Nortel Business Ethernet Switch 1000 Series

Using The Nortel Business Ethernet Switch 1000 Series

ATTENTION

Clicking on a PDF hyperlink takes you to the appropriate page. If necessary, scroll up or down the page to see the beginning of the referenced section.

NN47927-300

Document status: Standard
Document version: 01.01
Document date: 10 January 2007

Sourced in Canada and the United States of America.

The information in this document is subject to change without notice. The statements, configurations, technical data, and recommendations in this document are believed to be accurate and reliable, but are presented without express or implied warranty. Users must take full responsibility for their applications of any products specified in this document. The information in this document is proprietary to Nortel Networks.

The software described in this document is furnished under a license agreement and may be used only in accordance with the terms of that license. The software license agreement is included in this document.

Trademarks

Nortel, Nortel Networks, the Nortel logo, and the Globemark are trademarks of Nortel Networks.
The asterisk after a name denotes a trademarked item.

Restricted rights legend

Use, duplication, or disclosure by the United States Government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013.

Notwithstanding any other license agreement that may pertain to, or accompany the delivery of, this computer software, the rights of the United States Government regarding its use, reproduction, and disclosure are as set forth in the Commercial Computer Software-Restricted Rights clause at FAR 52.227-19.

Statement of conditions

In the interest of improving internal design, operational function, and/or reliability, Nortel Networks reserves the right to make changes to the products described in this document without notice.

Nortel Networks does not assume any liability that may occur due to the use or application of the product(s) or circuit layout(s) described herein.

Portions of the code in this software product may be Copyright © 1988, Regents of the University of California. All rights reserved. Redistribution and use in source and binary forms of such portions are permitted, provided that the above copyright notice and this paragraph are duplicated in all such forms and that any documentation, advertising materials, and other materials related to such distribution and use acknowledge that such portions of the software were developed by the University of California, Berkeley. The name of the University may not be used to endorse or promote products derived from such portions of the software without specific prior written permission.

SUCH PORTIONS OF THE SOFTWARE ARE PROVIDED “AS IS” AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

In addition, the program and information contained herein are licensed only pursuant to a license agreement that contains restrictions on use and disclosure (that may incorporate by reference certain limitations and notices imposed by third parties).

Nortel Networks software license agreement

This Software License Agreement (“License Agreement”) is between you, the end-user (“Customer”) and Nortel Networks Corporation and its subsidiaries and affiliates (“Nortel Networks”). PLEASE READ THE FOLLOWING CAREFULLY. YOU MUST ACCEPT THESE LICENSE TERMS IN ORDER TO DOWNLOAD AND/OR USE THE SOFTWARE. USE OF THE SOFTWARE CONSTITUTES YOUR ACCEPTANCE OF THIS LICENSE AGREEMENT. If you do not accept these terms and conditions, return the Software, unused and in the original shipping container, within 30 days of purchase to obtain a credit for the full purchase price.

“Software” is owned or licensed by Nortel Networks, its parent or one of its subsidiaries or affiliates, and is copyrighted and licensed, not sold. Software consists of machine-readable instructions, its components, data, audio-visual content (such as images, text, recordings or pictures) and related licensed materials including all whole or partial copies. Nortel Networks grants you a license to use the Software only in the country where you acquired the Software. You obtain no rights other than those granted to you under this License Agreement. You are responsible for the selection of the Software and for the installation of, use of, and results obtained from the Software.

1. **Licensed Use of Software.** Nortel Networks grants Customer a nonexclusive license to use a copy of the Software on only one machine at any one time or to the extent of the activation or authorized usage level, whichever is applicable. To the extent Software is furnished for use with designated hardware or Customer furnished equipment (“CFE”), Customer is granted a nonexclusive license to use Software only on such hardware or CFE, as applicable. Software contains trade secrets and Customer agrees to treat Software as confidential information using the same care and discretion Customer uses with its own similar information that it does not wish to disclose, publish or disseminate. Customer will ensure that anyone who uses the Software does so only in compliance with the terms of this Agreement. Customer shall not a) use, copy, modify, transfer or distribute the Software except as expressly authorized; b) reverse assemble, reverse compile, reverse engineer or otherwise translate the Software; c) create derivative works or modifications unless expressly authorized; or d) sublicense, rent or lease the Software. Licensors of intellectual property to Nortel Networks are beneficiaries of this provision. Upon termination or breach of the license by Customer or in the event designated hardware or CFE is no longer in use, Customer will promptly return the Software to Nortel Networks or certify its destruction. Nortel Networks may audit by remote polling or other reasonable means to determine Customer’s Software activation or usage levels. If suppliers of third party software included in Software require Nortel Networks to include additional or different terms, Customer agrees to abide by such terms provided by Nortel Networks with respect to such third party software.

2. **Warranty.** Except as may be otherwise expressly agreed to in writing between Nortel Networks and Customer, Software is provided “AS IS” without any warranties (conditions) of any kind. NORTEL NETWORKS DISCLAIMS ALL WARRANTIES (CONDITIONS) FOR THE SOFTWARE, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTY OF NON-INFRINGEMENT. Nortel Networks is not obligated to provide support of any kind for the Software. Some jurisdictions do not allow exclusion of implied warranties, and, in such event, the above exclusions may not apply.

3. **Limitation of Remedies.** IN NO EVENT SHALL NORTEL NETWORKS OR ITS AGENTS OR SUPPLIERS BE LIABLE FOR ANY OF THE FOLLOWING: a) DAMAGES BASED ON ANY THIRD PARTY CLAIM; b) LOSS OF, OR DAMAGE TO, CUSTOMER’S RECORDS, FILES OR DATA; OR c) DIRECT, INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS OR SAVINGS), WHETHER IN CONTRACT, TORT OR OTHERWISE (INCLUDING NEGLIGENCE) ARISING OUT OF YOUR USE OF THE SOFTWARE, EVEN IF NORTEL NETWORKS, ITS AGENTS OR SUPPLIERS HAVE BEEN ADVISED OF THEIR POSSIBILITY. The foregoing limitations of remedies also apply to any developer and/or supplier of the Software. Such developer and/or supplier is an intended beneficiary of this Section. Some jurisdictions do not allow these limitations or exclusions and, in such event, they may not apply.

