Cisco Bandwidth Quality Manager Installation Guide

Software Release 3.1

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Preface

About this Guide

Objective

This Installation Guide describes how to install the Cisco Bandwidth Quality Manager software and how to cable the device using passive taps to measure network data.

Audience

This document is targeted at the following types of users:

- Network Planners and Architects
- Traffic Engineers and Capacity Planners
- Network Operation and Maintenance Personnel
- IT Staff and Telco Product Managers

Related Documentation

For more information on using the BQM, see the following documents:

- Cisco Bandwidth Quality Manager 3.1 Getting Started Guide
- Cisco Bandwidth Quality Manager 3.1 User Guide
- Cisco Bandwidth Quality Manager 3.1 Release Notes

Conventions Used in This Guide

Command descriptions use these conventions:

`Monospace` indicates variable names, directory paths, file names, and configuration command examples.

Boldface indicates names of user interface elements, such as menu options, toolbar button, dialog box and window field names, and commands and keywords that are entered literally as shown.

Italics indicate net terms and command arguments for which you supply values; in contexts that do not allow italics, arguments are enclosed in angle brackets (< >).

Square brackets ([ ]) indicate optional elements.

Braces ({ }) group required choices, and vertical bars (|) separate alternative elements.

Braces and vertical bars within square brackets ([{ | }]) indicate a required choice within an optional element.

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

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Cisco.com

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http://www.cisco.com/techsupport

You can access the Cisco website at this URL:

http://www.cisco.com

You can access international Cisco websites at this URL:

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Product Documentation DVD

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http://www.cisco.com/univercd/home/home.htm

The Product Documentation DVD is created and released regularly. DVDs are available singly or by subscription. Registered Cisco.com users can order a Product Documentation DVD (product number DOC-DOCDVD= or DOC-DOCDVD=SUB) from Cisco Marketplace at the Product Documentation Store at this URL:

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You must be a registered Cisco.com user to access Cisco Marketplace. Registered users may order Cisco documentation at the Product Documentation Store at this URL:

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You can provide feedback about Cisco technical documentation on the Cisco Technical Support & Documentation site area by entering your comments in the feedback form available in every online document.

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Cisco provides a free online Security Vulnerability Policy portal at this URL:

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From this site, you will find information about how to do the following:

- Report security vulnerabilities in Cisco products
- Obtain assistance with security incidents that involve Cisco products
- Register to receive security information from Cisco

A current list of security advisories, security notices, and security responses for Cisco products is available at this URL:

http://www.cisco.com/go/psirt

To see security advisories, security notices, and security responses as they are updated in real time, you can subscribe to the Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed. Information about how to subscribe to the PSIRT RSS feed is found at this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

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- For emergencies only—security-alert@cisco.com

An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered non emergencies.

- For non emergencies—psirt@cisco.com

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

Tip We encourage you to use Pretty Good Privacy (PGP) or a compatible product (for example, GnuPG) to encrypt any sensitive information that you send to Cisco. PSIRT can work with information that has been encrypted with PGP versions 2.*x* through 9.*x*.

Never use a revoked encryption key or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security

Vulnerability Policy page at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

The link on this page has the current PGP key ID in use.

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support. If you do not have a valid Cisco service contract, contact your reseller.

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Access to all tools on the Cisco Technical Support & Documentation website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

http://tools.cisco.com/RPF/register/register.do

Note Use the **Cisco Product Identification Tool** to locate your product serial number before submitting a request for service online or by phone. You can access this tool from the Cisco Technical Support & Documentation website by clicking the **Tools & Resources** link, clicking the **All Tools (A-Z)** tab, and then choosing **Cisco Product Identification Tool** from the alphabetical list. This tool offers three search options: by product ID or model name; by tree view; or, for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Tip Displaying and Searching on Cisco.com

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Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/techsupport/servicerequest

For S1 or S2 service requests, or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411
Australia: 1 800 805 227
EMEA: +32 2 704 55 55
USA: 1 800 553 2447

For a complete list of Cisco TAC contacts, go to this URL:

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Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—An existing network is “down” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operations are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of the network is impaired while most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

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http://www.cisco.com/en/US/products/index.html

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http://www.cisco.com/en/US/learning/index.html

1 Installing the BQM Software

This guide describes how to install, set up and begin using the Cisco Bandwidth Quality Manager (BQM) software on the Cisco 1180 series appliance.

You can also refer to these documents for important information about configuring and managing the BQM software:

- Before performing an installation or upgrade, review the Release Notes document. It provides an overview of new features and describes resolved and open bugs.
- For details about configuring and managing BQM, including a complete CLI command reference, see the "Cisco Bandwidth Quality Manager User Guide."

This chapter describes steps required to install the BQM 3.1 release software and how to upgrade from release 3.0 to 3.1:

- Powering Up the Cisco 1180
- Connecting to the Cisco 1180 Management Port
- Installing the BQM Software

Note Performing a CD installation always wipes all stored data and configuration.

Powering Up the Cisco 1180

You begin by powering up the Cisco 1180:

WARNING Before connecting a power source, ensure that the voltage supply is within the allowed ranges (100 - 240 VAC). Failure to observe these precautions will result in damage to the unit and may result in injury.

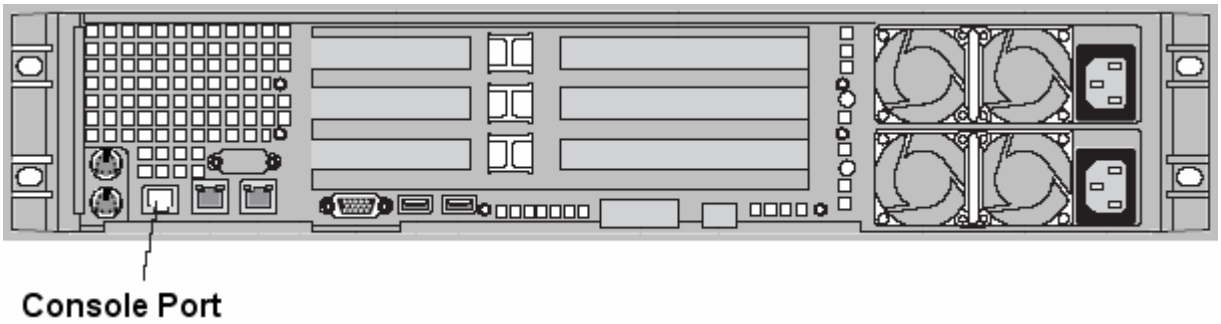
Step 1 Connect a power supply to the Cisco 1180. Insert the power cord, switch on at the mains and press the power switch. The unit turns on, illuminating the Power On LED.

Step 2 Verify that the Cisco 1180 has power by checking that the power LED (PWR) on the front panel of the Cisco 1180 is on.

Connecting to the Cisco 1180 Console Port

To perform the software installation procedure, you make a direct connection from a laptop to the Cisco 1180 console port (DTE). You will need a null-modem cable and a DB-9 to RJ-45 adapter cable to connect the laptop serial port and the Cisco 1180 console port.

Figure 1-1: Cisco 1180 Rear Panel – Console Port



Console Port Settings

The Cisco 1180 console port supports a RJ-45 interface with the following settings:

Bits per Second: 9600
Data bits: 8
Parity: None
Stop bits: 1
Flow control: Hardware

Examples of supported terminals include:

- tip (UNIX)
- minicom (Linux)
- HyperTerminal (Win32 with VT100 emulation)
- teraterm (Win32)

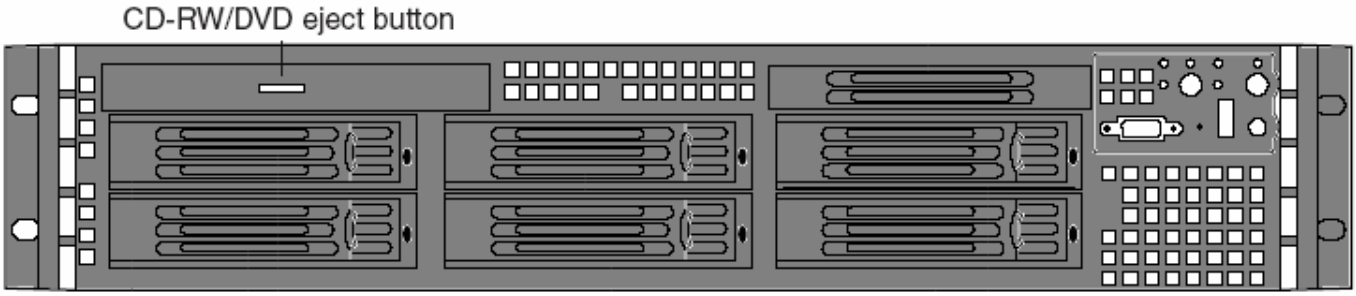
Installing the Software

If a problem occurs during the installations procedure, the best course of action is to start again from the beginning. If it still fails, you can plug in a keyboard and monitor to the appliance to see the reported error.

To install the software on the Cisco 1180, you do the following:

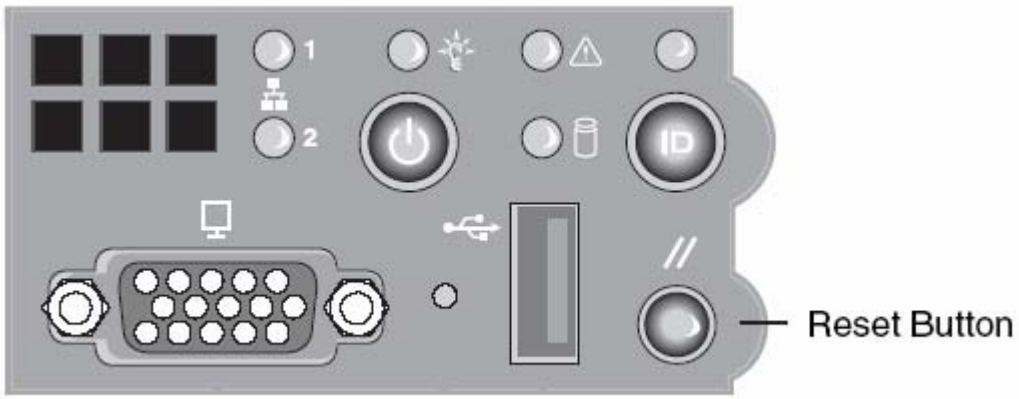
Step 1 Power on the appliance, and within 20 seconds, press the CD eject button, and remove the CD that is shipped with the appliance (if any).

Figure 1-2: Cisco 1180 Front Panel – DVD-ROM Drive



Step 2 Insert the BQM Installation CD in the Cisco 1180 CD drive and reboot the machine.

Figure 1-3: Cisco 1180 Front Panel – Control Panel



To reboot the machine you press the reset button on the front panel of the machine. The installation program starts automatically. There is a three minute wait until you will see a prompt on the terminal.

Step 3 When the introduction screen is displayed, you are prompted to start the installation.

```
Rebooting...

ISOLINUX 2.11 2004-08-16  Copyright (C) 1994-2004 H. Peter
Anvin


CBQM software installation CD.
Note any existing configuration will be overwritten.
Hit <ENTER> to continue.
boot:
Loading bzImage.............................
Loading cnx.............................
Ready.
Looking for CD-ROM
Verifying installation image
CBQM-v3.1.img.gz: OK
Installing CBQM image to /dev/sda
image copied to hard disk
second disk nulled
Installation completed
Please remove the CD, and press <Enter> to reboot
```

Note that any existing system and measurement configurations from previous installations will be lost when you boot off the installation CD. Press Enter to confirm that you want to begin the installation.

