Java Web management interface allows different switch administrators to have different access rights, including configuration, status, and monitoring. The Contivity switch offers RADIUS accounting support and extensive logging, including events, system, configuration, and security logs. Figure 2 shows the front view of the Contivity 1600.

Figure 2 Front view of the Contivity 1600



CS160001A

Components list

Table 1 lists all of the components and accessories of the Contivity 1600. If for any reason you have not received all of the materials ordered, contact Nortel Networks Customer Service.

Table 1 Components and accessories of a Contivity 1600

Description	Quantity
Contivity 1600	1
Power cord (ordered separately)	
Molded serial cable DB9/DB25-to-DB9/DB25	1
Contivity CD	1
Recovery diskette	1
IP Address Configuration Utility diskette	1
Getting Started with the Contivity 1600 (this book)	1
Release Notes	1
Mounting frame and hardware	1
Options: • 10/100BASE-TX LAN interface • Dual V.35 interface • Single V.35 interface • Single X.21 interface • T1 CSU/DSU interface • Memory	Optional

Chapter 2
Cabling and LEDS

This chapter provides the following information:

- Connecting power
- LAN/WAN connections to:
  - 10/100BASE-TX LAN interface
  - Dual V.35 interface
  - Single V.35 interface
  - Single X.21 interface
  - T1 CSU/DSU interface
- Serial interface connection
- Understanding the LEDs

Caution: Cabling for all WAN, LAN, and serial connections are not to be routed outside the building environment.

Connecting the cables

Power cord requirements

Warning: Connect the LAN/WAN and serial port cables before you plug the switch's power cord into the outlet.

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

Caution: You should protect your switch by plugging it into a surge suppressor.

Current rating

The power cord must be rated for the available AC voltage, and must have a current rating that is at least 125 percent of the switch's current rating (refer to Appendix A).

Wall outlet connector

The power cord must terminate in a male plug with appropriate grounding. The power cord must have certification marks from an acceptable regional agency.

Power supply connector

The connector that you plug into the switch power supply AC receptacle must be an IEC 320, Sheet C13 female.

Cord length and flexibility

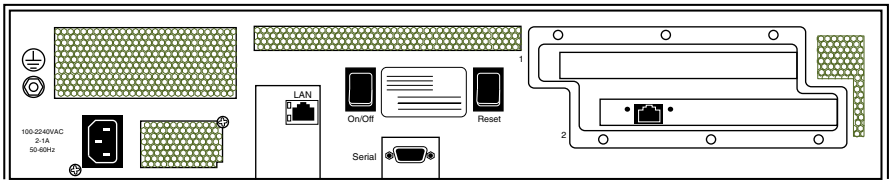
The power cord must be less than 4.5 meters (14.7 feet) long, and it must be a flexible HAR (harmonized) cord or VDE-certified cordage to comply with the switch's safety certifications.

Connecting the switch's cables

Use the following procedure to connect the switch's cables.

1 Connect the 10/100BASE-TX LAN RJ-45 connector to the switch and all other LAN/WAN connections. Figure 3 shows the back of the Contivity 1600.

Figure 3 Back view of the Contivity 1600



CS160002A

2 Remove the yellow sticker covering the power cord receptacle and insert the power cord.

3 Connect the power cord to wall outlet connector.

LAN interface connections

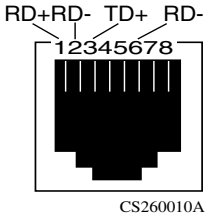
At least one LAN interface connection is for Web management.

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

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

Figure 4 shows the Contivity 1600 connector's 10/100BASE-TX pinouts.

Figure 4 10/100BASE-TX pinouts



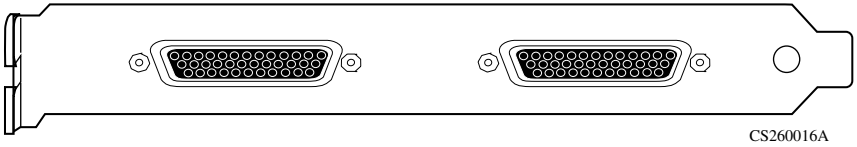
10BASE-T connections can use Category 3, 4, or 5 twisted-pair wiring. The LAN connectors on the rear of the switch are RJ-45 straight through.

Dual V.35 WAN interface (optional)

The dual V.35 WAN connectors are located on a PCI card that offers two separate DB28S connectors that provide the signals needed to interface to V.35 equipment. Included in the accessory box are two cables that map the DB28S signals to a standard V.35 connector. You will need a DSU/CSU (digital service unit/channel service unit) between the WAN connection and the switch. This section documents the connector and cables used with the V.35 WAN synchronous adapters.

Figure 5 shows the Dual V.35 interface.

Figure 5 Dual V35 interface



The cables provided with the WAN PCI card enable the WAN adapter to function as DTE (Data Terminal Equipment). Table 2 on the following page shows the DB28S-to-V.35 cable pinouts.

Table 2 DB28S-to-V.35 cable pinouts

Standard-wired end 28-pin male	Signal name	Pair # & conductor	Special-wired end 34-pin male	Notes
2	TDA	pair 1A	P	
14	TDB	pair 1B	S	
3	RDA	pair 2A	R	
16	RDB	pair 2B	T	
24	ETA	pair 3A	U	
11	ETB	pair 3B	W	
17	RCA	pair 4A	V	
9	RCB	pair 4B	X	
15	TCA	pair 5A	Y	
12	TCB	pair 5B	AA	
4	RTS	pair 6A	C	
		pair 6B	no conn	
5	CTS	pair 7A	D	
		pair 7B	no conn	
6	DSR	pair 8A	E	
		pair 8B	no conn	
8	DCD	pair 9A	F	
		pair 9B	no conn	
20	DTR	pair 10A	H	
		pair 10B	no conn	
7	SGND	pair 11A	B	
		pair 11B	no conn	
1	CGND	pair 12A	A	
		pair 12B	no conn	

Note the following information about the V.35 DTE cable construction:

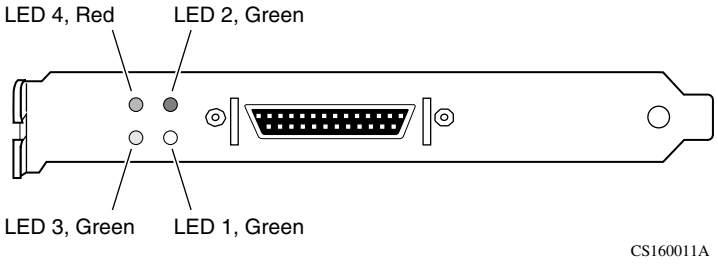
1. Braid must enter and make contact inside metal connector hood. V.35 conn strain relief must be conductive.
2. All hoods must be metal. V.35 connstrain relief must be conductive.

Single WAN interface V.35 or X.21 (optional)

The V.35 and X.21 WAN connectors are located on a PCI card that offers a separate connector that provides the signals needed to interface to V.35 and X.21. Included in the accessory box are two cables that map the signals to a standard V.35 connector. You will need a DSU/CSU (digital service unit/channel service unit) between the WAN connection and the switch. This section documents the connector and cables used with the V.35 and/or those used with X.21 WAN synchronous adapters.

The cables provided with the WAN PCI card enables the WAN adapter to function as DTE (Data Terminal Equipment). Figure 6 shows the single V.35/X.21 WAN interface.

Figure 6 Single V.35/X.21 WAN interface



Single V.35 WAN Interface

Table 3 on the following page shows the V.35 cable pinouts. Table 4 shows the X.21 cable pinouts.