4. **General**

   a. If Customer is the United States Government, the following paragraph shall apply: All Nortel Networks Software available under this License Agreement is commercial computer software and commercial computer software documentation and, in the event Software is licensed for or on behalf of the United States Government, the respective rights to the software and software documentation are governed by Nortel Networks standard commercial license in accordance with U.S. Federal Regulations at 48 C.F.R. Sections 12.212 (for non-DoD entities) and 48 C.F.R. 227.7202 (for DoD entities).

   b. Customer may terminate the license at any time. Nortel Networks may terminate the license if Customer fails to comply with the terms and conditions of this license. In either event, upon termination, Customer must either return the Software to Nortel Networks or certify its destruction.

   c. Customer is responsible for payment of any taxes, including personal property taxes, resulting from Customer’s use of the Software. Customer agrees to comply with all applicable laws including all applicable export and import laws and regulations.

   d. Neither party may bring an action, regardless of form, more than two years after the cause of the action arose.

   e. The terms and conditions of this License Agreement form the complete and exclusive agreement between Customer and Nortel Networks.

f. This License Agreement is governed by the laws of the country in which Customer acquires the Software. If the Software is acquired in the United States, then this License Agreement is governed by the laws of the state of New York.

Contents

Preface

This guide provides information about administering and configuring the Nortel Business Ethernet Switch 1000 (BES1000) Series devices. This guide describes the features of the following Nortel switches:

- Nortel Business Ethernet Switch 1010-24T
- Nortel Business Ethernet Switch 1010-48T
- Nortel Business Ethernet Switch 1020-24T PWR
- Nortel Business Ethernet Switch 1020-48T PWR

The term BES1000 Series switch describes the features common to the switches listed above.

The term BES1010 describes features common to the BES1010-24T and BES1010-48T.

The term BES1020 describes features common to the BES1020-24T and BES1020-48T.

A switch is referred to by its specific name when the feature that is described is exclusive to that switch.

Before you begin

This guide is intended for individuals who have the following background:

- basic knowledge of networks, Ethernet bridging, and IP routing
- familiarity with networking concepts and terminology
- basic knowledge of network topologies

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 you enter the command. Example: If the command syntax is
	`ping <ip_address>`
	enter
	`ping 192.32.10.12`

bold body text	Indicates objects such as window names, dialog box names, and icons, as well as user interface objects such as buttons, tabs, and menu items.
braces ({})	Indicate required elements in syntax descriptions where more than one option exists. Choose only one of the options. Do not type the braces when you enter the command. Example: If the command syntax is **`show ip {alerts|routes}`** 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 you enter the command. Example: If the command syntax is
	`show ip interfaces [-alerts]`
	enter either
	`show ip interfaces`
	or
	`show ip interfaces -alerts`

italic text	Indicates variables in command syntax descriptions. Also indicates new terms and book titles. 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** command 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 you enter the command.
	Example: If the command syntax is
	`show ip {alerts|routes}`
	enter either
	`show ip alerts`
	or
	`show ip routes`
	but not both.

Related publications

For more information about using the BES1000 Series switch, see: *Quick Installation Guide for the Nortel Business Ethernet Switch 1000* (NN

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

How to get help

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

If you purchase a Nortel service program, contact Nortel Technical Support.

The following information is available online:

- contact information for Nortel Technical Support
- information about the Nortel Technical Solutions Centers
- information about the Express Routing Code (ERC) for your product

An ERC is available for many Nortel 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. You can locate the ERC for your product or service online.

The Nortel Support Web page is at:
www.nortel.com

New in this release

The following section details what is new in *Using the Nortel Business Ethernet Switch 1000 Series (NN47927-301)* for hardware and software release 1.1:

Features

See the following sections for information about feature changes:

Release 1.0

The first release of *Using the Nortel Business Ethernet Switch 1000 Series*

Release 1.1

This is the second release of *Using the Nortel Business Ethernet Switch 1000 Series*. The document has been reorganized to indicate basic, advanced, and administrative sections for the Web-based user interface and the Element Manager.

Introduction

The BES1000 Series switches are high performance Web-managed switches that deliver performance and control to your network. The BES 1010-24T and BES 1010-48T versions provide 10/100/1000 autosensing ports which include two shared Small Form-Factor Pluggable (SFP) Ports; SFPs are hot-swappable products that enhance input and output and allow gigabit Ethernet ports to link with other gigabit Ethernet ports over various media types. Because SFPs use smaller connectors, they are easier to use in high density applications and unlike an RJ-45 port, can connect two optical fibers in the same space.

The BES 1020-24T-PWR and BES 1020-48T-PWR versions provide 10/100/1000 ports that include 12 and 24 Power over Ethernet (PoE) ports which include two shared SFP Ports.

Navigation

- To set up the Web UI for use with the BES1000, see "Using the Web-based user interface" (page 21).
- To set up the BES1000 management features using the Web UI, see "BES1000 basic configuration using the Web-based user interface" (page 37), and "BES1000 advanced features configuration" (page 59).
- To set up the Element Manager for use with the BES1000, see "Using the Element Manager user interface" (page 85).
- To set up the BES1000 management features using the Element Manager, see "BES1000 basic configuration using Element Manager " (page 89) and "BES1000 advanced configuration using Element Manager" (page 111).
- To reset the system, to change the IP address, to view system details, or to manage BES1000 firmware, see "BES1000 administration" (page 121).
- To learn about the BES1000 management features, see "BES1000 fundamentals" (page 209).

- For system defaults, specifications, compliances, and other reference information related to the BES1000, see "BES reference information" (page 253).

Using the Web-based user interface

Use this information to understand how to use the Web-based user interface to view and configure information about the BES1000 Series switch.

Prerequisites for using the Web-based user interface

To use the Web-based user interface, you need the following items:

- a computer connected to a network port that is a member of the management Virtual LAN (VLAN)
- one of the following Web browsers or Web engines installed on your computer:
  - Windows 95™, Windows 98™, Windows 2000™, Windows XP™, or Windows NT™ 5.1; en-US; rv:1.8.0.3, rv:1.7.5, and UNIX installed on the computer
  - Internet Explorer™ 6.0 and later

You will need to disable the cache option on the Browser you use. This issue is generated by a known issue regarding cache pages stored by Microsoft Internet Explorer (See Bulletin # 234067 in the Microsoft Knowledge Base Web page).

ATTENTION

The Web pages of the Web-based management interface can load at different speeds depending on which Web browser you use.

CAUTION

Web browser capabilities such as page bookmarking, refresh, page forward, and page back function the same as any other Web site. However, these capabilities do not enhance the functionality of the Web-based management interface. Nortel recommends that you use only the navigation tools provided in the management interface.

- the IP address of the BES1000 Series switch. For information about setting the IP address of the switch, see "Configuring initial settings by using the Quick Start feature" (page 37).