Step 4 The installation program reboots the machine and then initializes the disk and sets up the file system (this can take a few minutes).

```
Restarting system.

Cisco Bandwidth Quality Manager software: Version 3.1 (Thu 14
Dec 2006)

Booting...
/etc/init.d/rcS.d/S00-system_reset: OK
/etc/init.d/rcS.d/S01-ramdisk: OK
/etc/init.d/rcS.d/S10-defaults: OK
/etc/init.d/rcS.d/S15-sysid: OK
/etc/init.d/rcS.d/S20-watchdog-early: OK
/etc/init.d/rcS.d/S25-lcd: OK
/etc/init.d/rcS.d/S28-ipmi: OK
/etc/init.d/rcS.d/S30-syslog: OK
/etc/init.d/rcS.d/S35-xyratex1: OK
/etc/init.d/rcS.d/S40-iptables: OK
/etc/init.d/rcS.d/S41-interfaces: OK
/etc/init.d/rcS.d/S42-network: OK
/etc/init.d/rcS.d/S43-ntpd: OK
/etc/init.d/rcS.d/S44-xyratex2: OK
/etc/init.d/rcS.d/S45-watchdog: OK
/etc/init.d/rcS.d/S50-workdisk: disk0: creating partition P3
disk0: partition table changed, rebooting NOW ...

CP: C3
IBM RSA II Powered by ATI

IBM BIOS * (c) Copyright IBM Corporation 2005
Symmetric Multiprocessing System
Intel Xeon 3.4 GHz
2 Processors Installed

04096 MB Installed Memory

Press F1 for Setup
Press F2 for Diagnostics
Press F12 to select boot device

>> BIOS Version 1.06 <<

CP: 1E
CP: 4B

Broadcom NetXtreme Ethernet Boot Agent v7.6.6
Copyright (C) 2000*2004 Broadcom Corporation
All rights reserved.

Broadcom NetXtreme Ethernet Boot Agent v7.6.6
Copyright (C) 2000*2004 Broadcom Corporation
All rights reserved.
LSI Logic Corp. MPT IME BIOS
Copyright 1995*2003 LSI Logic Corp.
```

```
MPTBIOS*IME*5.04.06
I Build

HBA ID LUN VENDOR   PRODUCT              REV INT13  CYL/ HD/SEC
*** ** *** ******** ***************** ******** *****
************
 0   0  0  IBM*ESXS ST3300007LC   FN     B26C  BOOT 1024/  2/32
 0   1  0  IBM*ESXS ST3300007LC   FN     B26C  81h  1024/255/63
 0   7  0  LSILogic LSI1030[    402]  1032316
 0   8  0  IBM      25P3495a S320  1     1

LSI Logic Corp. MPT boot ROM successfully installed!
```

Step 5 Next, you remove the BQM installation CD from the CD drive. When the machine reboots you are presented with the details of the initialization process and finally the login prompt.

```
Cisco Bandwidth Quality Manager software: Version 3.1 Thu 14
Dec 2006)

Booting...
/etc/init.d/rcS.d/S00-system_reset: OK
/etc/init.d/rcS.d/S01-ramdisk: OK
/etc/init.d/rcS.d/S10-defaults: OK
/etc/init.d/rcS.d/S15-sysid: OK
/etc/init.d/rcS.d/S20-watchdog-early: OK
/etc/init.d/rcS.d/S25-lcd: OK
/etc/init.d/rcS.d/S28
/etc/init.d/rcS.d/S30-syslog: OK
/etc/init.d/rcS.d/S35-xyratex1: OK
/etc/init.d/rcS.d/S40-iptables: OK
/etc/init.d/rcS.d/S41-interfaces: OK
/etc/init.d/rcS.d/S42-network: OK
/etc/init.d/rcS.d/S43-ntpd: OK
/etc/init.d/rcS.d/S44-xyratex2: OK
/etc/init.d/rcS.d/S45-watchdog: OK
/etc/init.d/rcS.d/S50-workdisk: disk0: creating filesystem ...
disk1: creating partition ...
disk1: creating filesystem ...
OK
/etc/init.d/rcS.d/S51-post-install: OK
/etc/init.d/rcS.d/S60-postgresql: OK
/etc/init.d/rcS.d/S80-probe: OK
/etc/init.d/rcS.d/S81-services: OK
/etc/init.d/rcS.d/S82-sshd: OK
/etc/init.d/rcS.d/S83-resolver: OK
/etc/init.d/rcS.d/S85-java: OK
/etc/init.d/rcS.d/S86-pyrest: OK
Waiting for system to come up ...
System is now UP

cbqm login:
```

The software installation process is complete. The next task is to log in to the Cisco 1180 and perform the initial setup configuration.

Setting Up the Cisco 1180

You need to get the correct network addresses from your system administrator or consult your network plan to determine correct addresses before you set up the Cisco 1180:

- **IP Address** - IP address to be assigned to the Cisco 1180, for example 10.1.2.3. Consult your network administrator to obtain an unassigned address.
- **Net Mask** - Subnet mask for the subnet on which the Cisco 1180 resides, for example 255.255.255.0
- **Gateway IP address** – IP address the Cisco 1180 uses to reach other networks, for example 10.1.2.254. The gateway address is often the same as the site router address.
- **Domain Name Server** (optional) – IP address of the domain name server the Cisco 1180 can use to resolve host names. DNS requests are only sent on user demand.
- **NTP Server** (optional) **–** IP address of the NTP server the Cisco 1180 can use to synchronize system time.

The following steps describe the procedure to set up the Cisco 1180 on the first day of service:

Step 1 Log in as the admin user. The default admin password is ‘admin’. Only the admin user can configure the system for use.

Step 2 When you first log in, you are prompted for each piece of configuration information required by the Cisco 1180 to complete the configuration process.

```
Please enter setup information ...

                     IP Address: 192.168.2.71
                        Netmask: 255.255.0.0
                         Prefix: 16
                         Router: 192.168.1.10
  Domain-Name-Server [optional]:
          Ntp server [optional]:
                       Hostname: nyc_hq
     current time and timezone :
14:39:37 19 October 2006 UTC  (UTC)
```

The initial configuration is complete. For further instructions on initial configuration, such as licensing and setting the system time and time zone, see the “Getting Started Guide.”

2 Installing the Cisco 1180 with a Passive Tap

This chapter describes the hardware features of the Cisco 1180 and the steps required to install the Cisco 1180 appliance:

- Cisco 1180 rear panel features
- Installing the Cisco 1180 with a passive tap
- Verifying the Cisco 1180 installation
- Securing the Cisco 1180

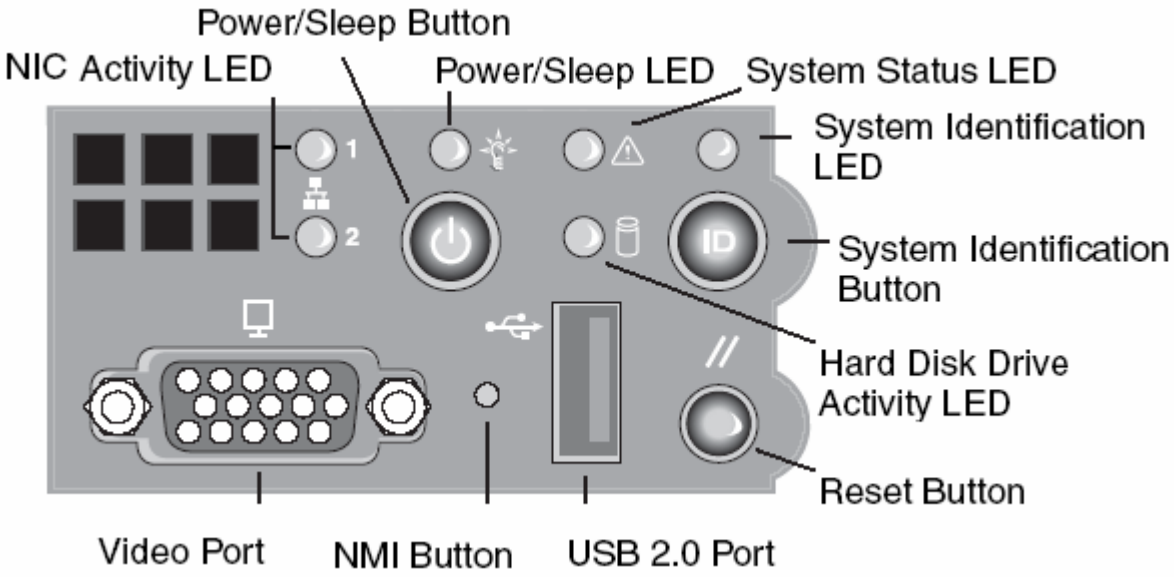
Overview

The Cisco 1180 has the capability to monitor Fast Ethernet and Gigabit Ethernet links. For monitoring Gigabit Ethernet, the Cisco 1180 supports optical interfaces (SX). The Cisco 1180 monitors the links using passive taps.

Cisco 1180 Controls and LEDs

The operator information panel is on the front right side of the appliance. The following illustration shows the LEDs on the front of the operator information panel, followed by a description of each LED (from left to right):

Figure 2-1: Cisco 1180 Front Panel Features



NIC activity LEDs: Continuous green light indicates a link between the system and the network to which it is connected. Blinking green light indicates network activity.

Power/Sleep LED: Continuous green light indicates the system has power applied to it. Blinking green indicates the system is in sleep state.

If the Power LED is off, it does not mean that there is no electrical power in the appliance. The LED might be burned out. To remove all electrical power from the appliance, you must disconnect the power cord from the electrical outlet.

Power/Sleep button: Press this button to turn the appliance on and off manually.

Hard disk drive activity LED: Random blinking green light indicates hard disk drive activity (SAS or SATA). No light indicates no hard disk drive activity.

System Identification LED: Use this blue LED to visually locate the appliance if it is in a location with numerous other servers. No light indicates system identification is not activated.

System Status LED: Solid green indicates normal operation.
Blinking green indicates degraded performance.
Solid amber indicates a critical or non-recoverable condition.
Blinking amber indicates a non-critical condition.
No light indicates POST is running or the system is off.

System Identification button: Solid blue indicates system identification is active.
No light indicates system identification is not activated.

Reset button: Press this button to reboot and initialize the system.

USB 2.0 Port: Connect a USB device to this connector.

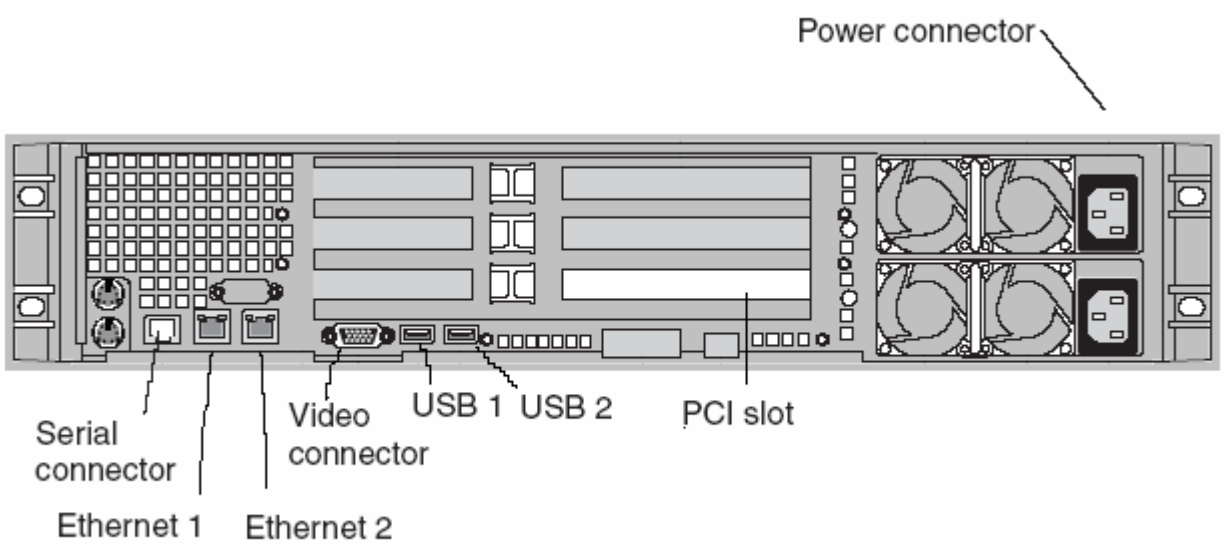
NMI button: Puts the server in a halt-state for diagnostic purposes.

Video port: Allows you to attach a video monitor to the front of the chassis. The front and rear video ports cannot be used at the same time.

Cisco 1180 Rear Panel

The following figure shows the main features of the Cisco 1180 rear panel.

Figure 2-2: Cisco 1180 Rear Panel Features



The following table describes the Cisco 1180 rear panel ports, connectors, and controls as shown in the preceding figure.

Table 2-1: Cisco 1180 Rear Panel Ports, Connectors and Controls

Item	Description
PCI slot	Measurement ports (PortA/PortB/PortC/PortD). For FastE/GigE electrical deployments: 10/100/1000 Ethernet. RJ-45 connector. For optical deployments: Gigabit Fiber SC connector. The other PCI slots are not used.
Power connector	Conenct a power cord to this connector.
Video connector	Monitor connector. Not used.
Console port	The console port (DTE) supports an RJ-45 connector with the following settings: 8 data bits, no parity, 1 stop bit, and the speed is 9600 bps. Use a null-modem cable and DB-9 to RJ-45 adapter when connecting to a laptop serial port.

USB connectors	USB device connectors. Not used.
Dual GB Ethernet connectors	Use the left-hand Ethernet connector as a management port to connect the device to an Ethernet network. The right-hand Ethernet port is not used.
Ethernet LEDs	There are a set of LEDs for each Ethernet connector. The top LED is the Ethernet link LED. When it is lit, it indicates that there is an active connection on the Ethernet port. The bottom LED is the Ethernet activity LED. When it flashes, it indicates that data is being transmitted or received between the appliance and a network device. The flashing frequency is proportional to the amount of traffic on the network link.