Table 3 V.35 cable pinouts

Standard-wired end 28-pin male	Signal name	Pair # & conductor	Special-wired end 34-pin male	Notes
2	TXDA	pair 1A	P	
14	TXDB	pair 1B	S	
3	RXDA	pair 2A	R	
16	RXDB	pair 2B	T	
15	TXCA	pair 3A	Y	
12	TXCB	pair 3B	AA	
17	RXCB	pair 4A	V	
9	RXCB	pair 4B	X	
24	SCTEA	pair 5A	U	
11	SCTEB	pair 5B	W	
4	RTSA	pair 6A	C	
19	RTSB	pair 6B	no conn	Note 2
5	CTSA	pair 7A	D	
13	CTSB	pair 7B	no conn	Note 2
6	DSRA	pair 8A	E	
22	DSRB	pair 8B	J	
20	DTRB	pair 9A	H	
23	DTRB	pair 9B	no conn	Note 2
8	DCDA	pair 10A	F	
10	DCDB	pair 10B	no conn	Note 2
18	LL	pair 11A	L	
21	RL	pair 11B	N	
25	TM	pair 12A	NN	
26	M0<-SIGNAL GROUND	pair 12B	B	Note 3
27	M1<-SIGNAL GROUND	pair 13A	B	Note 3
28	M2	pair 13B	no conn	Note 2
1	SHIELD	pair 14A	A	Note 1
7	SIGNAL GROUND	pair 14B	B	Note 3

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

1. At each end, the cable shield and connector shell must connect respectively to pin A of the 34-pin connector and pin 1 of the standard 28-pin connector.
2. The term “no conn” means the wire is not connected to a pin in the 34-pin connector.
3. Wires 12B, 13A, and 14B connect to pin B in the 34-pin connector.
4. Unused pins in the 34-pin connector need not be present.
5. Do not connect Shield to Signal Ground because these are separate signals.
6. The pair suffix A or B refers to an individual wire within a twisted pair.

Table 4 shows the X.21 cable pinouts.

Table 4 X.21 cable pinouts

Standard-wired end 28-pin male	Signal name	Pair ## & conductor	Special-wired end 37-pin male	Notes
2	TXDA	pair 1A	2	
14	TXDB	pair 1B	9	
3	RXDA	pair 2A	4	
16	RXDB	pair 2B	11	
15	TXCA	pair 3A	6	
12	TXCB	pair 3B	13	
17	RXCB	pair 4A	pair 5a	Note 5
9	RXCB	pair 4B	pair5b	Note 5
24	SCTEA	pair 5A	pair4a	Note 5
11	SCTEB	pair 5B	pair4b	Note 5
4	RTSA	pair 6A	3	
19	RTSB	pair 6B	10	
5	CTSA	pair 7A	12	
13	CTSB	pair 7B	no conn	
6	DSRA	pair 8A	no conn	Note 2
22	DSRB	pair 8B	no conn	Note 2
20	DTRB	pair 9A	no conn	Note 2
23	DTRB	pair 9B	no conn	Note 2
8	DCDA	pair 10A	no conn	Note 2
10	DCDB	pair 10B	no conn	Note 2
18	LL	pair 11A	no conn	Note 2
21	RL	pair 11B	no conn	Note 2
25	TM	pair 12A	no conn	Note 2
26	M0	pair 12B	no conn	Note 2
27	M1	pair 13A	no conn	Note 2
28	M2<-SIGNAL GROUND	pair 13B	8	Note 3
1	SHIELD	pair 14A	1	Note 1
7	SIGNAL GROUND	pair 14B	8	Note 3

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

1. At each end, the cable shield and connector shell must connect to pin 1 of the connector.
2. The term “no conn” means the wire is not connected to a pin in the 15-pin connector.
3. Wires 13B and 14B connect to pin 8 in the 15-pin connector.
4. Unused pins in the 15-pin connector need not be present.
5. Wires of pair 4 connect to wires of pair 5, but not to any pins in the DA-15. Do not interconnect Shield to Signal Ground because these are separate signals.
6. The pair suffix A or B refers to an individual wire within a twisted pair.

T1 CSU/DSU WAN interface

Note: The T1 CSU/DSU WAN interface cable is not supplied by Nortel Networks.

This cable has 8-pin male connectors on each end. The T1 CSU/DSU WAN crossover cable crosses the blue wire pair with the orange wire pair. This is different from the commonly available crossover cable used for 10BaseT, which crosses the green wire pair with the orange wire pair. Figure 7 shows the T1 CSU/DSU interface.

Figure 7 T1 CSU/DSU interface

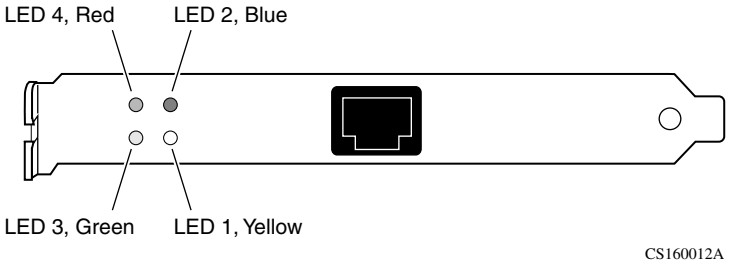


Table 5 shows the T1 CSU/DSU cable pinouts.

Table 5 T1 CSU/DSU cable pinouts

Standard-wired end 28-pin male	Signal name	Pair # & conductor	Special-wired end 8-pin male	Notes
1	RXDA->TXDA	wht/org pair 2A	5	
2	RXDB>TXDA	orange pair 2B	4	
3	not used	wht/grn pair 3A	3	
4	TXDB<-RXDB	blue pair 2B	2	
6	TXDA<-RXDA	wht/blu pair 1A	1	
7	not used	green pair 3B	6	
8	not used	wht/brn pair 4A	7	
9	not used	brown pair 4B	8	

The cable will operate properly if pins 3, 6, 7, and 8 are not connected.

Warning: Do not use Ethernet cable. The T1 CSU/DSU will appear to work, but will not work to specifications. Data may be corrupted.

Serial interface cable

Nortel Networks ships a serial cable with the Contivity 1600 to enable configuration of the management IP address, subnet mask, and default gateway address, and other configurable parameters. Nortel Networks recommends that you use the IP Address Configuration Utility diskette for easy initial IP address configuration. Later, you can use the serial interface configuration menu to perform management functions.

The serial cable provided with the switch is a DB9/DB25-to-DB9/DB25. This provides a crossover (transmit-to-receive and receive-to-transmit). The DB9 connector goes into the switch and the other DB9 or DB25 connector goes into your workstation. Table 6 shows the multiple cable DB9/DB25 serial interface cable pinouts.

Table 6 Multiple DB9 and DB25 connector pinouts

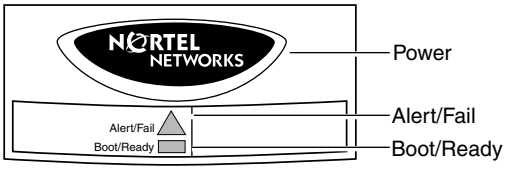
Serial Port DB9 Connector		**Serial Port DB25 Connector**			**Serial Port DB25 Connector**		**Serial Port DB9 Connector**	
Pinout	Signal	Pinout	Signal		Pinout	Signal	Pinout	Signal
2	RXD	3	TXD	>	2	RXD	3	TXD
3	TXD	2	RXD	>	3	TXD	2	RXD
4	DTR	20	DSR	>	6	DTR	6	DSR
5	Ground	7	Ground	>	7	Ground	5	Ground
6	DSR	6	DTR	>	20	DSR	4	DTR
7	RTS	4	RTS	>	5	CTS	8	CTS
8	CTS	5	CTS	>	4	RTS	7	RTS

Understanding the LEDs

Front panel LEDs

The front panel, shown in Table 8, has a lighted Nortel Networks logo, and 2 LEDs. These LEDs indicate the status of the Contivity VPN switch.

Figure 8 Front panel LEDs



- The **Power LED** is the lighted Nortel Networks logo. It is blue when the power is on.
- The triangular **Alert/Fail LED** is set to yellow or red by the Contivity 1600 switch software. Yellow indicates a non-fatal status requiring attention. Red indicates hardware errors that also cause the beeping condition. While both conditions require attention, red indicates more serious errors. This LED indicates the Health Check status that is described in Health Check reports. Refer to *Configuring the Contivity VPN Switch* for information on Health Check.
- The **Boot/Ready LED** is set to yellow or green. Yellow indicates a boot in process/non-ready state. A steady green indicates that the box has reached a state of readiness.

Private LAN LEDs

Figure 9 shows the private LAN port LEDs located on the back of the switch. Table 7 shows the corresponding LED table.