> **ATTENTION**
> To use some of the BES1000 Series switch Web-based management functionality, such as downloading software, you must connect your Trivial File Transfer Protocol (TFTP) server to a BES1000 Series switch.

Navigation

- "Setting up the Web-based user interface " (page 22)
- "Logging on to the Web-based management interface" (page 23)
- "Logging off from the Web-based management interface" (page 23)
- "Navigating the Web-based user interface" (page 24)
- "Setting the IP address" (page 26)
- "Setting the IP address automatically" (page 27)
- "Changing the administrator password" (page 29)
- "Configuring system information " (page 32)

Setting up the Web-based user interface

Nortel recommends that you follow the procedures in this section regarding Web-based user interface prerequisites before you use the management features of your switch for the first time.

Procedure steps

Step Action

1 Check that Java Runtime Environment (JRE) version 1.50_07-b03 or later is installed on your PC. Download the latest version from www.java.com if required.

> **ATTENTION**
> The menu on the left-hand side of the Web-based user interface may not appear if the Java Runtime Environment (JRE) is not installed.

2 Ensure the software programs on your PC enable Java script and Java applets, and Web browser pop-up dialog boxes. Refer to the corresponding software documentation for instructions. Software programs include but are not limited to:

- Web browser
- firewall

- software that controls Java behavior

> **ATTENTION**
>
> The menu on the left-hand side of the Web-based user interface may not appear if Java script and Java applets are disabled, and some management features do not work properly if pop-up dialog boxes are disabled.

—End—

Logging on to the Web-based management interface

Use this procedure to log on to the Web-based user interface.

Before you log on to the Web-based management interface, verify the VLAN port assignments and ensure that your switch and computer are assigned to the same VLAN. If the devices are not connected to the same VLAN, the IP address does not display on the home page.

The Default IP address is 192.168.1.132, and the security default is ON. The default Username is: **nnadmin**; the default Password is: **PlsChgMe!** The password and user name are case-sensitive.

Use this procedure to log on to the Web-based user interface.

Procedure steps

Step	Action
1	Start your Web browser.
2	In the address bar, type the IP address for your host switch, for example, **http://192.168.151.175**, and press **Enter**.

—End—

Network security is enabled by default.

Logging off from the Web-based management interface

Log off from the Web-based user interface after you finish using the switch.

Procedure steps

Step	Action
1	From the main menu, choose **Administration > Logout**. A logout message appears.

2 Click **OK** to log off or click **Cancel** to cancel the request.

—End—

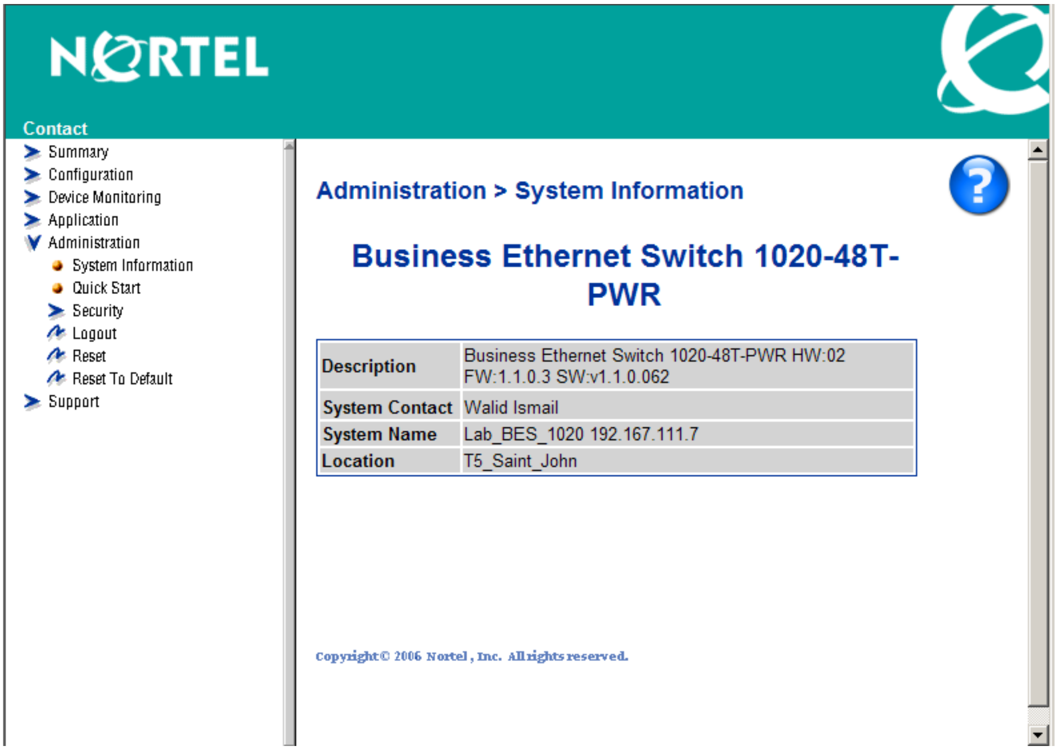
ATTENTION

If you do not configure system password security, a log off returns you to the home page. If you configure system password security, a log off returns you to a log on page.

Navigating the Web-based user interface

When your Web browser connects with the switch Web agent, the home page appears as shown in the figure below. The home page displays the main menu on the left side of the screen and System information on the right side. Use the main menu links to navigate to other menus and display configuration parameters and statistics.

BES1000 home page



Administration > System Information

Business Ethernet Switch 1020-48T-PWR

Description	Business Ethernet Switch 1020-48T-PWR HW:02 FW:1.1.0.3 SW:v1.1.0.062
System Contact	Walid Ismail
System Name	Lab_BES_1020 192.167.111.7
Location	T5_Saint_John

Copyright© 2006 Nortel, Inc. All rights reserved.

Menu and management pages

The menu is the same for all pages. It contains a list of six main headings. To navigate the Web-based user interface menu, click a menu title and then click one of its options. When you click an option, the corresponding page appears.

The first five headings provide options for viewing and configuring switch parameters. The Support heading provides options to open the online Help file and the Nortel Web site. Tools are provided in the menu to assist you in navigating the Web-based management interface.

Menu icons

Icon	Description
➤	This icon identifies a menu title. Click on this icon to display its options.
●	This icon identifies a menu title option. Click on this icon to display the corresponding page.
◔	This icon identifies a menu title option that has a hyperlink to related pages.
↯	This icon is linked to an action, for example, log off, reset, or reset to system defaults.