Choosing a Location for the Unit

Choose a location for the Cisco 1180 that complies with the environmental specifications listed at the end of this document. You must leave a minimum clearance of 3 inches at the front and rear of the unit to allow air to circulate. Air vents on the top, front, side, and rear of the unit must be left clear to allow adequate air circulation to prevent excessive heat, which can damage the internal components. The following table lists the various locations where you must not operate the unit.

Table 2-2: Unsuitable Locations

Location	Explanation
Dirty or dusty locations	Dirt and dust can damage the module unit components and clog the air vents.
Locations exposed to direct heat or sunlight	Direct heat and sunlight can cause the module unit to overheat and fail.
Unstable locations	See the appendix for Cisco 1180 Physical Specifications for the weight of the Cisco 1180. If you are not placing the module unit on the floor, make sure that the location is steady and stable and can support the weight.

CAUTION:
If the unit is mounted on a rack, then the system integrator is responsible for the mechanical stability of the rack configuration in both of the following situations:

- When the unit is in the fully home position
- When the unit is in the fully extended position

The system integrator is also responsible for the thermal design in the enclosure.

Installing the Cisco 1180 with a Passive Tap

Using a passive tap allows you to connect and disconnect the Cisco 1180 at any time, without disrupting the traffic on the network. Network traffic passes uninterrupted through the passive tap, even if power is lost.

Depending on the required deployment, you can install the Cisco 1180 with a passive tap in the following ways:

- Fast Electrical (10/100 TX) Ethernet - Single-Homed
- Fast Electrical (10/100 TX) Ethernet - Dual-Homed
- Fast Electrical (10/100 TX) Ethernet – Router to Router Single-Homed
- Fast Electrical (10/100 TX) Ethernet – Router to Router Dual-Homed
- Gigabit Electrical (1000 TX) Ethernet - Single-Homed
- Gigabit Electrical (1000 TX) Ethernet - Dual-Homed
- Gigabit Multi-Mode Optical (1000 SX) Ethernet - Single-Homed
- Gigabit Multi-Mode Optical (1000 SX) Ethernet - Dual-Homed

When you install the Cisco 1180 with a passive tap, you also need the appropriate tap model for the network segment to be monitored.

The following sections describe the wiring scheme that you must use when installing the Cisco 1180 with 10/100/1000 electrical and Gigabit optical taps. Whereas most combinations of cable types may appear to work, only the exact wiring described below will lead to predictable results. Failure to follow these recommendations may result in a link that doesn't work at all, or causes the function of the two tap analyzer ports to be effectively swapped.

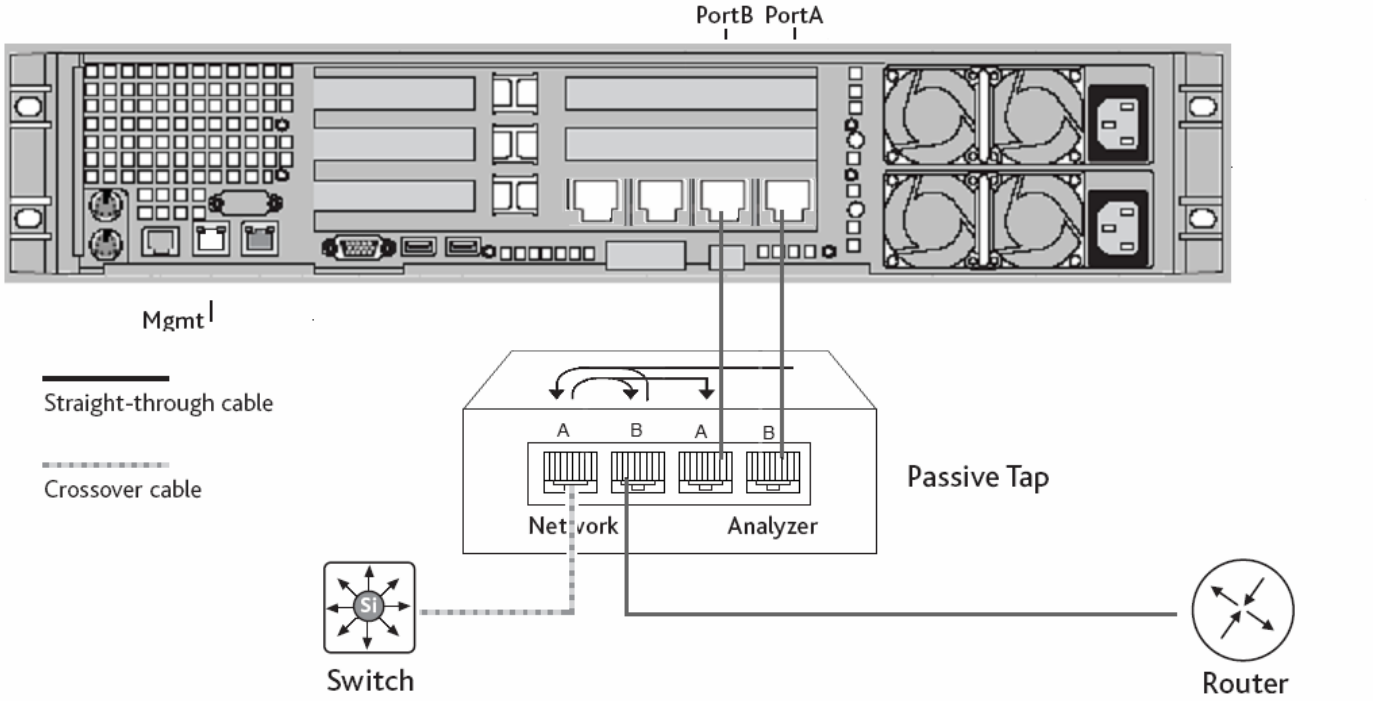
Auto-negotiation between ports on the link to be tapped should be switched OFF on at least one end of the link. Otherwise attempted auto-negotiation between the ports could cause the function of the two tap analyzer ports to be swapped.

The remainder of this chapter is divided into sections describing the cabling requirements and installation steps when installing taps in each of the deployments listed above.

Consult the section below that is relevant to your installation.

Fast Electrical (10/100 TX) Ethernet - Single-Homed

Figure 2-3: Example Single-Homed Cisco 1180 and Electrical Tap Deployment



The passive tap includes four shielded UTP connectors. The tap has two network ports and two analyzer ports. All the tap ports use standard RJ45 connectors. All ports on the tap behave as network equipment (DCE), like an Ethernet switch port.

The following table identifies which cable connections to use.

Table 2-3: Tap Cable Connections

Connection	Cable
Network Port A	Crossover to Switch
Network Port B	Straight-through to router
Analyzer A	Straight-through to Cisco 1180 PortA
Analyzer B	Straight-through to Cisco 1180 PortB

Installing the Tap

To install the passive tap in the network segment to be monitored, you use the following procedure:

Caution Only trained and qualified personnel should be allowed to install or replace this equipment.

Performing this installation will temporarily interrupt the data stream on the network.

Step 1 The first task is to restore the link by connecting the switch and the router to the tap:

- Connect Network Port A on the tap to the LAN/Service Provider core switch using a CAT5 RJ45 crossover cable.
- Connect Network Port B on the tap to the WAN edge or Service Provider edge router using a CAT5 RJ45 straight-through cable.

The link should now be restored. The next task is to verify link connectivity.

WARNING Before connecting a power source, ensure that the voltage supply is within the allowed ranges (100 – 240 VAC). Failure to observe these precautions will result in damage to the unit and may result in injury.

Step 2 With the tap powered ON, verify network connectivity of the original appliances on the network segment. With the tap powered OFF, verify network connectivity of the original appliances on the network.

Step 3 When you have verified connectivity on the link, you connect the Cisco 1180 to the tap:

- Connect the Cisco 1180 PortA interface to Analyzer Port B on the tap using a CAT5 RJ45 straight-through cable.
- Connect the Cisco 1180 Port B interface to Analyzer Port A on the tap using a CAT5 RJ45 straight-through cable.

Step 4 Connect a power supply to the Cisco 1180. Insert the power cord, switch on at the mains, and press the power switch on. The unit turns on, illuminating the Power On LED.

Step 5 Verify that the Cisco 1180 has power by checking that the power LED (PWR) on the front panel of the Cisco 1180 is on.

Cisco 1180 Management Port Configuration

The following table describes the cable connections to use when connecting to the Cisco 1180 management port.

Table 2-4: Management Port Cable Connections

Connection	Cable Type
Cisco 1180 Management Port	Straight-through to switch port

Autonegotiation of speed and duplex settings is often turned on by default, and enabled on all ports and devices. To work properly and reliably, autonegotation needs to be enabled on both ends of an Ethernet link. It is worth checking that the other end of a link has autonegotiation enabled when plugging in a new device, such as a Cisco 1180, that autonegotiates by default.

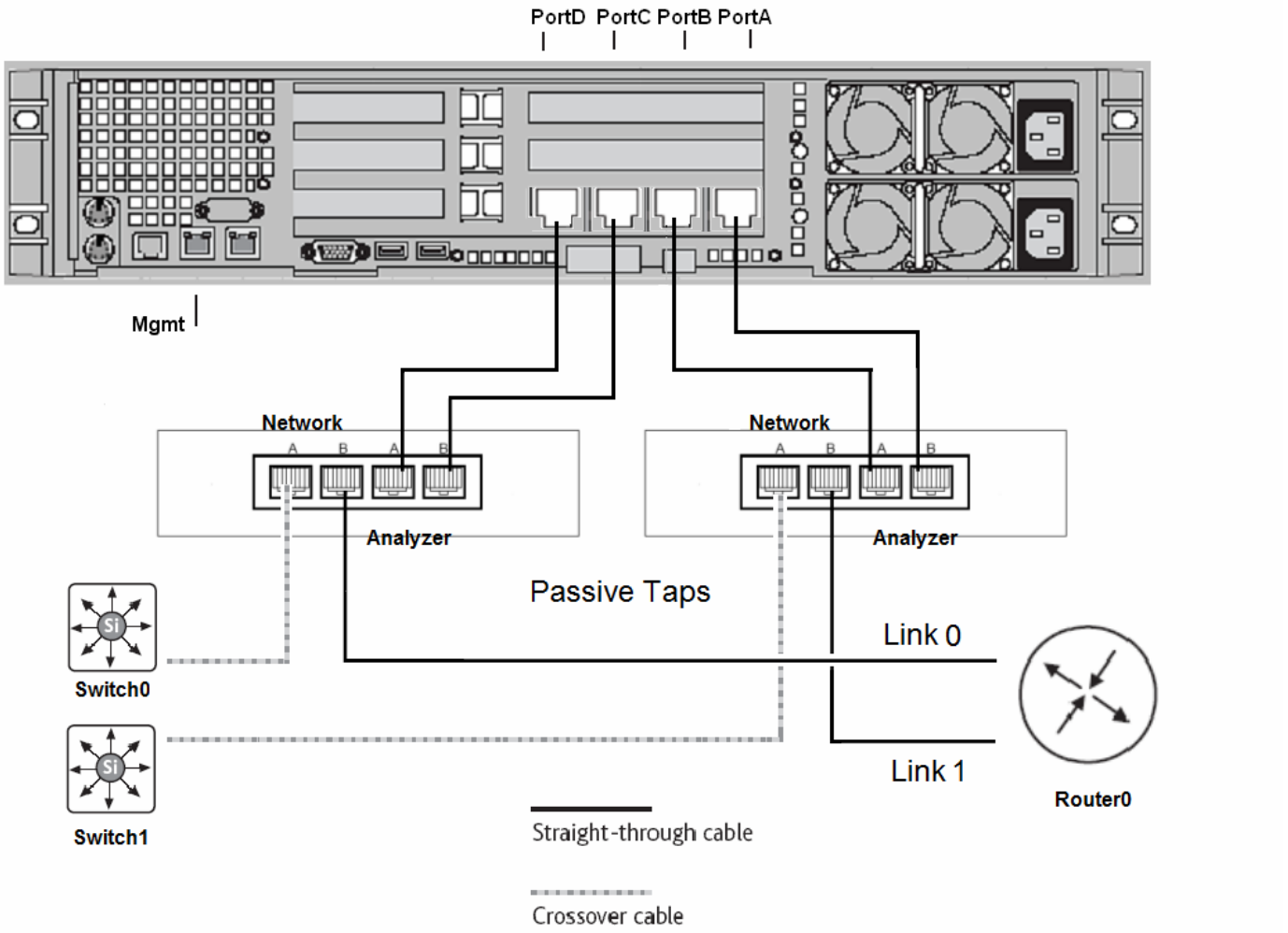
If for any reason autonegotiation is disabled on either end of the Ethernet link, then it MUST be disabled on the other end too, and both ends should be configured with the same speed and duplex settings. The most common cause of duplex mismatches is enabling autonegotiation at one end of a link but fixing the speed and duplex settings at the other end.