Figure 9 Private LAN port LEDs

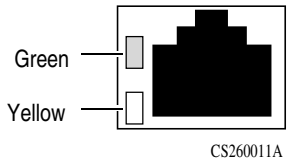


Table 7 LAN port LED indicators

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

Start the switch and confirm that the LAN interfaces are cabled properly by examining LEDs located on the I/O card panel.

V.35/X.21 single LEDs

Figure 10 shows the single V.35/X.21 LEDs. Table 8 shows the corresponding LED table.

Figure 10 Single V.35/X.21LEDs

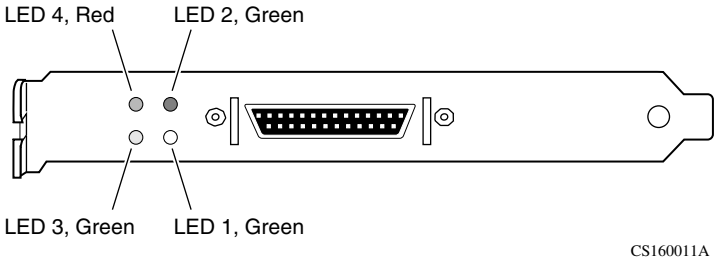


Table 8 Single V.35/X.21 LED indicators

LED	Description
LED1, Green	Power is on to the adapter and the onboard microcode is loaded.
LED2, Green	The signals CDC and DSR are on between the DSU and the adapter. LED2 detects receive link status.
LED3, Green	Cable is detected.
LED4, Red	No external transmit clock source is available.

Figure 11 shows the T1 CSU/DSU LEDs. Table 9 shows the corresponding LED table.

Figure 11 T1 CSU/DSU LEDs

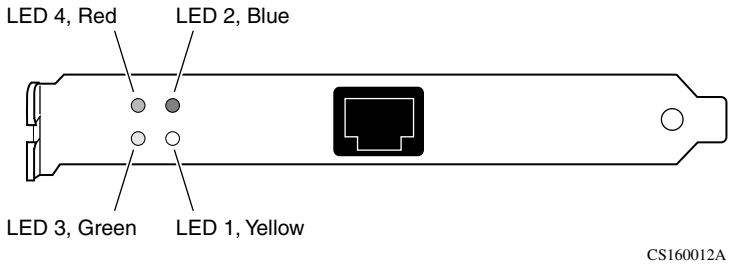


Table 9 T1 CSU/DSU LED indicators

LED	Description
LED1, Yellow	Yellow alarm LED is lit when the far-end equipment is in the red alarm condition.
LED2, Blue	Blue alarm LED is lit when receiving an upstream failure denoted by an alarm indication signal (AIS).
LED3, Green	Normal operation.
LED4, Red	Red alarm is lit when a loss-of-signal (LOS) or out-of-frame (OOF) condition is detected on the receive signal.

Public LAN LEDs

Figure 12 shows the PCI card 10/100BASE-TX public LAN LEDs. Table 10 shows the corresponding LED table.

Figure 12 10/100BASE-TX LAN LEDs

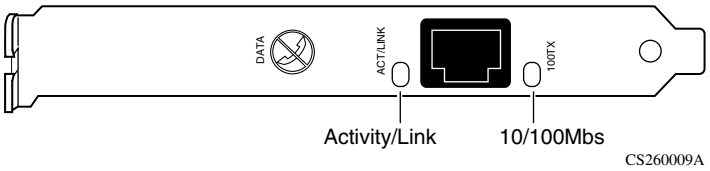


Table 10 10/100BASE-TX LAN LED card indicators

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

Chapter 3
Rack Mounting

The Contivity 1600 can be mounted in a rack or placed on a desktop. This chapter describes how to mount your switch in a chassis rack and also shows how to mount rubber feet, should you prefer desktop operation.

Nortel Networks recommends the following standard rack-mounting considerations:

- The maximum recommended ambient temperature is 40 degrees Celsius. Make sure the internal temperature of the rack also does not exceed 40 degrees Celsius.
- Do not block the power supply vents or otherwise restrict air flow when installing the switch into a rack.
- Stabilize your rack properly so that it does not tip over under the weight of the switch and other devices.
- Make sure that the electrical branch circuits are capable of handling the switch *and* other units in the rack before installing and turning on the switch.
- Maintain a reliable Earthing path in the rack system. The switch is intended to connect to an Earth ground.

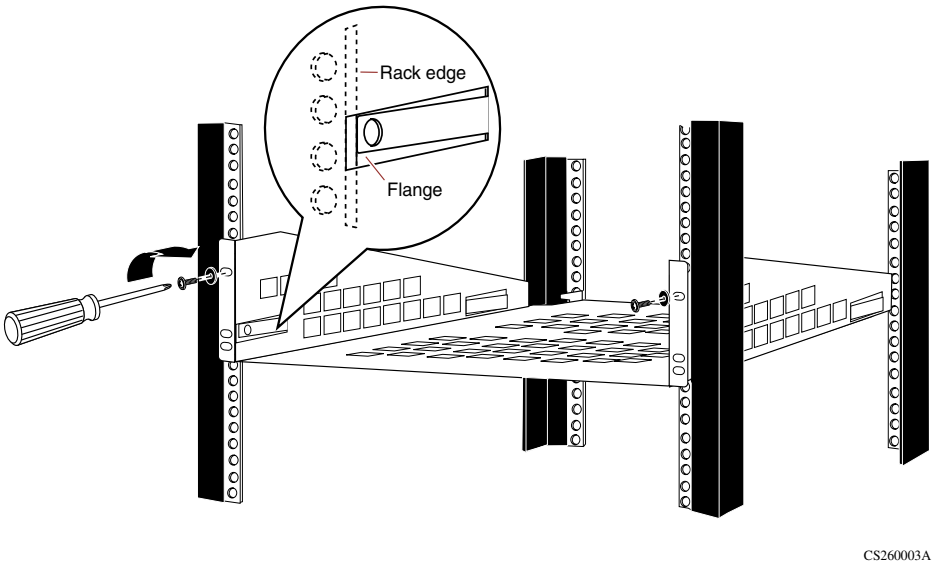
Rack-mount shelf installation procedure

Nortel Networks recommends that you have two people available when installing the unit in the rack. Figure 13 shows a shelf being attached in preparation for a rack-mount installation.

Attaching a shelf for a rack-mounted installation

1 Position the rack-mount shelf as shown in Figure 13.

Figure 13 Installing a shelf for a chassis rack mount



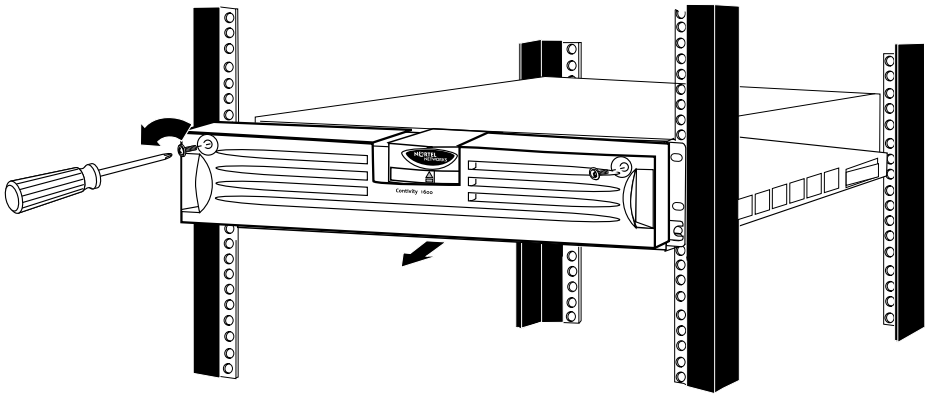
2 Make sure that the positioning flange snaps are in place to support the shelf.

3 Screw in the two upper rack-mounting screws. Repeat this step on the other side of the chassis.

4 Place the switch on the rack-mount shelf.

5 Remove the front bezel, as shown in Figure 14.

Figure 14 Removing the front bezel



6 Note that you *do not* need to turn off the switch if you are *only* removing the front bezel.

Warning: When handling the Contivity 1600 switch outside of the rack-mount shelf, do not use the piece with the Nortel Networks logo and the LEDs as a handle.

Note that the first few times you remove the front bezel it might seem to resist removal. This is simply because the ball studs and socket clips are new. After a few times, removal is easier.