When you click a menu option, the corresponding management page appears. A page is composed of one or more items.

Management page items

Item	Description
Tables and input forms	Gray cells are read only. White cells are input fields.
Check boxes	Enable or disable a selection by clicking a check box. When a check mark is displayed in the box, that selection is enabled. You disable a selection by clicking the checked box.
Icons and buttons	Icons and buttons perform an action concerning the displayed page or the switch. Some pages include a button that opens another page or updates the values shown on the current page. Some pages include icons that initiate an action, such as reformatting the current displayed data as a bar or pie chart.

Configuration options

Configurable parameters have a dialog box or a drop-down list. After you make a configuration change on a page, be sure to click the Submit button to confirm the new setting. The following table summarizes some of the common configuration buttons that appear throughout the Web-based user interface pages.

Web Page configuration buttons

Button	Action
Submit	Saves specified values to the system.
Reload	Refreshes the page with current values.
Add	Adds the selected parameter to the configuration.
Delete	Deletes the selected parameter from the configuration.
Remove	Removes the selected parameter from the configuration.
Help	Links directly to Web Help.

ATTENTION

To ensure proper screen refresh, in the Internet Explorer menu, choose **Tools > Internet Options > General > Temporary Internet Files > Settings** and select **Every visit to the page** as the setting for Check for newer versions of stored pages.

Setting the IP address

Use this procedure to configure an IP address for the switch.

To use the BES1000 management features, you must first configure the switch with an IP address that is compatible with the network where it is being installed. For simplicity, configure the IP address before you permanently install the switch.

Procedure steps

Step	Action
1	Place your switch close to the PC that you will use to configure it. It helps if you can see the front panel of the switch while you work on your PC.
2	Connect the Ethernet port of your PC to any port on the front panel of your switch.
3	Insert the power adapter into the DC power socket in front of the switch.
4	Plug the other end of the power adapter into a grounded, 3-pin socket, AC power source.

5 Check the front-panel LEDs as the device powers on to confirm that the PWR LED is green. If not, check that the power cable is correctly plugged in.

6 If the PC IP address is different from the switch but is on the same subnet, go to the next step. (For example, if the PC and switch both have addresses that start with 192.168.1.x.) Otherwise, manually set the IP address for the PC. See Changing a PC IP address. The default IP address of the switch is 192.168.1.132, the default subnet mask is 255.255.255.0, and the default gateway is 0.0.0.0.

7 Open your Web browser and enter the IP address of the switch, for example, **http://192.168.1.132**. If you do not see the logon page, check your IP address and repeat step 3.

8 If prompted, enter the default user name **nnadmin** and default password **PlsChgMe!**, and click **Login**.

9 From the main menu, click **Configuration > IP**.

10 On the **IP Settings** page, select a BootP request mode.

11 Enter an IP address followed by the new switch IP address, subnet mask, default gateway.

12 Click **Submit**.

—End—

No other configuration changes are required at this stage, but Nortel recommends that you change the administrator password and enable password authentication before you log off.

Setting the IP address automatically

You can use an IP address to manage access to the switch over your network. By default, the switch invokes BootP at startup to obtain an IP address for the user interface. If you want to configure the user interface IP address manually, you can power the BES without a BootP server present and browse to the factory default address for the user interface.

Prerequisites

- To configure the switch dynamically, the network must provide BOOTP services.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > IP**.
2	In the **BootP Request Mode** box, choose the type of BootP mode you want.
3	Click **Submit**. If BOOTP is enabled, the switch broadcasts a request for IP configuration settings on each power reset.

—End—

Variable definitions

Variable	Value
BootP Request Mode	Choose from: • BootP or Default IP • BootP always • BootP Disabled • BootP or Last Address
	BootP or Default IP: This setting sends a BootP request when the switch IP address stored in nonvolatile memory is the factory default value. If the stored IP address differs from the factory default value, the switch uses the stored network parameters. If the switch cannot find a BootP server, it tries five more times to find one and then defaults to the factory settings.
	BootP Always: This setting ignores the stored network parameters and sends a BootP request each time the switch boots. If the BootP request fails, the switch boots with the factory default IP configuration. This setting disables remote management if no BootP server is set up for the switch, but it lets the switch boot normally.
	BootP Disabled: This setting uses the IP configuration parameters stored in nonvolatile memory each time the switch boots. If a BootP configuration is in progress when you issue this command, the BootP configuration stops.
	BootP or Last Address: This setting obtains the IP configuration using BootP at each start up. If the BootP request fails, the switch uses the network parameters stored in its nonvolatile memory.

Variable	Value
	Note: Valid parameters obtained in using BootP always replace current information stored in the nonvolatile memory.
	Note: Whenever the switch broadcasts BootP requests, the BootP process times out if a reply is not received within approximately 60 seconds. When the process times out, the BootP request mode automatically changes to BootP Disabled mode. To restart the BootP process, change the BootP request mode to any of the two following modes: BootP Always, or to BootP or Last Address.
IP Address	Type a new IP address in the appropriate format.
Switch IP Address	Type a new switch IP address in the appropriate format. The default switch IP address is 192.168.1.32 ***Note:*** When the IP address is entered in the In-Band IP Address field, and the In-Band Subnet Mask field value is not present, the software provides an in-use default value for the In-Band Subnet Mask field that is based on the class of the IP address entered in the In-Band IP Address field.
Subnet Mask	Type a new subnet mask in the appropriate format. The default subnet mask value is 255.255.255.0.
Default Gateway	Type an IP address for the default gateway in the appropriate format. The default gateway value is 192.168.1.1.
Administration	username: nnadmin password: PlsChgMe!

Changing the administrator password

Use the Web, Console, and Remote Authentication Dial-In User Service (RADIUS) pages to change access passwords. RADIUS is a client / server-based authentication software system that provides secure Internet access, especially in a Virtual Private Network (VPN). When a RADIUS password is used for dial in access to an Internet Service Provider (ISP), the username and password are checked and if they are correct, the RADIUS server authorizes access to the ISP systems and network. Because the administration of user profiles within an authentication database is centralized in a RADIUS system, support for multiple VPN switches is simplified.

Configuring Web security

Use this procedure to configure Web security for the BES1000.

Procedure steps

Step	Action
1	From the main menu, choose **Administration > Security > Web**.

The Security > Web page appears.