There may be specific cases where autonegotiation does not work.

To complete the Cisco 1180 installation process, see the section at the end of this chapter on verifying the installation.

Fast Electrical (10/100 TX) Ethernet - Dual-Homed

Figure 2-4: Example Dual-Homed Cisco 1180 and Electrical Tap Deployment



In the dual-homed deployment, two taps are required, one for each of the dual-homed links. Two measurement interfaces of the Cisco 1180 connect to the Analyzer A interface on the two taps, and the other two measurement interfaces connect to the Analyzer B interface on the two taps. The passive taps each include four shielded UTP connectors. Each tap has two network ports and two analyzer ports. All the tap ports use standard RJ45 connectors.

The following table identifies which cable connections to use.

Table 2-5: Tap Cable Connections

Connection	Cable
Network Port A	Crossover to Switch
Network Port B	Straight-through to router
Analyzer A	Straight-through to Cisco 1180 ports
Analyzer B	Straight-through to Cisco 1180 ports

Installing the Taps

To install the passive taps in the network segment to be monitored, you use the following procedure:

Caution Only trained and qualified personnel should be allowed to install or replace this equipment.

Performing this installation will temporarily interrupt the data stream on the network.

Step 1 The first task is to replace the existing straight CAT5 cables and restore the link by connecting the switches and the router through the taps:

- Connect Network Port A on the first tap to the first LAN/Service Provider core switch (switch0 in the preceding figure) using a CAT5 RJ45 crossover cable.
- Connect Network Port A on the second tap to the other LAN/Service Provider core switch (switch1 in the preceding figure) using a CAT5 RJ45 crossover cable.
- Connect Network Port B on the first tap to the WAN edge or Service Provider edge router using a CAT5 RJ45 straight-through cable.
- Connect Network Port B on the second tap to the WAN edge or Service Provider edge router using a CAT5 RJ45 straight-through cable. The link should now be restored. The next task is to verify link connectivity.

WARNING:
Before connecting a power source, ensure that the voltage supply is within the allowed ranges (100 – 240 VAC). Failure to observe these precautions will result in damage to the unit and may result in injury.

Step 2 With the taps powered ON, verify network connectivity of the original appliances on the network segment. With the taps powered OFF, verify network connectivity of the original appliances on the network.

Step 3 When you have verified connectivity on the link, you connect the Cisco 1180 to the taps.

- Connect a CAT5 RJ45 straight-through cable from Analyzer Port A on the first tap to the Cisco 1180 PortD interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port A on the second tap to the Cisco 1180 PortB interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port B on the first tap to the Cisco 1180 PortC interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port B on the second tap to the Cisco 1180 PortA interface.

Step 4 Connect a power supply to the Cisco 1180 appliance. Insert the power cord, switch on at the mains, and press the power switch on. The unit turns on, illuminating the Power On LEDs.

Step 5 Verify that the Cisco 1180 has power by checking that the power LED (PWR) on the front panel of the Cisco 1180 is on.

Cisco 1180 Management Port Configuration

The following table describes the cable connections to use when connecting to the Cisco 1180 management port.

Table 2-6: Management Port Cable Connections

Connection	Cable Type
Cisco 1180 Management Port	Straight-through to switch port

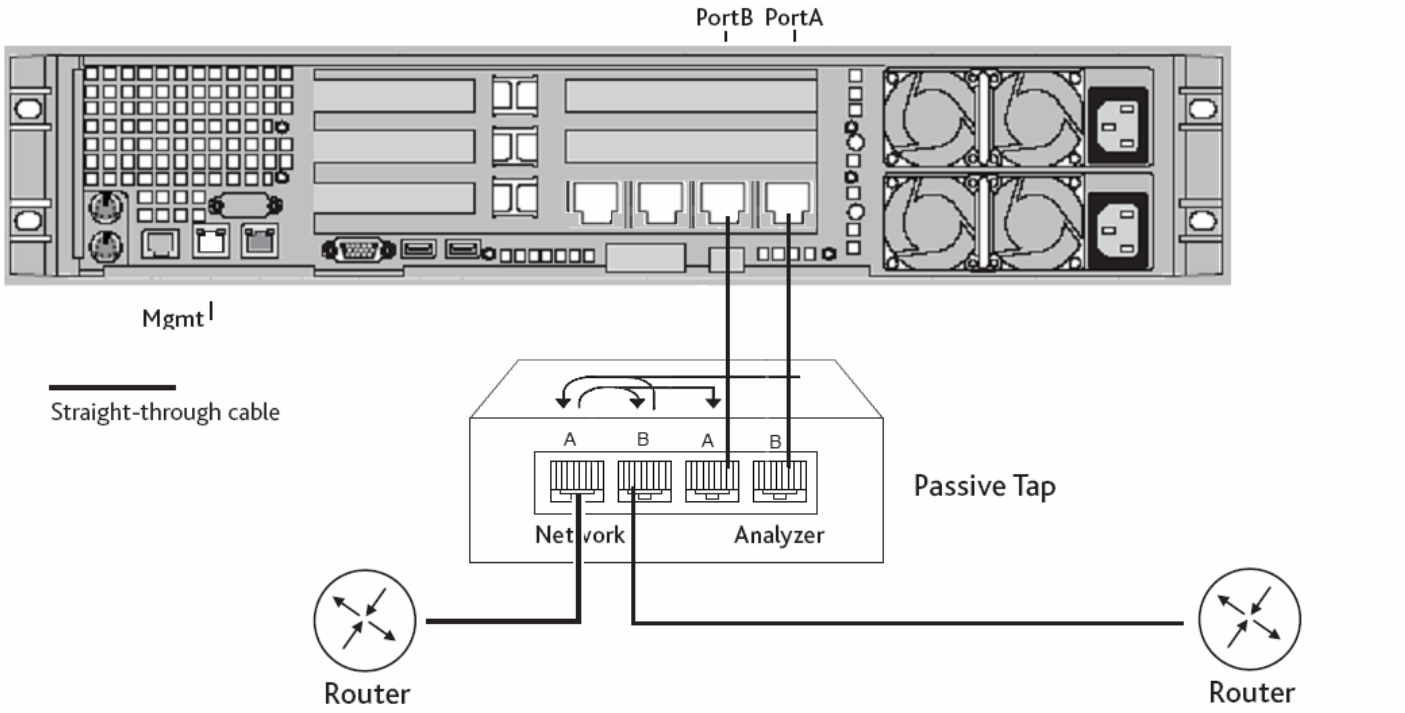
Autonegotiation of speed and duplex settings is often turned on by default, and enabled on all ports and devices. To work properly and reliably, autonegotiation needs to be enabled on both ends of an Ethernet link. It is worth checking that the other end of a link has autonegotiation enabled when plugging in a new device, such as a Cisco 1180, that autonegotiates by default. If for any reason autonegotiation is disabled on either end of the Ethernet link, then it MUST be disabled on the other end too, and both ends should be configured with the same speed and duplex settings. The most common cause of duplex mismatches is enabling autonegotiation at one end of a link but fixing the speed and duplex settings at the other end. There may be specific cases where autonegotiation does not work.

To complete the Cisco 1180 installation process, see the section at the end of this chapter on verifying the installation.

Fast Electrical (10/100 TX) Ethernet Router to Router - Single-Homed

The following figure shows an example single-homed deployment of the Cisco 1180 with a 10/100 Ethernet TX full duplex tap.

Figure 2-5: Example Single-Homed Cisco 1180 and Electrical Tap Deployment



The passive tap includes four shielded UTP connectors. The tap has two network ports and two analyzer ports. All the tap ports use standard RJ45 connectors. All ports on the tap behave as network equipment (DCE), like an Ethernet switch port. The table below identifies which cable connections to use.

Table 2-7: Tap Cable Connections

Connection	Cable
Network Port A	Straight-through to router
Network Port B	Straight-through to router
Analyzer A	Straight-through to Cisco 1180 PortA
Analyzer B	Straight-through to Cisco 1180 PortB

Installing the Tap

To install the passive tap (for example, NetOptics 10/100BaseT Tap Model 96430) in the network segment to be monitored, you use the following procedure:

Caution Only trained and qualified personnel should be allowed to install or replace this equipment.

Performing this installation will temporarily interrupt the data stream on the network.

Step 1 The first task is to replace the existing single crossover CAT5 cable and restore the link by connecting the two routers through the tap:

- Connect Network Port A on the tap to the LAN/Service Provider router using a CAT5 RJ45 straight-through cable.
- Connect Network Port B on the tap to the WAN edge or Service Provider edge router using a CAT5 RJ45 straight-through cable.

The link should now be restored. The next task is to verify link connectivity.

WARNING:
Before connecting a power source, ensure that the voltage supply is within the allowed ranges (100 – 240 VAC). Failure to observe these precautions will result in damage to the unit and may result in injury.

Step 2 With the tap powered ON, verify network connectivity of the original appliances on the network segment. With the tap powered OFF, verify network connectivity of the original appliances on the network.

Step 3 When you have verified connectivity on the link, you connect the Cisco 1180 to the tap.

- Connect a CAT5 RJ45 straight-through cable from Analyzer Port B on the tap to the Cisco 1180 PortA interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port A on the tap to the Cisco 1180 PortB interface.

Step 4 Connect a power supply to the Cisco 1180. Insert the power cord, switch on at the mains, and press the power switch on. The unit turns on, illuminating the Power On LED.

Step 5 Verify that the Cisco 1180 has power by checking that the power LED (PWR) on the front panel of the Cisco 1180 is on.

Cisco 1180 Management Port Configuration

The following table describes the cable connections to use when connecting to the Cisco 1180 management port.

Table 2-8: Management Port Cable Connections

Connection	Cable Type
Cisco 1180 Management Port	Straight-through to switch port

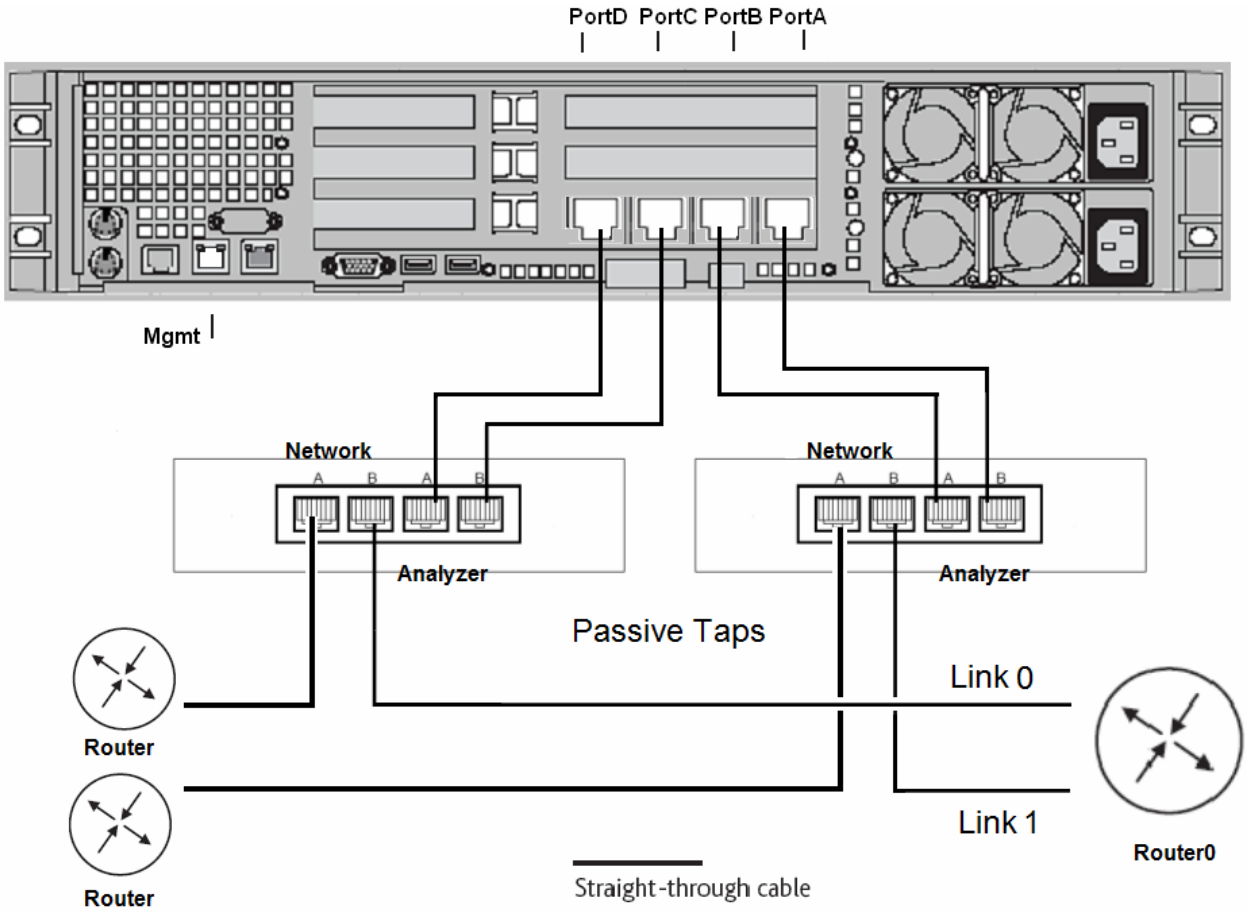
Autonegotiation of speed and duplex settings is often turned on by default, and enabled on all ports and devices. To work properly and reliably, autonegotiation needs to be enabled on both ends of an Ethernet link. It is worth checking that the other end of a link has autonegotiation enabled when plugging in a new device, such as a Cisco 1180, that autonegotiates by default. If for any reason autonegotiation is disabled on either end of the Ethernet link, then it MUST be disabled on the other end too, and both ends should be configured with the same speed and duplex settings. The most common cause of duplex mismatches is enabling autonegotiation at one end of a link but fixing the speed and duplex settings at the other end. There may be specific cases where autonegotiation does not work.