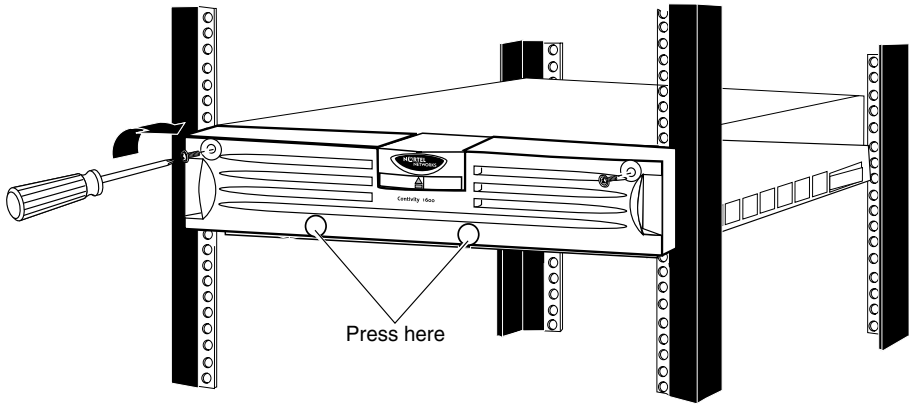
To remove the front bezel, you need a Phillips screwdriver.

7 Using the screwdriver, turn each of the two screws on the front bezel a quarter turn counter-clockwise.

8 Grip the two handles and firmly pull the bezel towards you to unsnap it from the chassis.

9 Secure the switch to the rack-mount shelf by screwing in the lower rack-mount screw position. Replace the bezel as shown in Figure 15. Turn the front screws one-quarter turn clockwise to lock the bezel in place on the chassis.

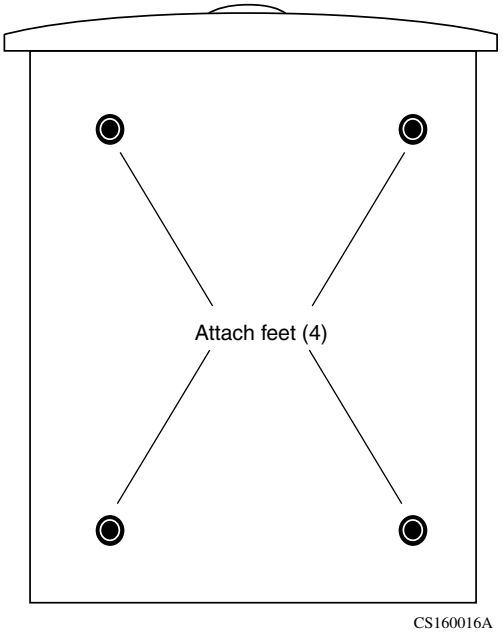
Figure 15 Replacing the front bezel



Desktop operation

Four rubber feet are included that can be attached to the bottom of the switch, should you want to use it from a desktop. Figure 16 shows the placement of these rubber feet.

Figure 16 Attaching rubber feet to the bottom of the chassis



Chapter 4
Changing Hardware Configurations

This chapter describes how Nortel Networks trained service personnel can change existing hardware configurations, including installing LAN and WAN cards, and how to add memory.

Warning: Wear an antistatic band when handling electronic components for the Contivity switch to avoid damaging them.

Note: Turn off the Contivity switch and unplug it before installing LAN or WAN cards, or system memory.

Figure 17 shows the back view of the Contivity 1600 with power, Ethernet, and serial cables.

Figure 17 Back view of the Contivity 1600 with cables

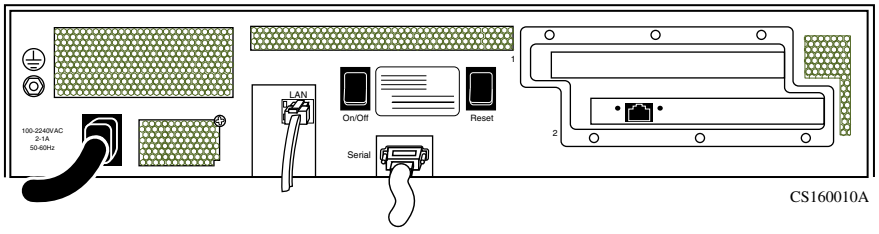
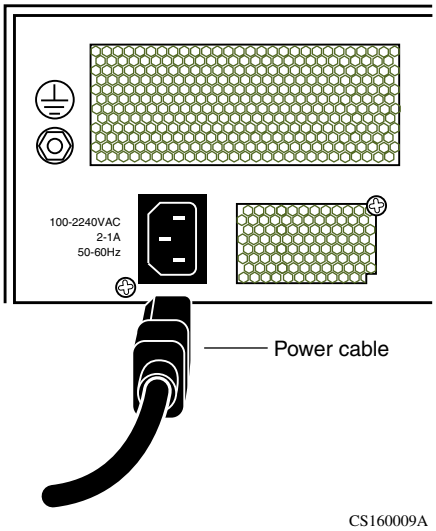


Figure 18 shows how to remove the power cord from the Contivity switch.

Figure 18 Removing the power cord



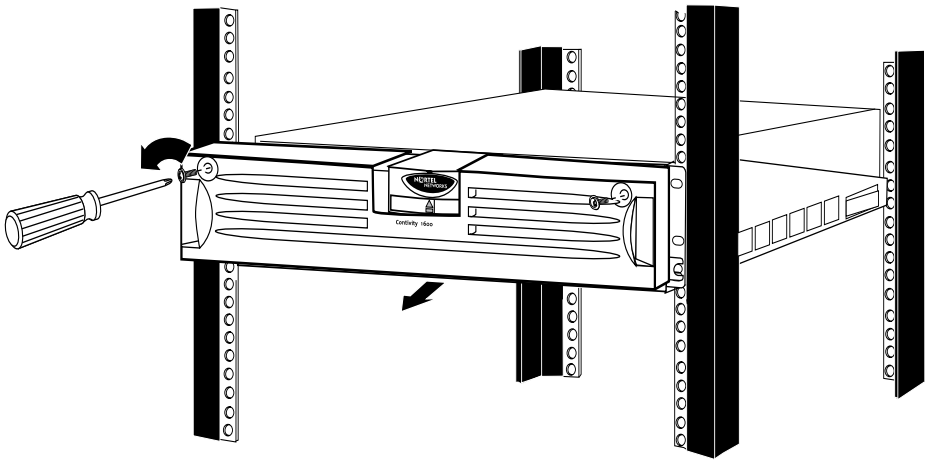
To access the diskette drive for system recovery operations, you must first remove the switch's front bezel. To install LAN or WAN cards or to install additional memory, you must remove the switch's front bezel and top cover.

Removing the front bezel

You must remove the bezel to insert the recovery diskette. Note that you *do not* need to turn off the Contivity switch if you are *only* removing the front bezel. Figure 19 shows you how to remove the front bezel from the Contivity switch.

Warning: When handling the Contivity switch outside of the rack-mount shelf, do not use the piece with the Nortel Networks logo and the LEDs as a handle.

Figure 19 Removing the front bezel



Note that the first few times you remove the front bezel it might seem to resist removal. This is simply because the ball studs and socket clips are new. After a few times, removal is easier.

To remove the front bezel, you need a Phillips screwdriver.

1. Using the screwdriver, turn each of the two screws on the front bezel a quarter turn counter-clockwise.
2. Grip the two handles and firmly pull the bezel towards you to unsnap it from the chassis.

Removing the front bezel and the top cover

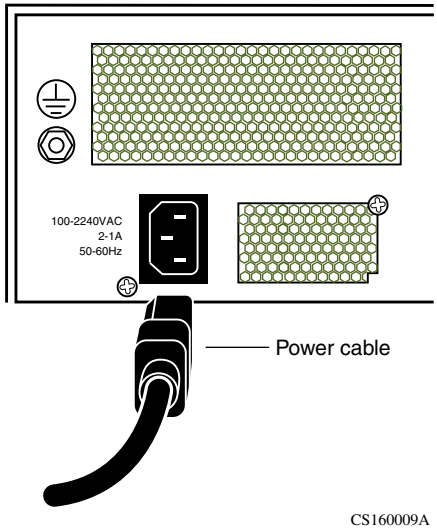
To install LAN or WAN cards, or to install additional memory, you must remove the Contivity 1600 switch's front bezel and then you must remove the switch's top cover.