2 In the **Web Switch Password Type** list, select a new password type.

3 In the **Read-Only Switch Password** box, type a new read-only access password.

4 In the **Read-Write Switch Password** box, type a new read-write access password.

5 Click **Submit**.

—End—

Variable definitions

Variable	Value
Web Switch Password Setting	
Web Switch Password Type	Select a password type to use to access the Web interface. The password type is as follows: - None - Local Password - RADIUS Authentication
Read-Only Switch Password	Specify the read-only password for access to the Web interface.
Read-Write Switch Password	Specify the read-write password for access to the Web interface.

Configuring RADIUS security

Use this procedure to configure RADIUS security for the BES1000.

Procedure steps

Step Action

1 From the main menu, choose **Administration > Security > RADIUS**.

The **Security > RADIUS** page appears.

2 In the **Primary RADIUS Server** box, type the address of the primary RADIUS server address.

3 In the **Secondary RADIUS Server** box, type the address of the secondary RADIUS server address.

4 In the **UDP RADIUS Port** box, type the port number for User Datagram Protocol (UDP).

5 In the **RADIUS Shared Secret** box, type a password string for your RADIUS server.

6 Click **Submit**.

—End—

Variable	Value
RADIUS Authentication Setting	
Primary RADIUS Server	The address of the primary RADIUS server address.
Secondary RADIUS Server	The address of the secondary RADIUS server address.
UDP RADIUS Port	The port number for User Datagram Protocol (UDP).
RADIUS Shared Secret	The password string for your RADIUS server. You can use up to 128 characters.

Configuring console security

Use this procedure to configure console security for the BES1000.

Procedure steps

Step Action

1 From the main menu, choose **Administration > Security > Console**.

The Security > Console page appears.

2 In the **Console Switch Password Type** list, select a new password type.

3 In the **Read-Only Switch Password** box, type a new read-only access password.

4 In the **Read-Write Switch Password** box, type a new read-write access password.

5 Click **Submit**.

—End—

Variable definitions

Variable	Value
Console Switch Password Setting	
Console Switch Password Type	Select a password type to use to get console access to the switch. The password type is as follows: - None - Local Password - RADIUS Authentication
Read-Only Switch Password	Specify the read-only password for console access to the switch.
Read-Write Switch Password	Specify the read-write password for console access to the switch.

Configuring system information

Use the System page to provide a descriptive name, location, and contact information to the system. The configurable parameters on the System page are displayed in a read-only format on the System Information home page.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > System**. The System page appears.
2	Type a contact name, system name, and system location information.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
System Description	The factory set description of the hardware and software versions.
System Object ID	The object identifier (OID) for the system.
System Up Time	The elapsed time since the system is last reinitialized. **Note**: This field is updated only when the screen is redisplayed.

Variable	Value
System Contact	Administrator responsible for the system. The range of values is from 1 to 255 characters in length.
System Name	A name assigned to the switch system. The range of values is from 1 to 255 characters in length.
System Location	The system location. The range of values is from 1 to 255 characters in length.

Help screens

Use these procedures to access the BES1000 help screens.

Accessing BES1000 help

Procedure steps

Step	Action
1	From the main menu, choose **Support > Help**. The Online Help table of contents for the BES1000 Series Switch appears.
2	Scroll through the entries or click a link on a topic to see information about the topic.

—End—

Accessing BES1000 release notes

Procedure steps

Step	Action
1	From the main menu, choose **Support > Release Notes**. The Nortel Technical Support page appears.
2	Select BES1000 series products from the **Product Category**, **Products A-Z**, or **Product Families** lists.
3	Choose a product from the list that appears.
4	Choose the type of content from the list.
5	Click **Go**.
6	To clear the entries from the fields in this screen, click **Reset**.

—End—

Accessing BES1000 manuals

Procedure steps

Step	Action
1	From the main menu, choose **Support > Manuals**. The Nortel Technical Support page appears.
2	Select BES1000 series products from the **Product Category**, **Products A-Z**, or **Product Families** lists.
3	Choose a product from the list that appears.
4	Choose the type of content from the list.
5	Click **Go**.
6	To clear the entries from the fields in this screen, click **Reset**.

—End—

Accessing the management interface

Log on to the Web-based management interface to use the application. With Web access enabled, the switch can support a maximum of five concurrent Web page users. Two predefined user levels are available, and each user level has a corresponding user name and password.

The password for the Read-Only Community String is: **PlsChgMe!RO**; the password for the Read-Write Community String is: **PlsChgMe!RW**. The passwords are case sensitive.

Procedure steps

Step	Action
1	Open a web browser.
2	In the **Address bar**, type the Address URL or IP address of the BES1000.
3	In the **Username** box, type a valid user name. Default values are **nnadminRO** [lowercase] for read-only access or **nnadmin** [lowercase] for read/write access.

4 In the **Password** box, type your password.

Default values are **PlsChgMe!RO** for read-only access or **PlsChgMe!** for read/write access.

5 Click **Log On**.

The System Information page appears.

—End—

BES1000 basic configuration using the Web-based user interface

Use these procedures to manage the basic configuration of your BES1000 Series switch.

Navigation

- "Configuring initial settings by using the Quick Start feature" (page 37)
- "Configuring Simple Network Management Protocol (SNMP)" (page 39)
- "Configuring SNMPv3 management access" (page 41)
- "Configuring Virtual LANs (VLANs)" (page 48)
- "Configuring Link Aggregation Control Protocol (LACP) ports" (page 52)
- "Configuring Power over Ethernet (PoE) management" (page 52)
- "Viewing Spanning Tree Port information" (page 54)
- "Viewing Spanning Tree Bridge information" (page 55)
- "Configuring rate limiting" (page 56)

Configuring initial settings by using the Quick Start feature

Configure initial settings by using the Quick Start feature which can consolidate multiple setup pages into a single page. The Quick Start screen can be used to configure the following information:

- switch IP address
- subnet mask
- default gateway
- default (Management VLAN)
- Web passwords

During the initial setup mode, all ports in the switch are assigned to the new default VLAN.

A port-based Quick Start VLAN is created if the new default VLAN does not exist. All ports are removed from the current default VLAN and are assigned to the Quick Start VLAN. The Port VLAN ID (PVIDs) for all ports are changed to the Quick Start VLAN. The Quick Start VLAN is also designated as the management VLAN.

Procedure steps

Step	Action
1	From the main menu, select **Administration > Quick Start**. The Quick Start page is displayed.
2	Type the IP address, subnet mask, default gateway, default management VLAN, select a password type, type a read-only password, and a read-write password.
3	Click **Submit** after making the required settings.