To complete the Cisco 1180 installation process, see the section at the end of this chapter on verifying the installation.

Fast Electrical (10/100 TX) Ethernet Router to Router - Dual-Homed

The following figure shows an example dual-homed deployment of Cisco 1180 appliances with two 10/100 Ethernet TX full duplex taps.

Figure 2-6 Example Dual-Homed Cisco 1180 and 10/100 TX Electrical Tap Deployment



In the dual-homed deployment, two taps are required, one for each of the dual-homed links. Two measurement interfaces of the Cisco 1180 connect to the Analyzer A interface on the two taps and the other two measurement interfaces connect to the Analyzer B interface on the two taps. The passive taps each include four shielded UTP connectors. Each tap has two network ports and two analyzer ports. All the tap ports use standard RJ45 connectors.

The table below identifies which cable connections to use.

Table 2-9: Tap Cable Connections

Connection	Cable
Network Port A	Straight-through to router
Network Port B	Straight-through to router
Analyzer A	Straight-through to Cisco 1180 PortA
Analyzer B	Straight-through to Cisco 1180 PortB

Installing the Taps

To install the passive taps (for example, two NetOptics 10/100BaseT Tap Model 96430) in the network segment to be monitored, you use the following procedure:

Caution Only trained and qualified personnel should be allowed to install or replace this equipment.

Performing this installation will temporarily interrupt the data stream on the network.

Step 1 The first task is to replace the existing crossover CAT5 cable and restore the link by connecting the routers through the taps:

- Connect Network Port A on the first tap to the first LAN/Service Provider core router using a CAT5 RJ45 straight-through cable.
- Connect Network Port A on the second tap to the other LAN/Service Provider core router using a CAT5 RJ45 straight-through cable.
- Connect Network Port B on the first tap to the WAN edge or Service Provider edge router using a CAT5 RJ45 straight-through cable.
- Connect Network Port B on the second tap to the WAN edge or Service Provider edge router using a CAT5 RJ45 straight-through cable.

The link should now be restored. The next task is to verify link connectivity.

WARNING:
Before connecting a power source, ensure that the voltage supply is within the allowed ranges (100 – 240 VAC). Failure to observe these precautions will result in damage to the unit and may result in injury.

Step 2 With the taps powered ON, verify network connectivity of the original appliances on the network segment. With the taps powered OFF, verify network connectivity of the original appliances on the network.

Step 3 When you have verified connectivity on the link, you connect the Cisco 1180 to the taps.

- Connect a CAT5 RJ45 straight-through cable from Analyzer Port A on the first tap to the Cisco 1180 PortD interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port A on the second tap to the Cisco 1180 PortB interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port B on the first tap to the Cisco 1180 PortC interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port B on the second tap to the Cisco 1180 PortA interface.

Step 4 Connect a power supply to the Cisco 1180 appliance. Insert the power cord, switch on at the mains, and press the power switch on. The unit turns on, illuminating the Power On LEDs.

Step 5 Verify that the Cisco 1180 appliance has power by checking that the power LED (PWR) on the front panel of the Cisco 1180 is on.

Cisco 1180 Management Port Configuration

The following table describes the cable connections to use when connecting to the Cisco 1180 management port.

Table 2-10: Management Port Cable Connections

Connection	Cable Type
Cisco 1180 Management Port	Straight-through to switch port

Autonegotiation of speed and duplex settings is often turned on by default, and enabled on all ports and devices. To work properly and reliably, autonegotiation needs to be enabled on both ends of an Ethernet link. It is worth checking that the other end of a link has autonegotiation enabled when plugging in a new device, such as a Cisco 1180, that autonegotiates by default. If for any reason autonegotiation is disabled on either end of the Ethernet link, then it MUST be disabled on the other end too, and both ends should be configured with the same speed and duplex settings. The most common cause of duplex mismatches is enabling autonegotiation at one end of a link but fixing the speed and duplex settings at the other end. There may be specific cases where autonegotiation does not work.

To complete the Cisco 1180 installation process, see the section at the end of this chapter on verifying the installation.

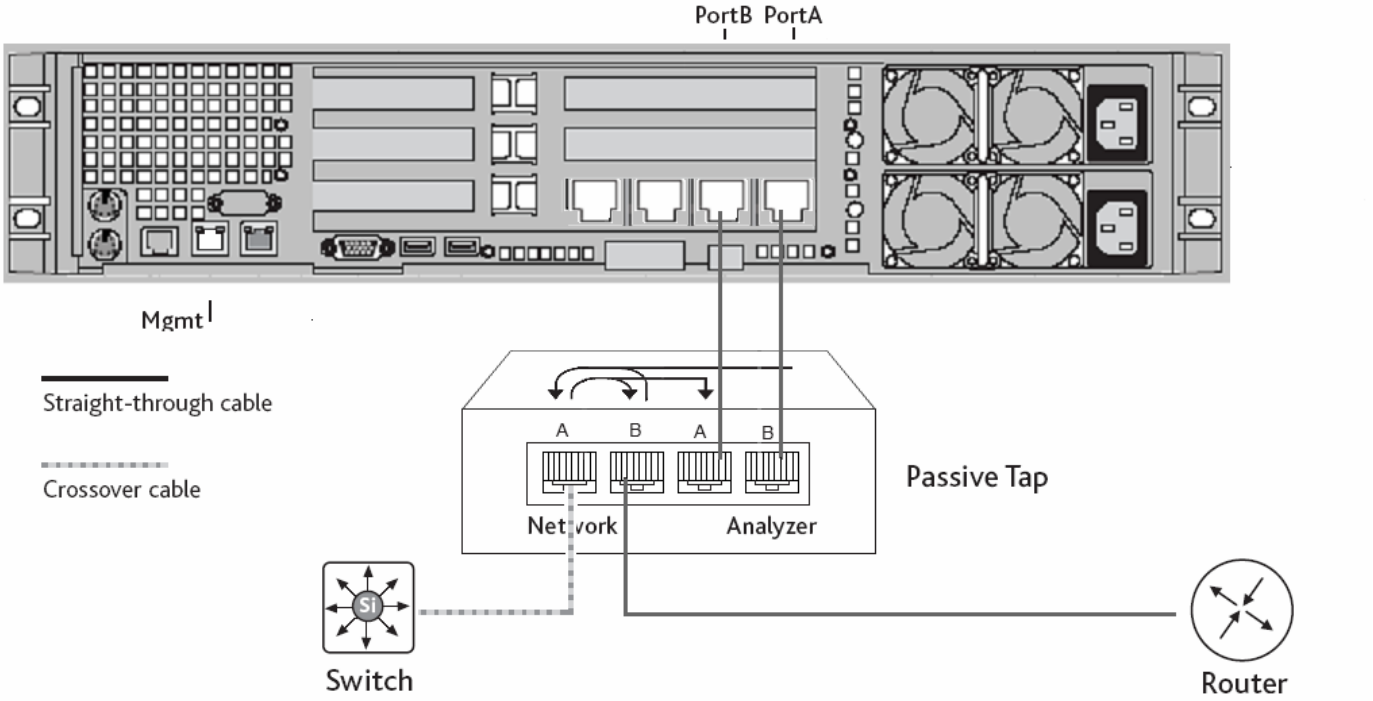
Gigabit Electrical (1000 TX) Ethernet - Single-Homed

There are two taps available, one from NetOptics and one from Datacom Systems. The major deployment distinction between the two taps is in the use of cross-over cables versus straight-through cables when connecting the tap to a switch port.

Datacom Systems Gigabit Electrical Tap

The following figure shows an example single-homed deployment of the Cisco 1180 with a Datacom Systems Gigabit Ethernet electrical tap.

Figure 2-7: Example Single-Homed Cisco 1180 and Datacom Systems Gigabit Electrical Tap Deployment



The passive tap includes four shielded UTP connectors. The tap has two network ports and two analyzer ports. All the tap ports use standard RJ45 connectors. The table below identifies the cable connections to use with the Datacom Systems Gigabit tap.

Table 2-11: Tap Cable Connections

Connection	Cable
Network Port A	Crossover to Switch
Network Port B	Straight-through to router
Analyzer A	Straight-through to Cisco 1180 PortA
Analyzer B	Straight-through to Cisco 1180 PortB

Installing the Datacom Systems Gigabit Tap

To install the Datacom Systems Gigabit tap in the network segment to be monitored, you use the following procedure:

Caution Only trained and qualified personnel should be allowed to install or replace this equipment.

Performing this installation will temporarily interrupt the data stream on the network.

Step 1 The first task is to replace the existing single straight CAT5 cable and restore the link by connecting the switch and the router through the tap:

- Connect Network Port A on the tap to the LAN/Service Provider core switch using a CAT5 RJ45 crossover cable.
- Connect Network Port B on the tap to the WAN edge or Service Provider edge router using a CAT5 RJ45 straight-through cable.

The link should now be restored. The next task is to verify link connectivity.

WARNING:
Before connecting a power source, ensure that the voltage supply is within the allowed ranges (100 – 240 VAC). Failure to observe these precautions will result in damage to the unit and may result in injury.

Step 2 With the tap powered ON, verify network connectivity of the original appliances on the network segment. With the tap powered OFF, verify network connectivity of the original appliances on the network.

Step 3 When you have verified connectivity on the link, you connect the Cisco 1180 to the tap.

- Connect a CAT5 RJ45 straight-through cable from Analyzer Port A on the tap to the Cisco 1180 PortB interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port B on the tap to the Cisco 1180 PortA interface.

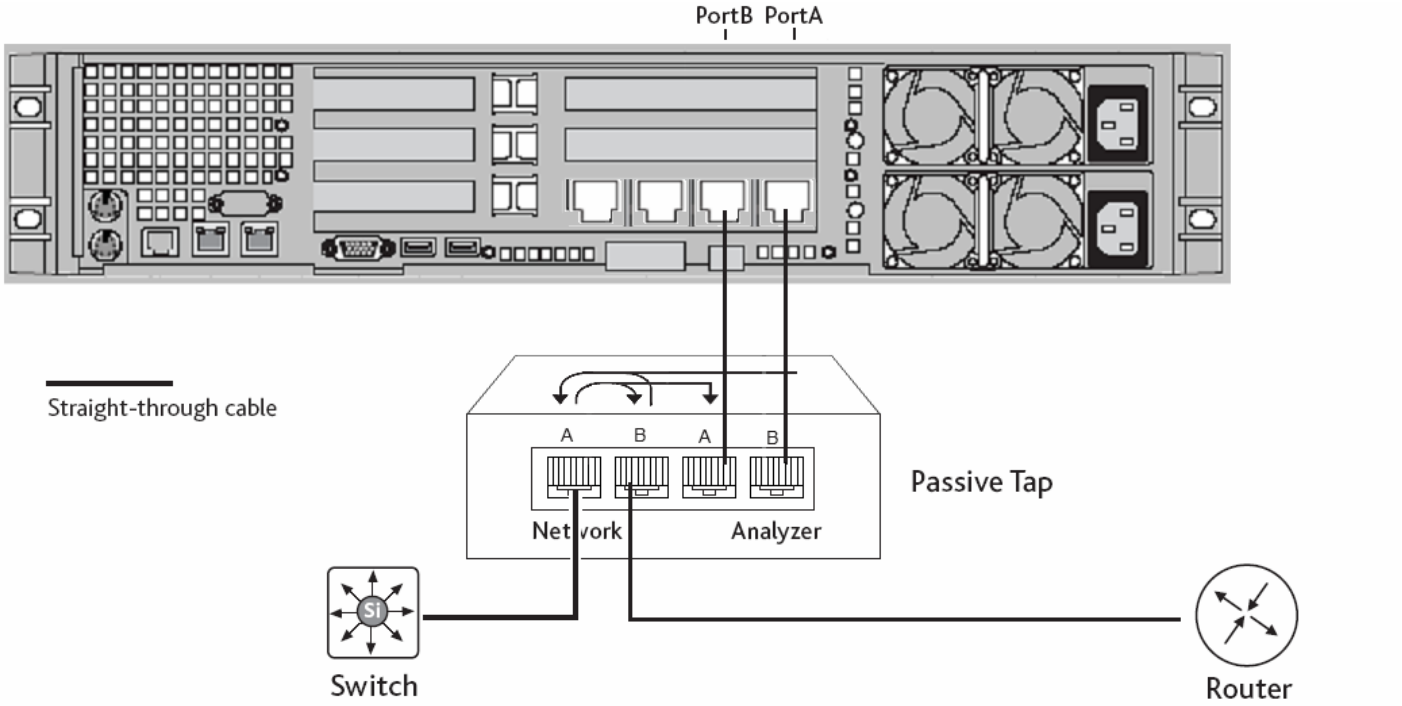
Step 4 Connect a power supply to the Cisco 1180. Insert the power cord, switch on at the mains, and press the power switch on. The unit turns on, illuminating the Power On LED.