To remove the front bezel and cover you need a Phillips screwdriver. Note that you **do** need to turn off the Contivity switch to remove the top cover.

1 Turn off the Contivity switch's power and unplug it.

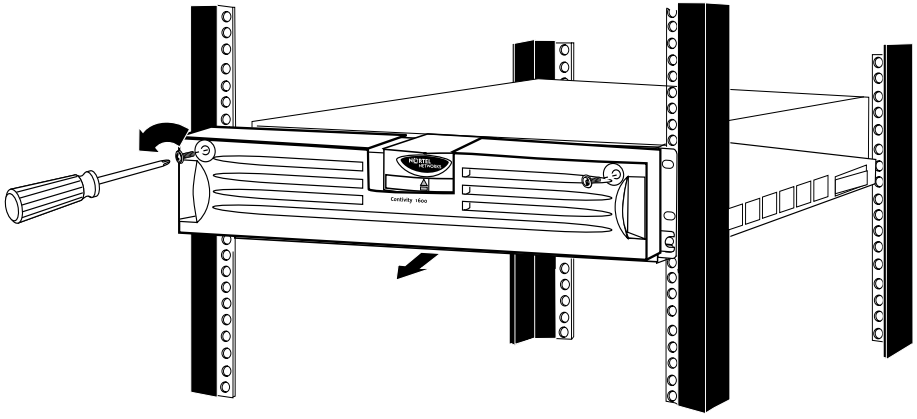
Figure 20 shows how to remove the power cable from the Contivity switch.

Figure 20 Removing the power cable



2 Using the Phillips screwdriver, turn each of the two screws on the front bezel a quarter turn counter-clockwise as shown in Figure 21.

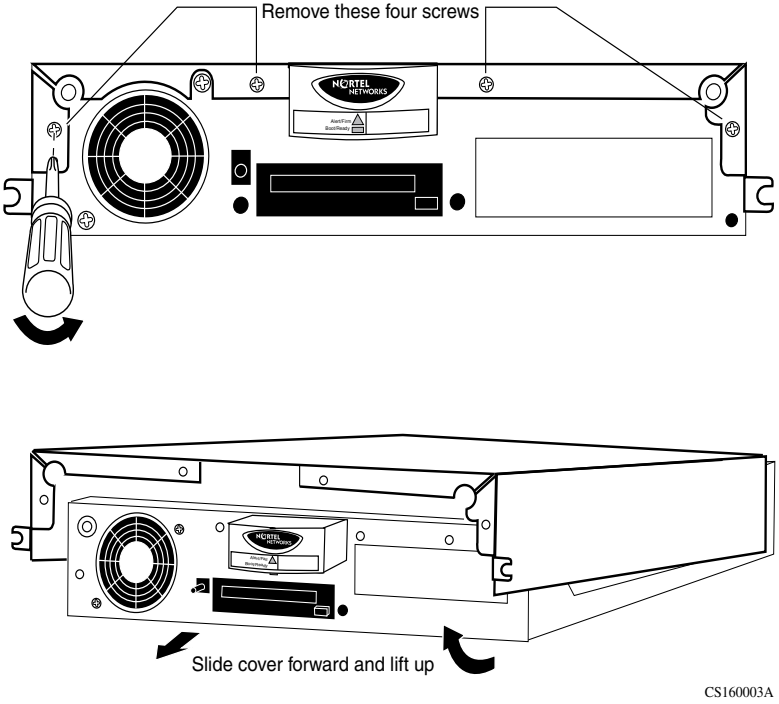
Figure 21 Removing the Contivity 1600 front bezel



CS160014A

3 Grip the two handles and firmly pull the bezel towards you to unsnap it from the chassis. Do not use the piece with the Nortel Networks logo and the LEDs as a handle. Using the Phillips-head screwdriver, remove the four screws that secure the cover to the chassis, as shown in Figure 22.

Figure 22 Removing the top cover

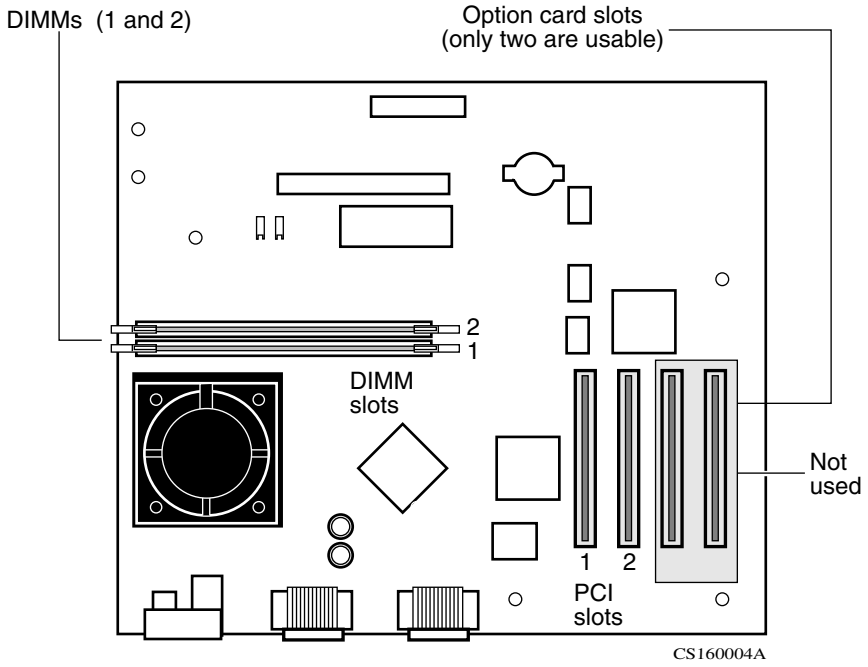


4 Slide the top cover forward approximately 1/4 inch, then lift the lid 2 to 3 inches, and move it away from the chassis.

System board

Figure 23 shows the Contivity 1600 switch's system board, in particular the Dual Inline Memory Modules (DIMMs), option card slots, and the CPU cooling fan.

Figure 23 Contivity 1600 system board



Warning: Beware of danger if the battery is incorrectly replaced. Replace with the *same* or an *equivalent battery* only, as recommended by the manufacturer's instructions.

Danger: In spite of the above warning, which is mandated for regulatory approval, *you should not change the battery.* If you suspect a dead battery, contact Nortel Networks Customer Support.

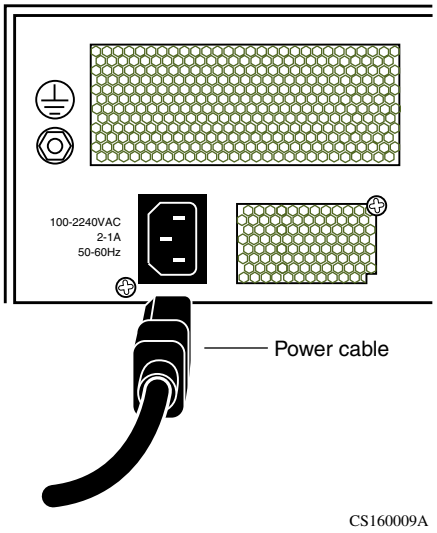
Installing option cards

This section shows you how to install LAN or WAN option cards in the Contivity 1600. To remove the front bezel and cover, you need a Phillips screwdriver.

1 Power off the Contivity.

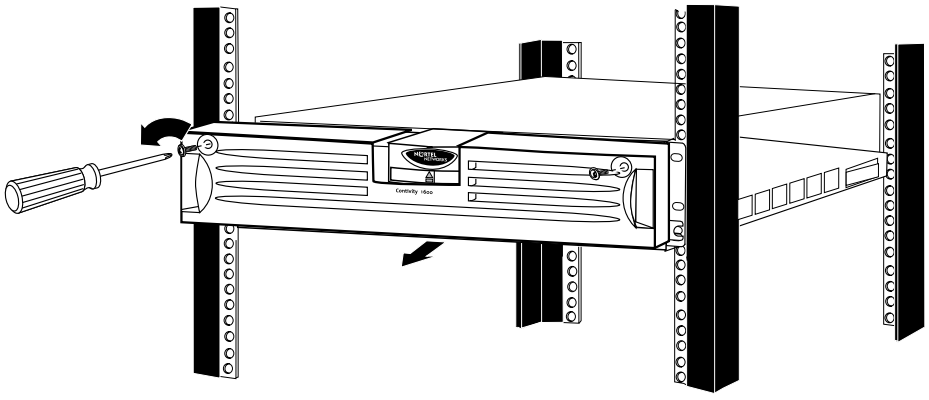
2 Remove the power cord, as shown in Figure 24.