—End—

Variable definitions

Variable	Value
Switch IP Address	Specify a new IP address for the switch.
Subnet Mask	Enter a new subnet mask.
Default Gateway	Specify an IP address for the default gateway.
Default (Management) VLAN	Specify the VLAN ID number of the port-based default management VLAN.
Web Switch Password Type	Select one of the following types for password access to the Web interface: • None • Local Password • RADIUS Authentication
Read-Only Switch Password	Specifies the read-only password for access to the Web interface.
Read-Write Switch Password	Specifies the read/write password for access to the Web interface.

Configuring Simple Network Management Protocol (SNMP)

Configure an SNMPv1 to configure an IP address and community string. You can also use SNMPv1 to modify read/write and read-only community strings, enable or disable trap mode settings, and/or enable or disable the autotopology feature.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > SNMPv1**. The SNMPv1 page appears.
2	Type information in the text boxes or select from a list.
3	Click **Submit** in any section to save your changes.

—End—

Variable definitions

Variable	Value
Community String Setting	
Read-Only Community String	Type in the read-only password. (Default: PlsChgMe!RO). The password can be from 1 to 32 characters in length.
Read-Write Community String	Type in the read-write password. (Default: PlsChgMe!RW). The password can be from 1 to 32 characters in length.
Trap Mode Setting	
AuthenticationTrap	Choose to enable or disable the authentication trap: - Enable - Disable

Configuring an SNMP trap receiver

Configure an IP address and community string for a new SNMP trap receiver to receive notification of significant events.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > SNMP Trap**. The SNMP Trap Receiver page appears.

2 In the **Trap Receiver Creation** section type information in the text boxes, or select from a list.

3 Click **Submit**.

The new entry is displayed in the Trap Receiver Table.

—End—

Variable definitions

Variable	Value
X	Deletes the row.
Trap Receiver Index	Choose the number of the trap receiver to create or modify. The range is from 1 to 4.
IP Address	Type the network address of the SNMP manager that is to receive the specified trap. Use the following format: XXX.XXX.XXX.XXX
Community	Type the community string for the specified trap receiver. The range is from 0 to 32 characters.

Deleting an SNMP trap receiver configuration

Delete SNMP trap receiver configurations that you no longer need.

Procedure steps

Step Action

1 From the main menu, choose **Configuration > SNMP Trap**.

The SNMP Trap Receiver page appears.

2 In the **Trap Receiver Table**, click the **Delete** icon (**X**) for the entry you want to delete.

A message appears prompting you to confirm your request.

3 Click **OK** to confirm or **Cancel** to quit without deleting the entry.

—End—

Configuring SNMPv3 management access

Use these procedures to configure SNMPv3 management access to the BES1000.

- "Viewing SNMPv3 System information" (page 41)
- "Configuring SNMPv3 users" (page 42)
- "Configuring group membership" (page 43)
- "Configuring group access rights" (page 44)
- "Setting SNMPv3 views" (page 45)
- "Configuring notification messages" (page 46)
- "Configuring Target Address" (page 46)
- "Configuring target parameters" (page 47)

Viewing SNMPv3 System information

View simple network management protocol (SNMP) system information to determine how SNMP is managing the switch.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration**.
2	Choose **SNMPv3**.
3	Choose **System Information**. The System Information page appears.

—End—

Variable definitions

Variable	Value
System Information	
SNMP Engine ID	The SNMP address.
SNMP Engine Boots	The number of times SNMP has been activated.
SNMP Engine Time	The amount of time the engine has been active.
SNMP Engine Maximum Message Size	The message size in bytes that the engine supports.
SNMP Engine Dialects	The versions of SNMP that are supported.

Variable	Value
Authentication Protocols Supported	The types of protocols SNMP supports.
Private Protocols Supported	Indicates whether private protocols are supported.
SNMP V3 Counters	
Unavailable Contexts	Number of SNMP proxy requests to unavailable entities.
Unknown Contexts	Number of SNMP proxy requests to unknown entities.
Unsupported Security Levels	Number of packets received by the SNMP engine that are dropped because they requested a security level that is unknown to the SNMP.
Not In Time Windows	Number of packets received by the SNMP engine that are dropped because they appeared outside of the authoritative SNMP window.
Unknown User Names	Number of packets received by the SNMP engine that are dropped because they referenced a user that is not known to the SNMP engine.
Unknown Engine IDs	Number of packets received by the SNMP engine that are dropped because they referenced an snmpEngineID that is not known to the SNMP engine.
Wrong Digests	Number of packets received by the SNMP engine that are dropped because they do not contain the expected digest value.
Decryption Errors	Number of packets received by the SNMP engine that are dropped because they cannot be decrypted.

Configuring SNMPv3 users

Use the SNMPv3 Users page to assign SNMPv3 users.

Procedure steps

Step Action

1 From the main menu, choose **Configuration > SNMPv3 > User Specification**.

The User Specification page appears.

2 In the **User Name** box, type a name.

3 In the **Authentication Protocol** list, make a selection.

4 In the **Authentication Passphrase** box, type a passphrase for the protocol.

5 In the **Privacy Protocol** list, make a selection.

6 In the **Privacy Passphrase** box, type a passphrase for the protocol.

7 In the **Entry Storage** list, make a selection.

8 Click **Submit** in any section to save your changes.

—End—

Variable definitions

Variable	**Value**
User Specification Creation	
User Name	Type a user name.
Authentication Protocol	Indicates which authentication protocol is in use.
Authentication Passphrase	Type a passphrase for the authentication protocol.
Privacy Protocol	Indicates None if no privacy protocol is used.
Privacy Passphrase	Type a passphrase to use that is at least eight characters in length.
Entry Storage	Choose whether the storage is volatile or nonvolatile.

Configuring group membership

Use this procedure to assign SNMPv3 users to groups.

Procedure steps

Step **Action**

1 From the main menu, choose **Configuration > SNMPv3 > Group Membership**.

The Group Membership page appears.

2 Type information in the text boxes or choose from a list.

3 Click **Submit** in any section to save your entries.

—End—

Variable definitions

Variable	Value
Group Membership Creation	
Security Name (i.e. User Name)	Type a user name for the SNMPv3 group.
Security Model	Choose the SNMP type. • SNMPv1 • SNMPv2c • USM
Group Name	Type a name to identify the group.
Entry Storage	Choose whether the storage is volatile or nonvolatile.

Configuring group access rights

Use this procedure to configure the access rights for each SNMPv3 group.

Procedure steps

Step Action

1 From the main menu, choose **Configuration > SNMPv3 > Group Access Rights**.

The Group Access Rights page appears.