Step 5 Verify that the Cisco 1180 has power by checking that the power LED (PWR) on the front panel of the Cisco 1180 is on.

NetOptics Gigabit Tap

The following figure shows an example single-homed deployment of the Cisco 1180 with a NetOptics Gigabit Ethernet tap.

Figure 2-8 Example Single-Homed Cisco 1180 and NetOptics Gigabit Electrical Tap Deployment



The passive tap includes four shielded UTP connectors. The tap has two network ports and two analyzer ports. All the tap ports use standard RJ45 connectors. The table below identifies which cable connections to use with the NetOptics tap.

Table 2-12: Tap Cable Connections

Connection	Cable
Network Port A	Straight-through to Switch
Network Port B	Straight-through to router
Analyzer A	Straight-through to Cisco 1180 PortA
Analyzer B	Straight-through to Cisco 1180 PortB

Installing the NetOptics Gigabit Tap

To install the NetOptics Gigabit tap in the network segment to be monitored, you use the following procedure:

Caution Only trained and qualified personnel should be allowed to install or replace this equipment.

Performing this installation will temporarily interrupt the data stream on the network.

Step 1 The first task is to replace the existing single straight CAT5 cable and restore the link by connecting the switch and the router through the tap:

- Connect Network Port A on the tap to the LAN/Service Provider core switch using a CAT5 RJ45 straight-through cable.
- Connect Network Port B on the tap to the WAN edge or Service Provider edge router using a CAT5 RJ45 straight-through cable.

The link should now be restored. The next task is to verify link connectivity.

WARNING:
Before connecting a power source, ensure that the voltage supply is within the allowed ranges (100 – 240 VAC). Failure to observe these precautions will result in damage to the unit and may result in injury.

Step 2 With the tap powered ON, verify network connectivity of the original appliances on the network segment. With the tap powered OFF, verify network connectivity of the original appliances on the network.

Step 3 When you have verified connectivity on the link, you connect the Cisco 1180 to the tap.

- Connect a CAT5 RJ45 straight-through cable from Analyzer Port A on the tap to the Cisco 1180 PortB interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port B on the tap to the Cisco 1180 PortA interface.

Step 4 Connect a power supply to the Cisco 1180. Insert the power cord, switch on at the mains, and press the power switch on. The unit turns on, illuminating the Power On LED.

Step 5 Verify that the Cisco 1180 has power by checking that the power LED (PWR) on the front panel of the Cisco 1180 is on.

Cisco 1180 Management Port Configuration

The following table describes the cable connections to use when connecting to the Cisco 1180 management port.

Table 2-13: Management Port Cable Connections

Connection	Cable Type
Cisco 1180 Management Port	Straight-through to switch port

Autonegotiation of speed and duplex settings is often turned on by default, and enabled on all ports and devices. To work properly and reliably, autonegotiation needs to be enabled on both ends of an Ethernet link. It is worth checking that the other end of a link has autonegotiation enabled when plugging in a new device, such as a Cisco 1180, that autonegotiates by default. If for any reason autonegotiation is disabled on either end of the Ethernet link, then it MUST be disabled on the other end too, and both ends should be configured with the same speed and duplex settings. The most common cause of duplex mismatches is enabling autonegotiation at one end of a link but fixing the speed and duplex settings at the other end. There may be specific cases where autonegotiation does not work.

To complete the Cisco 1180 installation process, see the section at the end of this chapter on verifying the installation.

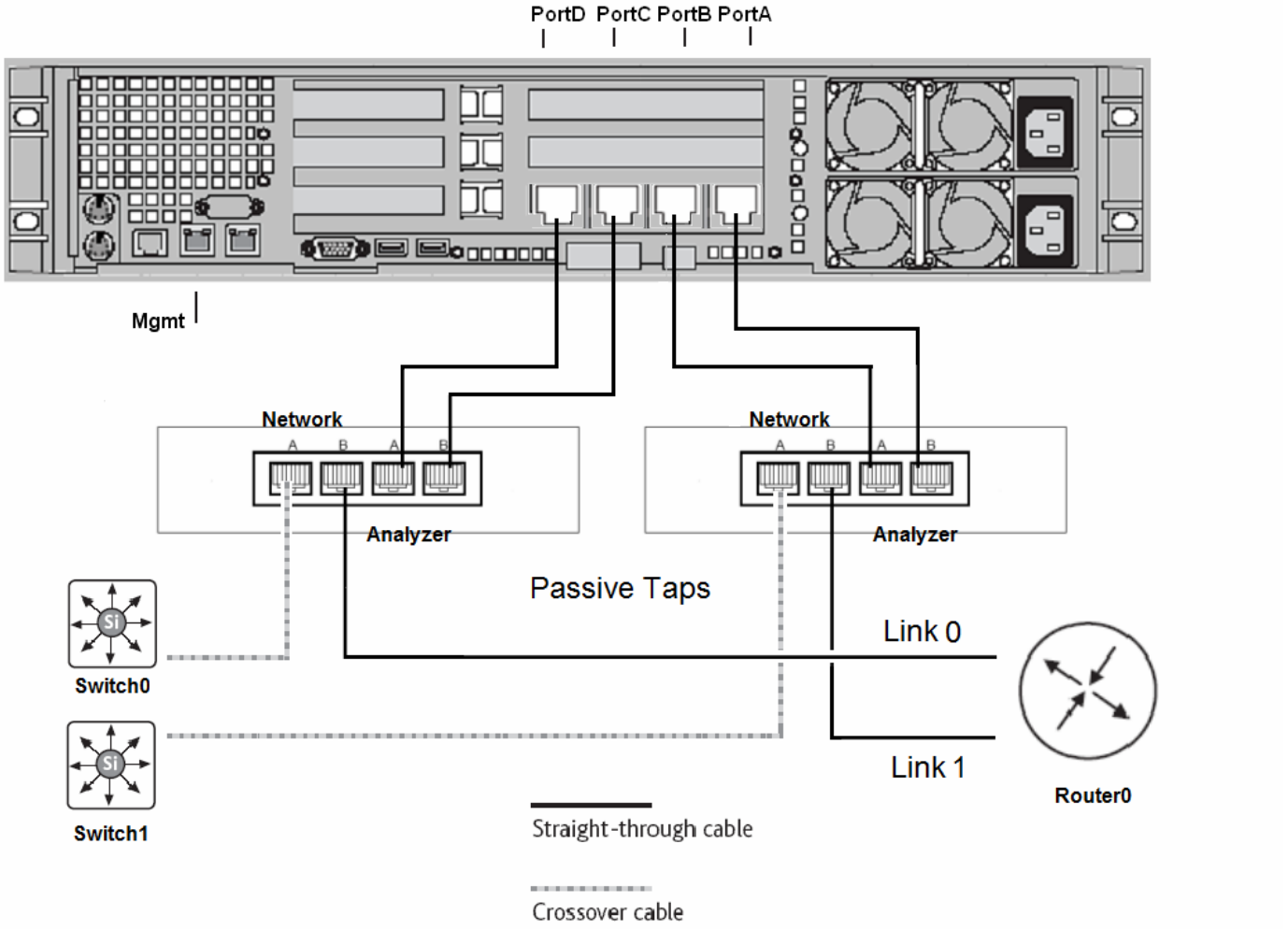
Gigabit Electrical (1000 TX) Ethernet - Dual-Homed

There are two candidate taps, one from NetOptics and one from Datacom Systems. The major deployment distinction between the two taps is in the use of cross-over cables versus straight-through cables when connecting the tap to a switch port.

Datacom Systems Gigabit Taps

The following figure shows an example dual-homed deployment of Cisco 1180 appliances with two Datacom Systems Gigabit Ethernet TX full duplex taps.

Figure 2-9: Example Dual-Homed Cisco 1180 and Datacom Systems Gigabit Electrical Tap Deployment



In the dual-homed deployment, two taps are required, one for each of the dual-homed links. Two measurement interfaces of the Cisco 1180 connect to the Analyzer A interface on the two taps and the other two measurement interfaces connect to the Analyzer B interface on the two taps.

The passive taps each include four shielded UTP connectors. Each tap has two network ports and two analyzer ports. All the tap ports use standard RJ45 connectors. The table below identifies which cable connections to use.

Table 2-14: Tap Cable Connections

Connection	Cable
Network Port A	Crossover to Switch
Network Port B	Straight-through to router
Analyzer A	Straight-through to Cisco 1180 PortA
Analyzer B	Straight-through to Cisco 1180 PortB

Installing the Datacom Systems Gigabit Taps

To install the two Datacom Systems Gigabit taps in the network segment to be monitored, you use the following procedure:

Caution Only trained and qualified personnel should be allowed to install or replace this equipment.

Performing this installation will temporarily interrupt the data stream on the network.

Step 1 The first task is to replace the existing straight CAT5 cables and restore the link by connecting the switches and the router through the taps:

- Connect Network Port A on the first tap to the first LAN/Service Provider core switch (switch0 in the preceding figure) using a CAT5 RJ45 crossover cable.
- Connect Network Port A on the second tap to the other LAN/Service Provider core switch (switch1 in the preceding figure) using a CAT5 RJ45 crossover cable.
- Connect Network Port B on the first tap to the WAN edge or Service Provider edge router using a CAT5 RJ45 straight-through cable.
- Connect Network Port B on the second tap to the WAN edge or Service Provider edge router using a CAT5 RJ45 straight-through cable.

The link should now be restored. The next task is to verify link connectivity.

WARNING:
Before connecting a power source, ensure that the voltage supply is within the allowed ranges (100 – 240 VAC). Failure to observe these precautions will result in damage to the unit and may result in injury.

Step 2 With the taps powered ON, verify network connectivity of the original appliances on the network segment. With the taps powered OFF, verify network connectivity of the original appliances on the network.

Step 3 When you have verified connectivity on the link, you connect the Cisco 1180 to the taps.

- Connect a CAT5 RJ45 straight-through cable from Analyzer Port A on the first tap to the Cisco 1180 PortD interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port A on the second tap to the Cisco 1180 PortB interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port B on the first tap to the Cisco 1180 PortC interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port B on the second tap to the Cisco 1180 PortA interface.