Figure 24 Removing the power cord



3 Remove the front bezel, as shown in Figure 25.

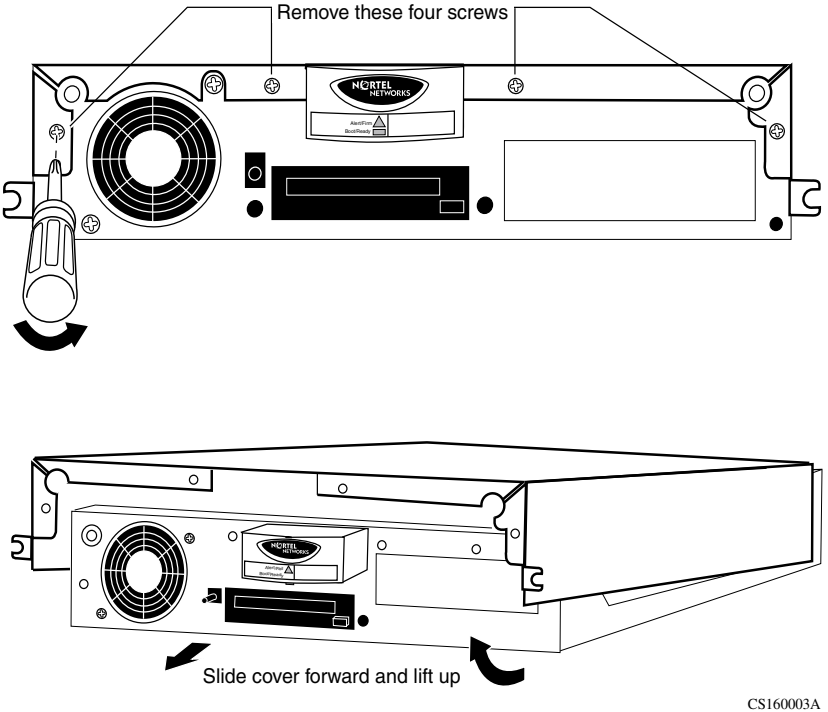
Figure 25 Removing the front bezel



CS160014A

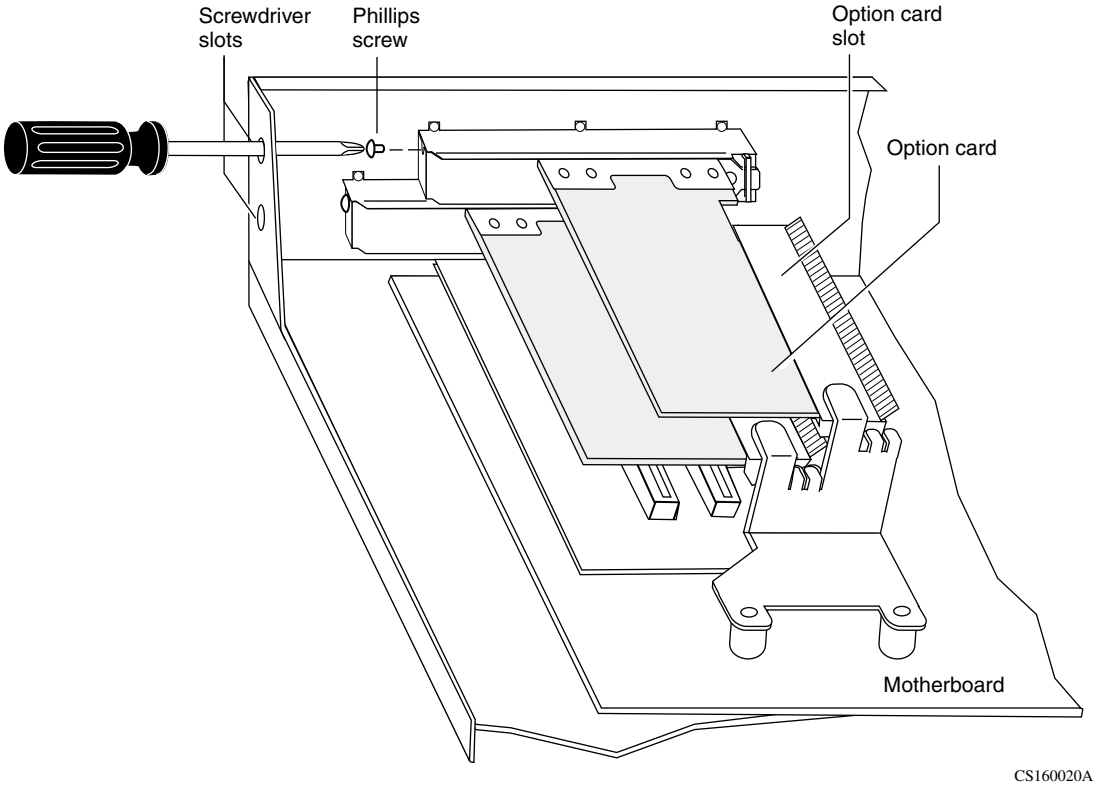
4 Remove the top cover, as shown in Figure 26.

Figure 26 Removing the top cover



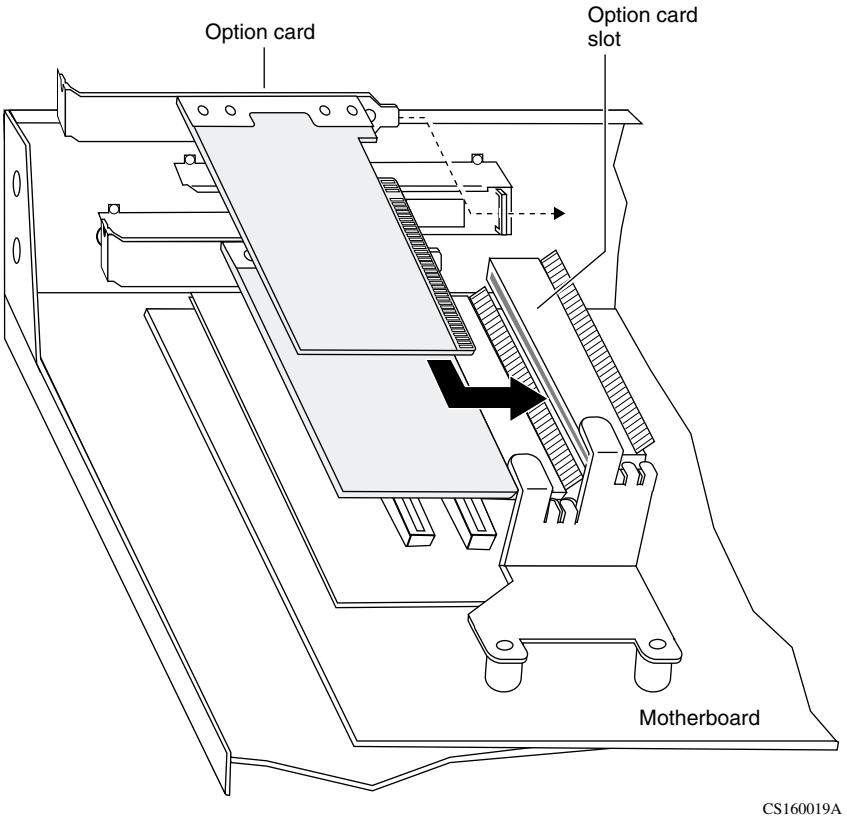
5 Remove the filler panel screw and pull out the filler panel, as shown in Figure 27.