2 Type information in the text boxes or choose from a list.

3 Click **Submit** in any section to save your entries.

—End—

Variable definitions

Variable	Value
Group Access Creation	
Group Name	Type a name to identify the group.
Security Model	Choose the SNMP type.
Security Level	Choose an authentication and privilege level.
Read View	Indicate the SNMP group that has read-only access.
Write View	Indicate the SNMP group that has write access.

Variable	Value
Notify View	Indicate the SNMP group that has notify access.
Entry Storage	Choose whether the storage is volatile or nonvolatile.

Setting SNMPv3 views

Use this procedure to configure SNMPv3 views.

You can use SNMPv3 views to restrict user access to specified portions of the Management Information Base (MIB) tree.

Procedure steps

Step Action

1 From the main menu, choose **Configuration > SNMPv3 > Management Info View**.

The Management Info View page appears.

2 In the **View Name** box, type a name,

3 In the **View Subtree** box, type a subnet address.

4 In the **View Mask** box, type a mask address.

5 In the **View Type** list, make a selection.

6 In the **Entry Storage** list, make a selection.

7 Click **Submit** in any section to save your entries.

—End—

Variable definitions

Variable	Value
Management Information Creation	
View Name	The name for the SNMP group.
View Subtree	The subnet address to assign to the group.
View Mask	The mask address to assign to the group.
View Type	Indicate the view type as follows: - Include - Exclude
Entry Storage	Choose whether the storage is volatile or nonvolatile.

Configuring notification messages

Use this procedure to configure SNMPv3 notification messages.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > SNMPv3 > Notification**. The Notification page appears.
2	In the **Notify Name** box, type a name.
3	In the **Notify Tag** box, type a name for the tag.
4	In the **Notify Type** list, make a selection.
5	In the **Entry Storage** list, make a selection.
6	Click **Submit** in any section to save your entries.

—End—

Variable definitions

Variable	Value
Notification Creation	
Notify Name	The name for the notification.
Notify Tag	The tag for the notification.
Notify Type	Indicate the SNMP notification as follows: - Trap - Inform
Entry Storage	Choose whether the storage is volatile or nonvolatile.

Configuring Target Address

Use this procedure to configure the SNMPv3 target address.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > SNMPv3 > Target Address**. The Target Address page appears.
2	In the **Target Name** box, type a target name.

3 In the **Target Address** box, type an address for the target.

4 In the **Target Timeout** box, type a number for the timeout interval.

5 In the **Target Retry Count** box, type a number for the amount of retries.

6 In the **Target Tag List** box, type a tag list name.

7 In the **Target Param Entry** box, type a parameter tag.

8 In the **Entry Storage** list, make a selection.

9 Click **Submit** in any section to save your entries.

—End—

Variable definitions

Variable	Value
Target Address Creation	
Target Name	Type a name for the target.
Target Address	Type an address for the target.
Target Timeout	The number to indicate a timeout interval for the target. The range is from 0 to 2147483647.
Target Retry Count	The number to indicate the number of retries for the target. The range is from 0 to 255.
Target Tag List	The tag list to assign to the target.
Target Param Entry	The parameter tag to assign to the target.
Entry Storage	Choose whether the storage is volatile or nonvolatile.

Configuring target parameters

Use this procedure to configure the SNMPv3 target parameters.

Procedure steps

Step Action

1 From the main menu, choose **Configuration > SNMPv3 > Target Parameter**.

The Target Parameter page appears.

2 In the **Parameter Tag** box, type a parameter tag to assign.

3 In the **Msg Processing Model** list, make a selection.

4 In the **Security Name** box, type a name for the group.

5 In the **Security Level** list, make a selection.

6 In the **Entry Storage** list, make a selection.

7 Click **Submit** in any section to save your entries.

—End—

Variable definitions

Variable	Value
Target Parameter Creation	
Parameter Tag	The parameter tag to assign to the target.
Msg Processing Model	The SNMP type: - SNMPv1 - SNMPv2c - SNMPv3
Security Name	Type a name for the SNMP group.
Security Level	Choose an authentication and privilege level.
Entry Storage	Choose whether the storage is volatile or nonvolatile.

Configuring Virtual LANs (VLANs)

Use these procedures to configure the VLANs on your BES1000 Series switch using the Web-base user interface.

Navigation

- "Creating a port-based VLAN" (page 106)
- "Configuring a port-based VLAN" (page 49)
- "Modifying a port-based VLAN" (page 50)
- "Selecting a management VLAN" (page 50)
- "Deleting a VLAN configuration" (page 51)

Creating a port-based VLAN

Create a port-based VLAN to specifically configure ports in the VLAN.

Procedure steps

Step Action

1 From the main menu choose **Application > VLAN > VLAN Configuration**.

The VLAN Configuration page appears.

2 Click **Create VLAN**.

The VLAN Configuration: Port based page appears.

3 Type information in the text boxes or select from a list.

4 Click **Submit**.

5 To modify the port membership of the VLAN, see "Modifying a port-based VLAN" (page 50).

—End—

Configuring a port-based VLAN

Use this procedure to configure a port for your BES1000 Series switch.

Procedure steps

Step Action

1 In the main menu, choose **Application > VLAN > Port Configuration**.

The VLAN > Port Configuration page appears.

2 In the **Port Name** field, enter a name to assign for the port.

3 In the **Untagged Priority** field, select a value from the Untagged Priority list.

4 In the **Egress Tagging** section, select from the list to enable or disable egress tagging.

5 Click **Submit**.

—End—

Variable definitions

Variable	Value
Port	The port number.
Port Name	The name of the port that is associated with the port number.

Variable	Value
Untagged Priority	Choose a priority from zero to seven to assign to the port.
Egress Tagging	Choose Off to disable egress tagging or choose ON to enable egress tagging.

Modifying a port-based VLAN

Modify an existing port-based VLAN to change the VLANID of the port.

Procedure steps

Step	Action
1	From the main menu, choose **Application > VLAN > VLAN Configuration**. The VLAN Configuration page appears.
2	Click the **Action** icon next to the VLAN you want to modify. The VLAN Configuration: Port Based page appears.
3	Select the check boxes for the ports that you want to include in the current VLAN.
4	Click **Submit**. The VLAN Configuration page appears.

—End—

Variable definitions

Variable	Value
VLAN	The number of the currently selected VLAN. The range is from 1 to 4094.
VLAN Name	Enter up to 16 characters.
Port	Number of the port included in the VLAN. Choose: Yes or No

Selecting a management VLAN

Select any VLAN to perform as the management VLAN. VLAN 1 is the default management VLAN for the switch.