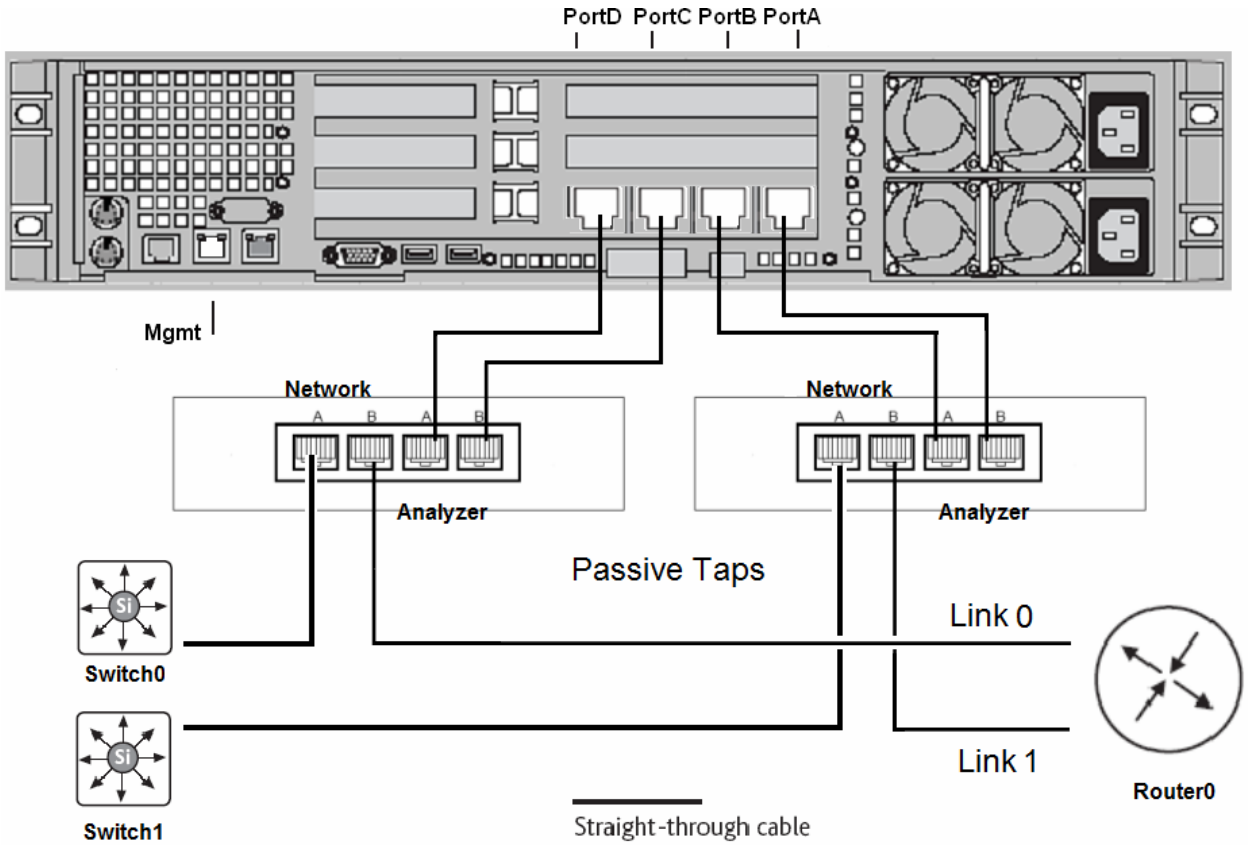
Step 4 Connect a power supply to the Cisco 1180 appliance. Insert the power cord, switch on at the mains, and press the power switch on. The unit turns on, illuminating the Power On LEDs.

Step 5 Verify that the Cisco 1180 appliance has power by checking that the power LED (PWR) on the front panel of the Cisco 1180 is on.

NetOptics Gigabit Taps

The following figure shows an example dual-homed deployment of Cisco 1180 appliances with two NetOptics Gigabit Ethernet TX full duplex taps.

Figure 2-10: Example Dual-Homed Cisco 1180 and NetOptics Gigabit Electrical Tap Deployment



In the dual-homed deployment, two taps are required, one for each of the dual-homed links. Two measurement interfaces of the Cisco 1180 connect to the Analyzer A interface on the two taps the other two measurement interfaces connect to the Analyzer B interface on the two taps. The passive taps each include four shielded UTP connectors. Each tap has two network ports and two analyzer ports. All the tap ports use standard RJ45 connectors. The table below identifies which cable connections to use.

Table 2-15: Tap Cable Connections

Connection	Cable
Network Port A	Straight-through to Switch
Network Port B	Straight-through to router
Analyzer A	Straight-through to Cisco 1180 PortA
Analyzer B	Straight-through to Cisco 1180 PortB

Installing the NetOptics Gigabit Taps

To install the two NetOptics Gigabit taps in the network segment to be monitored, you use the following procedure:

Caution Only trained and qualified personnel should be allowed to install or replace this equipment.

Performing this installation will temporarily interrupt the data stream on the network.

Step 1 The first task is to replace the existing straight CAT5 cables and restore the link by connecting the switches and the router through the taps:

- Connect Network Port A on the first tap to the first LAN/Service Provider core switch (switch0 in the preceding figure) using a CAT5 RJ45 straight-through cable.
- Connect Network Port A on the second tap to the other LAN/Service Provider core switch (switch1 in the preceding figure) using a CAT5 RJ45 straight-through cable.
- Connect Network Port B on the first tap to the WAN edge or Service Provider edge router using a CAT5 RJ45 straight-through cable.
- Connect Network Port B on the second tap to the WAN edge or Service Provider edge router using a CAT5 RJ45 straight-through cable.

The link should now be restored. The next task is to verify link connectivity.

WARNING:
Before connecting a power source, ensure that the voltage supply is within the allowed ranges (100 – 240 VAC). Failure to observe these precautions will result in damage to the unit and may result in injury.

Step 2 With the taps powered ON, verify network connectivity of the original appliances on the network segment. With the taps powered OFF, verify network connectivity of the original appliances on the network.

Step 3 When you have verified connectivity on the link, you connect the Cisco 1180 to the taps.

- Connect a CAT5 RJ45 straight-through cable from Analyzer Port A on the first tap to the Cisco 1180 PortD interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port A on the second tap to the Cisco 1180 PortB interface.
- Connect a CAT5 RJ45 straight-through cable from Analyzer Port B on the first tap to the Cisco 1180 PortC interface.

- Connect a CAT5 RJ45 straight-through cable from Analyzer Port B on the second tap to the Cisco 1180 PortA interface.

Step 4 Connect a power supply to the Cisco 1180 appliance. Insert the power cord, switch on at the mains, and press the power switch on. The unit turns on, illuminating the Power On LEDs.

Step 5 Verify that the Cisco 1180 appliance has power by checking that the power LED (PWR) on the front panel of the Cisco 1180 is on.

Cisco 1180 Management Port Configuration

The following table describes the cable connections to use when connecting to the Cisco 1180 management port.

Table 2-16: Management Port Cable Connections

Connection	Cable Type
Cisco 1180 Management Port	Straight-through to switch port

Autonegotiation of speed and duplex settings is often turned on by default, and enabled on all ports and devices. To work properly and reliably, autonegotiation needs to be enabled on both ends of an Ethernet link. It is worth checking that the other end of a link has autonegotiation enabled when plugging in a new device, such as a Cisco 1180, that autonegotiates by default.

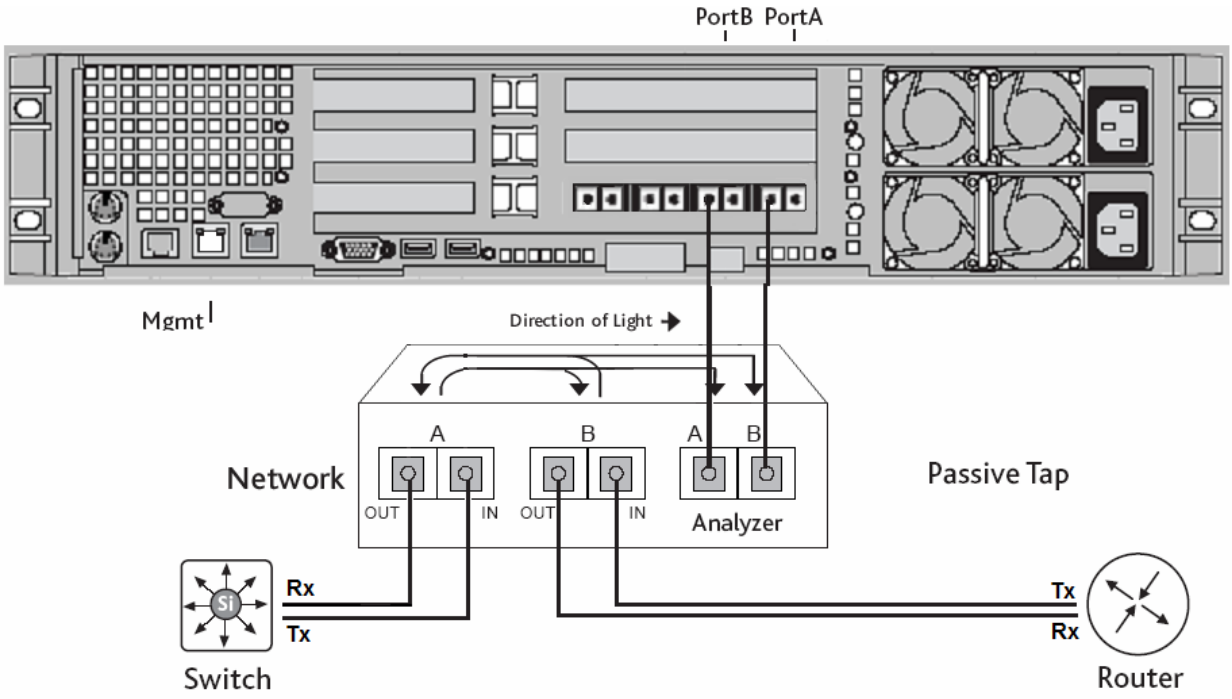
If for any reason autonegotiation is disabled on either end of the Ethernet link, then it MUST be disabled on the other end too, and both ends should be configured with the same speed and duplex settings. The most common cause of duplex mismatches is enabling autonegotiation at one end of a link but fixing the speed and duplex settings at the other end.

There may be specific cases where autonegotiation does not work.

To complete the Cisco 1180 installation process, see the section at the end of this chapter on verifying the installation.

Gigabit Multi-Mode Optical (1000 SX) Ethernet - Single-Homed

Figure 2-11: Example Single-Homed Cisco 1180 and Gigabit Optical Tap Deployment



The Cisco 1180 optical card is present for optical installations only. The electrical ports are not enabled for optical installations.

The tap has network ports and analyzer ports. All the tap ports use standard SC fiber cable connectors.

The following table describes which cable connection to use.

Table 2-17: Tap Cable Connections

Connection	Cable Type
From switch to tap	Duplex SC on the tap side Duplex SC or LC on the switch side
From router to tap	Duplex SC on the tap side Duplex SC or LC on the router side
From tap to Cisco 1180	Simplex SC to LC for both Analyzer ports

Installing the Tap

To install the Cisco 1180 with a gigabit optical tap (for example, NetOptics Gigabit Tap Model 96042), you use the following procedure:

Caution Only trained and qualified personnel should be allowed to install or replace this equipment.

Performing this installation will temporarily interrupt the data stream on the network.

Step 1 The first task is to replace the existing single straight CAT5 cable and restore the link by connecting the switch and router through the tap:

- Connect Network Port A to the Enterprise LAN or Service Provider core switch using the appropriate duplex fiber cable as indicated in the above table.
- Connect Network Port B to the WAN edge/Service Provider edge router using the appropriate duplex fiber cable as indicated in the above table

The link should now be restored. The next task is to verify link connectivity.

Step 2 When you have verified connectivity on the link, you connect the Cisco 1180 to the tap:

- Connect one SC-LC simplex cable from tap Port A to the Cisco 1180 PortB.
- Connect one SC-LC simplex cable from tap Port B to the Cisco 1180 PortA.

When you connect the simplex cables to the Cisco 1180 measurement ports, you connect to the Receive (Rx) ports only. The Receive (Rx) ports are on the left of each pair of ports. The Transmit (Tx) ports are ignored.

WARNING:
Before connecting a power source, ensure that the voltage supply is within the allowed ranges (100 – 240 VAC). Failure to observe these precautions will result in damage to the unit and may result in injury.

Step 3 Connect a power supply to the Cisco 1180. Insert the power cord, switch on at the mains, and press the power switch on. The unit turns on, illuminating the Power On LED.

Step 4 Verify that the Cisco 1180 has power by checking that the power LED on the front panel of the Cisco 1180 is on.

Cisco 1180 Management Port Configuration

The following table describes the cable connections to use when connecting to the Cisco 1180 management port.

Table 2-18: Management Port Cable Connections

Connection	Cable Type
Cisco 1180 Management Port	Straight-through to switch port

Autonegotiation of speed and duplex settings is often turned on by default, and enabled on all ports and devices. To work properly and reliably, autonegotiation needs to be enabled on both ends of an Ethernet link. It is worth checking that the other end of a link has autonegotiation enabled when plugging in a new device, such as a Cisco 1180, that autonegotiates by default.