Figure 27 Installing LAN or WAN option cards



6 Slide the option card into the intended slot, as shown in Figure 28.

Figure 28 Installing option cards



Make sure the card seats firmly and evenly into the card slot. If the card is not seated properly, it will not work.

7 Replace the card and screw.

8 Replace the top cover.

9 Replace the front bezel.

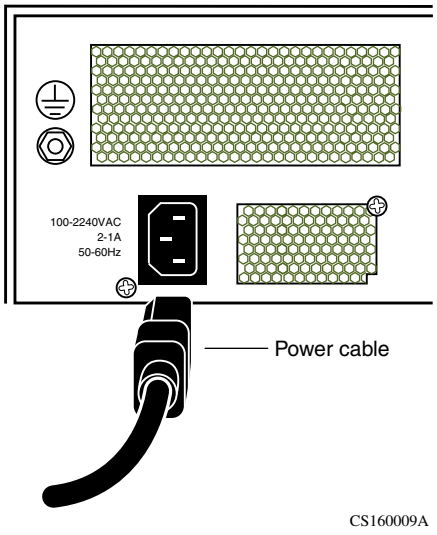
Installing additional DIMMs

This section shows you how to unlock a Dual Inline Memory Module (DIMM) and remove or install the DIMM in the next available slot (for example, if the DIMM # 1 slot is populated, than add the next DIMM to the DIMM # 2 slot).To install a DIMM, follow these steps.

1 Turn off the Contivity switch.

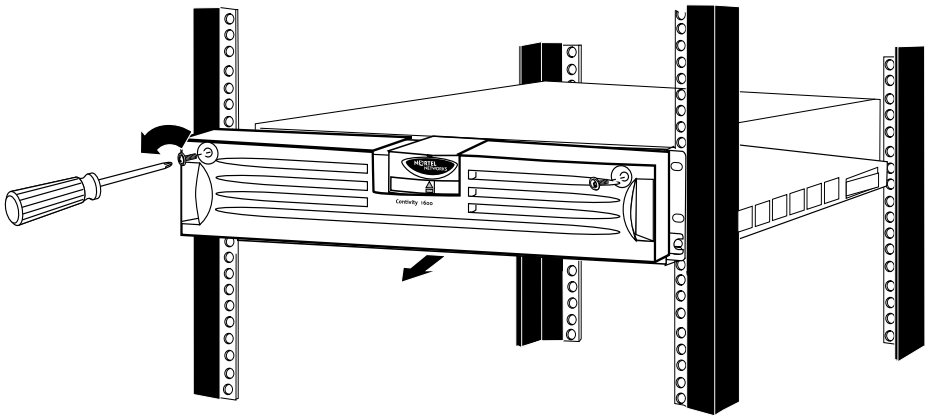
2 Remove the power cord, as shown in Figure 29.

Figure 29 Removing the power cord



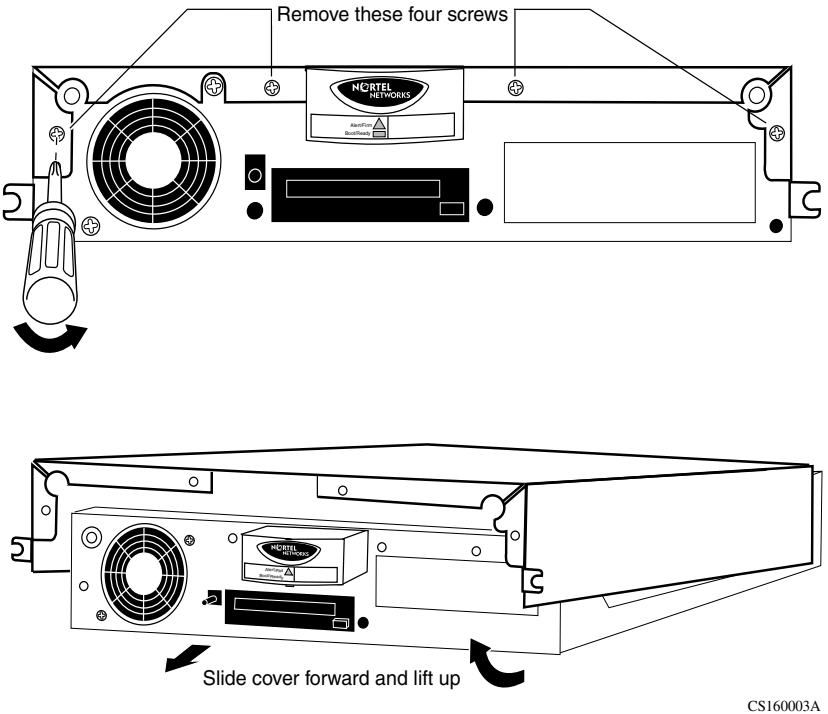
3 Remove the front bezel, as shown in Figure 30.

Figure 30 Removing the front bezel



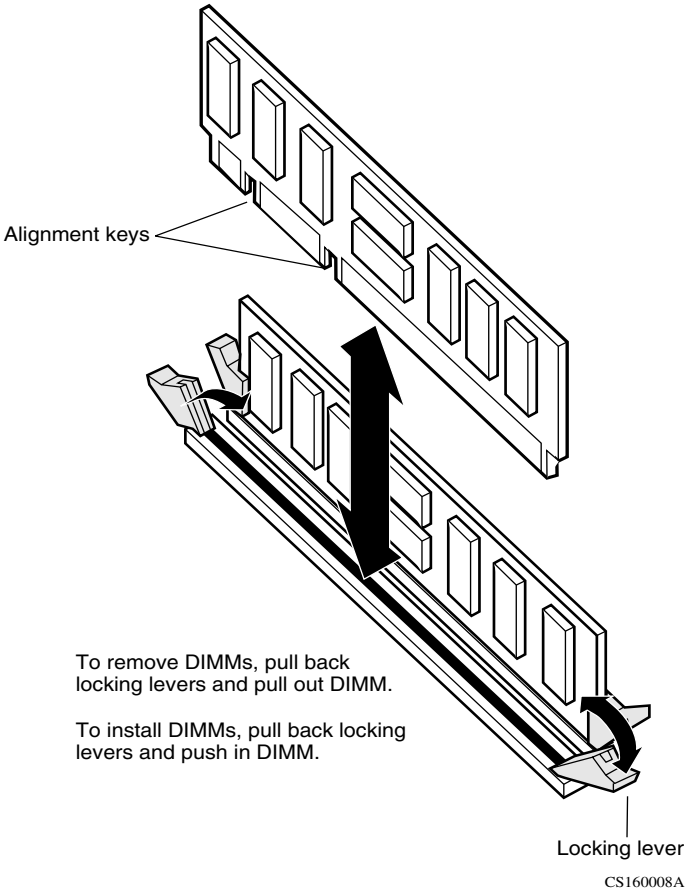
4 Remove the top cover, as shown in Figure 31.

Figure 31 Removing the top cover



5 Press down the locking levers on both sides of the DIMM, as shown in Figure 32.

Figure 32 Installing memory



6 Pull the DIMM up to remove it from the slot.

7 Place a new DIMM in the slot, making sure to properly position the DIMM's alignment keys. Make sure the DIMM is pressed firmly into the socket.