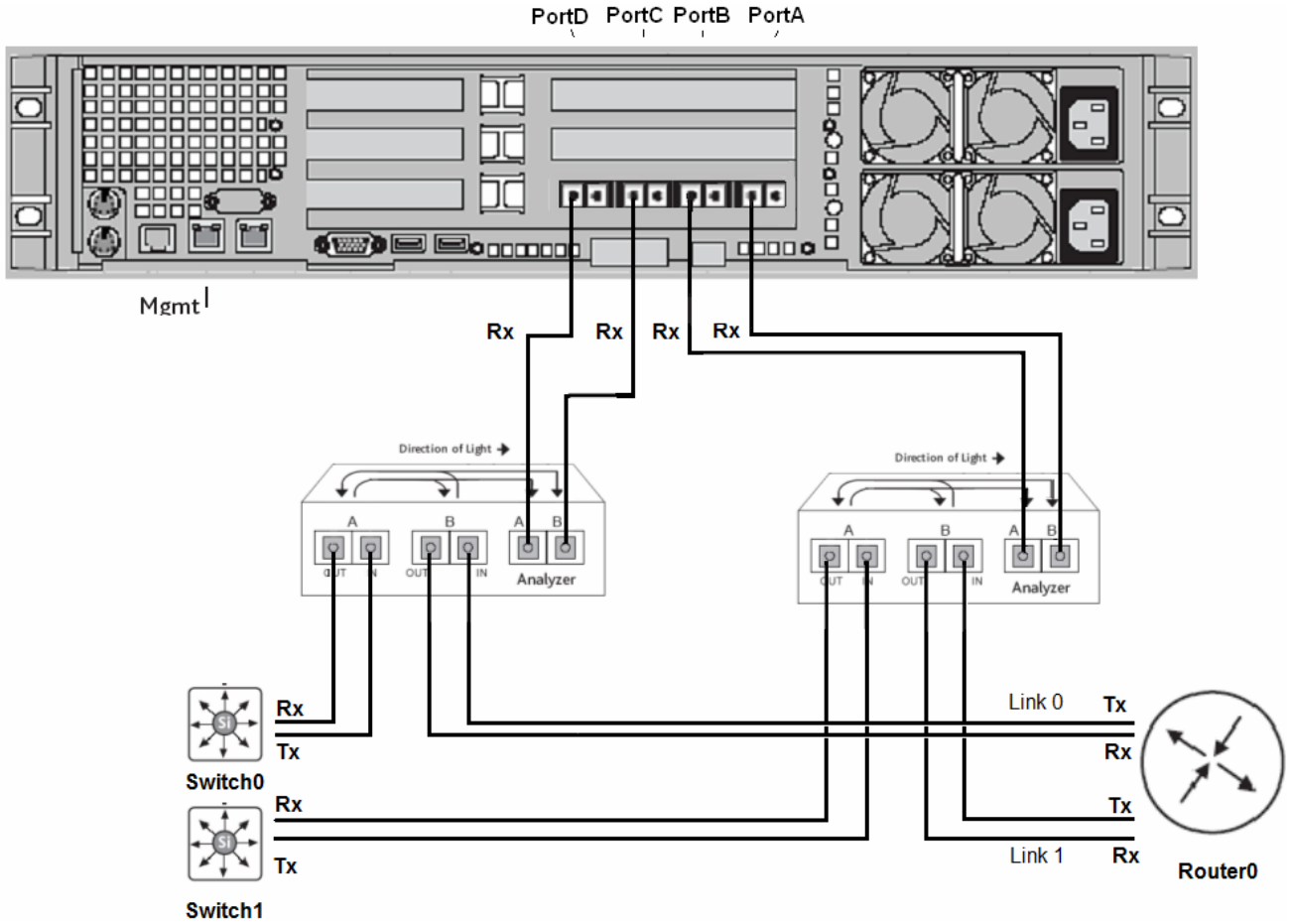
If for any reason autonegotiation is disabled on either end of the Ethernet link, then it MUST be disabled on the other end too, and both ends should be configured with the same speed and duplex settings. The most common cause of duplex mismatches is enabling autonegotiation at one end of a link but fixing the speed and duplex settings at the other end.

There may be specific cases where autonegotiation does not work.

To complete the Cisco 1180 installation process, see the section at the end of this chapter on verifying the installation.

Gigabit Multi-Mode Optical (1000 SX) Ethernet - Dual-Homed

Figure 2-12: Example Dual-Homed Cisco 1180 and Gigabit Optical Tap Deployment



In the dual-homed deployment, two taps are required, one for each of the dual-homed links. Two Cisco 1180 measurement interfaces connect to the Analyzer A interface on the two taps and the other two measurement interfaces connect to the Analyzer B interface on the two taps.

The taps have network ports and analyzer ports. All the tap ports use standard SC fiber cable connectors.

The following table identifies which cable connections to use.

Table 2-19: Tap Cable Connections

Connection	Cable Type
From switch to tap	Duplex SC on the tap side Duplex SC or LC on the switch side
From router to tap	Duplex SC on the tap side Duplex SC or LC on the router side
From tap to Cisco 1180	Simplex SC to LC for both Analyzer ports

Installing the Taps

To install the optical taps (for example, two NetOptics Gigabit Tap Model 96042) in the network segment to be monitored, you use the following procedure:

Caution Only trained and qualified personnel should be allowed to install or replace this equipment.

Performing this installation will temporarily interrupt the data stream on the network.

Step 1 The first task is to replace the existing cable and restore the link by connecting the switches and router through the tap:

- Connect Network Port A on the first tap to the first Enterprise LAN or Service Provider core switch (switch0 in the preceding figure) using the appropriate duplex fiber cable as indicated in the above table.
- Connect Network Port A on the second tap to the other Enterprise LAN or Service Provider core switch (switch1 in the preceding figure) using the appropriate duplex fiber cable as indicated in the above table.
- Connect Network Port B on the first tap to the WAN edge/Service Provider edge router using the appropriate duplex fiber cable as indicated in the above table.
- Connect Network Port B on the second tap to the WAN edge/Service Provider edge router using the appropriate duplex fiber cable as indicated in the above table.

The link should now be restored. The next task is to verify link connectivity.

Step 2 When you have verified connectivity on the link, you can connect the Cisco 1180 to the tap:

- Connect one SC-LC simplex cable from Analyzer Port A on the first tap to PortD on the Cisco 1180.
- Connect one SC-LC simplex cable from Analyzer Port B on the first tap to PortC on the Cisco 1180.
- Connect one SC-LC simplex cable from Analyzer Port A on the second tap to PortB on the Cisco 1180.
- Connect one SC-LC simplex cable from Analyzer Port B on the second tap to PortA on the Cisco 1180.

When you connect the simplex cables to the Cisco 1180 measurement ports, you connect to the Receive (Rx) ports only. The Receive (Rx) ports are on the left of each pair of ports. The Transmit (Tx) ports are ignored.

WARNING:
Before connecting a power source, ensure that the voltage supply is within the allowed ranges (100 – 240 VAC). Failure to observe these precautions will result in damage to the unit and may result in injury.

Step 3 Connect a power supply to the Cisco 1180. Insert the power cord, switch on at the mains, and press the power switches on. The units turn on, illuminating the Power On LEDs.

Step 4 Verify that the Cisco 1180 has power by checking that the power LED (PWR) on the front panel of the Cisco 1180 is on.

Cisco 1180 Management Port Configuration

The following table describes the cable connections to use when connecting to the Cisco 1180 management port.

Table 2-20: Management Port Cable Connections

Connection	Cable Type
Cisco 1180 Management Port	Straight-through to switch port

Autonegotiation of speed and duplex settings is often turned on by default, and enabled on all ports and devices. To work properly and reliably, autonegotation needs to be enabled on both ends of an Ethernet link. It is worth checking that the other end of a link has autonegotation enabled when plugging in a new device, such as a Cisco 1180, that autonegotiates by default.

If for any reason autonegotiation is disabled on either end of the Ethernet link, then it MUST be disabled on the other end too, and both ends should be configured with the same speed and duplex settings. The most common cause of duplex mismatches is enabling autonegotation at one end of a link but fixing the speed and duplex settings at the other end.

There may be specific cases where autonegotiation does not work.

To complete the Cisco 1180 installation process, see the following section on verifying the installation.

Verifying the Installation

To verify that the management interface is connected to the network, you ping the router from the Cisco 1180, using the configured IP address (for example, 172.16.2.254). You press Ctrl+C to terminate the ping:

```
host /# ping 172.16.2.254
PING 172.16.2.254 (172.16.2.254) 56(84) bytes of data.
64 bytes from 172.16.2.254: icmp_seq=1 ttl=64 time=0.322 ms
64 bytes from 172.16.2.254: icmp_seq=2 ttl=64 time=0.109 ms
64 bytes from 172.16.2.254: icmp_seq=3 ttl=64 time=0.135 ms
64 bytes from 172.16.2.254: icmp_seq=4 ttl=64 time=0.168 ms
--- 172.16.2.254 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 2997ms
rtt min/avg/max/mdev = 0.109/0.183/0.322/0.083 ms
host /#
```

The Cisco 1180 ships with a default measurement configuration. You can use the **status** command to check if you can see traffic on the measurement ports (PortA/PortB/PortC/PortD).

```
host(config)# status
Cisco Bandwidth Quality Manager software: Version 3.1
CorvilMeter software: CDK_3_0_BUILD_38 (conf Dec 22 16:14:49 2006)
Application Recognition Module: ARM (full) v3.9
System type: 50c
Logging: <off>
Access control: unrestricted
host uptime is 9 days, 1 hour, 8 minutes, 57 seconds

License system id: 03d2d7a29546c28c90
License status: valid
License features: Sites: 100, Packet Capture: enabled
License evaluation time total: unlimited
License evaluation time remaining: unlimited

cpu #0: "Intel(R) Xeon(R) CPU           E5335  @ 2.00GHz", 4096 KB cache, 37%
cpu #1: "Intel(R) Xeon(R) CPU           E5335  @ 2.00GHz", 4096 KB cache, 38%
cpu #2: "Intel(R) Xeon(R) CPU           E5335  @ 2.00GHz", 4096 KB cache, 37%
cpu #3: "Intel(R) Xeon(R) CPU           E5335  @ 2.00GHz", 4096 KB cache, 40%
5-minute average load (all CPUs): 20%

disk #0: "Slot 0 [FUJITSU MAX3147RC    0104]  Slot 1 [FUJITSU MAX3147RC    0104]
", total=279662344 KB, used=6553224 KB (2%)
disk #1: "Slot 2 [FUJITSU MAX3147RC    0104]  Slot 3 [FUJITSU MAX3147RC    0104]
", total=280680376 KB, used=25753456 KB (9%)

6 fan component(s), 0 alert(s)
1 power supply component(s), 0 alert(s)
7 temperature sensor component(s), 0 alert(s)
BIOS date: 08/18/06

Xyratex firmware revision: 0xf500329a

Last Backup/Restore operation 'no status available for the last backup/restore o
peration'
Memory: total=4138988 KB, cached=1097756 KB, used=2862536 KB (69%)
        5-minute average usage: 69%

System throughput: 0%

Interface        Received             Sent
---------        --------             ----
mgmt:
          bytes  124710721            930738275
        packets  1566539              912623
```

```
   dropped pkts  0
   frame errors  0
     CRC errors  0
protocol errors  0

PortA:
          bytes  108760917
        packets  137361
   dropped pkts  0
   frame errors  0
     CRC errors  0
protocol errors  0

PortB:
          bytes  108760917
        packets  137361
   dropped pkts  0
   frame errors  0
     CRC errors  0
protocol errors  0

PortC: *** down 0 days, 0 hours, 15 minutes, 32 seconds ***
          bytes  0
        packets  0
   dropped pkts  0
   frame errors  0
     CRC errors  0
protocol errors  0

PortD:  *** down 0 days, 0 hours, 15 minutes, 32 seconds ***
          bytes  0
        packets  0
   dropped pkts  0
   frame errors  0
     CRC errors  0
protocol errors  0

Configuration totals:
            class-maps: 1
               matches: 1
            interfaces: 7
  monitor-queuing-maps: 4
  monitor-end2end-maps: 5
       peer-interfaces: 2
           policy-maps: 1
               routers: 3
                 sites: 2
    configured classes: 1
        active classes: 9
      service policies: 9

Packets dropped during disk capture: 0

host(config)#
```

The example above shows packets measured by the two active interfaces (PortA and PortB) in the interface statistics section near the end of the output. You can also see the configuration totals. The Cisco 1180 ships with a default configuration with pre-configured policy-maps and class-maps. So this test is successful. The Cisco 1180 is set up and measuring traffic based on the default configuration.

3 Cisco 1180 Series Appliance Specifications

Microprocessor

Intel™ quad core Xeon Processor (X5355) 2.0GHz 2x4MB L2 cache, 1066 MHz FSB

Memory

Minimum: 4 GB
Maximum: 16 GB
Type: 4 x 1GB FBDIMM 667 MHz

Drives

DVD-ROM drive

Power Supply

750 watt hot-swap power supply standard
Optional redundant 750 watt power

Size

Height: 87.3 mm (3.44 in., 2U)
Depth: 704.8 mm (27.75 in.)
Width: 430 mm (16.93 in.)
Max. weight: approximately 29.5 kg (65 lb)

Integrated Functions

Two 10/100/1000 Ethernet controllers
Three Universal Serial Bus (USB) 2.0 ports
One RJ-45 console port
Keyboard port
Mouse port
Video port

Acoustical Noise Emissions

Sound power, 7.0 bel for a typical office ambient temperature (65° to 75°F)

Environment

Air temperature: – Server on: 10° to 35°C (50.0° to 95.0°F); derated 0.5°C for every 1000 ft (305m) to a maximum of 10,000 ft – Server off: -40° to 70°C
Humidity: – Non-operating: 90% relative humidity (non-condensing) at 30°C.