8 Pull up the locking levers on both sides of the DIMM, and snap in the DIMM, as necessary.

9 Replace the top cover.

10 Replace the front bezel.

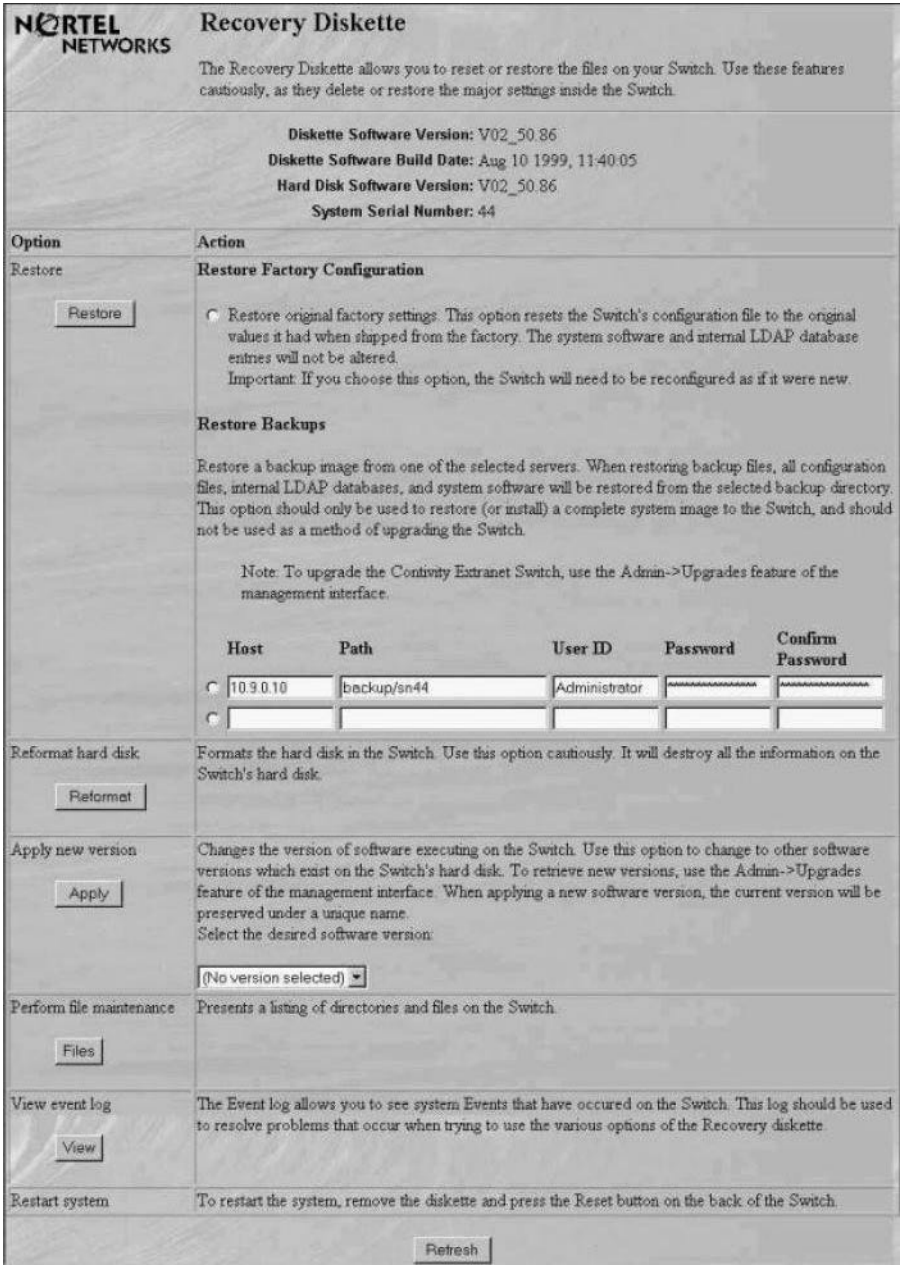
Chapter 5
Using the Recovery Diskette

Remove the switch's front cover. Insert the recovery diskette into the drive and press the Reset button on the back of the switch. This supplies the switch with a minimal configuration utility that allows you to view the switch from a Web browser.

At your Web browser, enter the management IP address of your switch. The Recovery Diskette display shown in Figure 33 appears, which allows you to:

- Restore the factory default configuration or the backup configuration.
- Reformat the switch's hard disk.
- Apply a new software version to the switch.
- Perform file maintenance.
- View the Event log.
- Restart the system.

Figure 33 The Recovery Diskette display



1 Restore the configuation:

To restore the factory default configuration or the backup configuration, select the hard disk drive to which you want to restore the system files; either ide0 (drive 0) or ide1 (drive 1) and then do one of the following:

➨ Restore the factory configuration by selecting Restore Factory Configuration, then click Restore to return the switch to its original factory default configuration. This erases data contained in flash memory and also in the configuration file.

Warning: Selecting this option requires you to rebuild your entire switch configuration again from scratch.

An online message specifies the result of the Factory Configuration reset action.

➨ Or you can restore the switch's previously backed-up configuration by clicking Restore. If you previously chose to automatically back up the file systems, then the Backup Server Host (or IP address) and Path Name, User ID, and Password appear in the table.

Click the radio button of the preferred backup server. The backed-up file system, including software image and configuration files, from the latest backup copy residing on the designated server will be restored onto the hard drive of your switch.

You can use the same backup server for multiple switches. Each switch creates a unique directory based on its serial number. The following example shows the Host, Path, and Serial Number (where the serial number [SN] is five digits):

```
C:/software/backup/v101/SN01001
```

The Serial Number is used to differentiate backup configurations from multiple switches that are saved on the same backup server. The Serial Number uniquely identifies each switch's backup data.

A blank row in the server backup field always appears to allow you to manually enter a backup server in case you did not configure automatic backup server locations.

Alternatively, a new factory default software image and file system can be restored to the switch's hard disk. Specify the name or address and path of the network file server onto which the software from the Nortel Networks CD has been installed.

Note: This will restore the disk to an operable but "clean" condition (for example, configuration values will be at factory defaults).

To view your switch's Serial Number when the switch is operational, click Status→System from the Navigational Menu. The Serial Number is also listed on the bar code label on the back of the switch.

2 Click Reformat your switch's hard disk if you must reformat the hard disk, for example if you:

— Have problems restoring your configuration that are not caused by the network or the file/backup server from which the file restoration is being retrieved.

— Want to reconfigure the switch from scratch.

— Install a new disk.

Caution: Selecting this option will completely wipe out anything that previously resided on the hard disk.

An online message indicates whether the reformatting of the hard disk was successful.

3 Click the drop-down list box to view the available software image and file systems that are stored on the hard disk and select the image version that you want to activate.

4 Click Files to bring up the File Maintenance display, which allows you to view the entire hard disk file system.

5 Click View to display the Event Log beneath the Recovery Diskette display. This is especially useful if a Restore operation fails.

6 Set the boot disk by clicking the drop-down list box to select the hard disk drive from which you want to boot the switch: either ide0 (drive 0) or ide1 (drive 1). Then click Set.

7. Click Synchronize to immediately synchronize the primary and secondary disks. Thereafter, the disks will automatically synchronize every hour.
8. Upgrade the system boot software by clicking the drop-down list box to select a drive onto which you want to update the system boot software. Click Upgrade to rewrite the boot software onto the hard disk. You would do this if the system boot sector were to become corrupted.
9. Restart the system by removing the diskette and pressing the Reset button on the back of the switch. Then reposition your Web browser to the Management IP address, and press “Reload” or “Refresh” from your browser menu to access the management page of the software running on the hard disk.

Appendix A
Specifications

Table 11 shows the physical specifications and operating environment for the Contivity 1600.

Table 11 Physical specifications and operating environment

Specification	**Description**
Physical	
Depth	21.0 in. (53.34 cm)
Width	17.75 in. (45.09 cm) (19 in. rack mount)
Height	3.5 in. (8.89 cm)
Weight	26 lbs. (11.82 kg)
Electrical	
Voltage	100 - 240 VAC
Current	2.0/1.0 A
Frequency	50/60 HZ
Operating Environment	
Temperature	32 - 110° F (0 - 45° C)
Relative Humidity	10 - 90% noncondensing

Index

Numbers

100BASE-TX interface 34
10BASE-T interface 34

A

acronyms 22

B

backup
configuration 73

C

Category 3, 4
wiring requirements 34
Category 5
wiring requirements 34
connecting cables 33
conventions 21
customer support 24

D

DB26S to V.35
connector 35, 37
pinouts 35, 37
DB9 or DB25
connectors 42
DIMMs
installing 67
documentation map 20
DSU/CSU
required 35, 37

F

factory default 71, 73
configuration 73
front bezel
removing 57

H

hard drive
reformat 74

L

LAN cards
installing 62

P

product support 24
publications
hard copy 23

R

rack mount 50
recovery
diskette
using the 71
recovery diskette
drive 57
reset button 75
RJ-45

pinouts 34

S

safety
power off 62, 67
serial cable connectors 42
serial interface
connector 42
serial number 73
software
version 74
new 71
support, Nortel Networks 24

T

technical publications 23
technical support 24
text conventions 21

U

user interface 24

W

WAN cards
installing 62
WAN connection
DSU/CSU 35, 37