Prerequisites

- The VLAN State field value must be active.

> **WARNING**
> Changing the default management VLAN could result in loss of Web- management connectivity. Ensure that the port you are currently connected to is part of the new VLAN group, or move your connection to a port on the new VLAN after you click Submit.

Procedure steps

Step	Action
1	From the main menu, choose **Application > VLAN > VLAN Configuration**. The VLAN Configuration page appears.
2	In the **VLAN Setting** section, choose the VLAN to assign as your management VLAN.
3	Click **Submit**.

—End—

Deleting a VLAN configuration

Delete a VLAN configuration that you no longer require.

Procedure steps

Step	Action
1	From the main menu, choose **Application > VLAN > VLAN Configuration**. The VLAN Configuration page appears.
2	Identify the entry you want to delete.
3	In the **Action** field, click the **X** icon associated with the VLAN to delete. A message appears prompting you to confirm your request.
4	Click **OK** to delete the VLAN configuration or **Cancel** to quit without deleting the VLAN.

—End—

Configuring Link Aggregation Control Protocol (LACP) ports

You can use Link Aggregation (LA) to create and manage a trunk group. You can control and configure a trunk group automatically through the use of the Link Aggregation Control Protocol (LACP).

Procedure steps

Step	Action
1	From the main menu, choose **Application > Link Aggregation Protocol > Port Configuration**. The Port Configuration page appears.
2	Set the values for each parameter.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
Port	Lists each port on the switch.
Priority	Lists the priority number of each port.
LACP mode	Select to enable or disable the LACP mode.
Admin key	The admin value of the key.
Operational Key	The current operational value of the key.
Aggregator ID	The identifier value of the aggregator that this Aggregation Port currently selects.
Trunk ID	The ID of the LAG. The possible values are: 1 to 6.
Partner Port	The index of the port from the partner switch.
Status	Status of the selected port.

Configuring Power over Ethernet (PoE) management

Display PoE parameters for the BES1000 Series switch using the Web-based management system.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > Power Management > Global Power Mgmt**. The Global Power Management page appears.
2	Click **Update** to refresh the current power management page.

—End—

Variable definitions

Variable	Value
Available PoE Power	Displays the amount of power available to powered devices from the switch. Depending on the power sources you use and the power configuration you enable, you see one of the following values: 275 watt 175 watt
PoE Power Status	Displays the status of the PoE feature: • Normal - all power functioning correctly • Error - PoE failed
PoE Power Consumption	Displays total power use on all devices currently drawing power.

Configuring port PoE power priorities

Use this procedure to set up the powering priorities for the ports.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > Power Management > Port Property**. The Power Management > Port Property page appears.
2	In the **Admin. Status** list, choose a selection.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
Port Power Setting	
Port	The Port address.
Admin. Status	Specify the current administration status as follows: Enabled: The port is connected and operational. Disabled: The port is not connected or is not operational.
Current Status	The current status of the corresponding port as follows: disable, detecting, delivering power, error, invalid PD, overload, deny low priority, and test
Power (Watt)	The number of watts the port is using.

Viewing Spanning Tree Port information

Use the Spanning Tree port information page to determine the status of the spanning tree port.

Procedure steps

Step Action

1 From the main menu, choose **Application > Spanning Tree > Port Information**.

The Port Information page appears.

2 In the Admin **Edge Status** list, make a selection.

3 Click **Submit**.

—End—

Spanning Tree Port Information page items

Item	Description
Port	The port number.
Path Cost	This read-only field displays the lowest path cost to the root.

Item	Description
Admin Edge Status	The ports directly connected to end stations cannot create bridging loops in the network but they can directly transition to forwarding, skipping the listening and learning stages. The edge port does not generate topology changes when the link toggles. An edge port that receives a Bridge Protocol Data Unit (BPDU) immediately loses its edge port status and becomes a normal spanning tree port.
Oper Edge Status	A value of True indicates that the spanning tree can assume this port as an edge port and a value of False indicates that the spanning tree can assume this port as a non-edge port. The switch software sets this object to False on reception of a BPDU.
DesignatedRoot	The bridge identifier of the root of the spanning tree. This value is used as the Root Identifier parameter in all Configuration Bridge PDUs originated by this node.
OperP2P Status	The administrative point-to-point status of the LAN segment attached to this port. A value of True indicates that the spanning tree treats this port as if it is connected to a point-to-point link. A value of False indicates that the spanning tree treats this port as having a shared media connection. A value of Auto indicates that this port is considered to have a point-to-point link if it is an aggregator and all of its members are aggregatable. A value of Auto indicates that this port is considered to have a point-to-point link if the MAC entity is configured for full-duplex operation, either through autonegotiation or by management means.
Oper Protocol Version	Indicates the Spanning Tree Port (STP) version in which the port participates.
Role	Indicates the role of the port in the Spanning Tree instance.
State	Used to identify the Rapid Spanning Tree Port (RSTP) port state. The port state is cataloged as Discarding, Learning, or Forwarding.

Viewing Spanning Tree Bridge information

Use the Spanning Tree Bridge Information page switch settings to see bridge information.

Procedure steps

Step	Action
1	From the main menu, choose **Application > Spanning Tree > Bridge Information**.

The Bridge Information page appears.

2 Click **Update** to refresh the page.

—End—

Spanning Tree Bridge Information page items

Item	Description
STP Priority	The priority value of the bridge ID in hexadecimal notation, which is the most significant byte of the bridge ID. The Spanning Tree Algorithm uses this parameter to determine the root bridge (or designated bridge). For example, the bridge with the lowest bridge ID becomes the root bridge, with Bridge Priority values compared first, followed by the hardware addresses. The values displayed for Bridge Priority are in hexadecimal.
Stp Version	The version of STP running on the switch.
Designated Root	The bridge identifier of the root of the spanning tree. This value is used as the Root Identifier parameter in all Configuration Bridge PDUs originated by this node.
Bridge Max Age	The value that all bridges use for the maximum age of a bridge when it acts as the root.
Bridge Hello Time	The value that all bridges use for HelloTime when this bridge acts as the root.
Bridge Forward Delay Time	The value that all bridges use for ForwardDelay when this bridge acts as the root.
Tx Hold Count	The maximum number of bridge protocol data units transmitted in any BridgeHelloTime.
PathCost Default type	The default path cost for this bridge. The default can be either 16 bit, which applies to the Institute of Electrical and Electronics Engineers (IEEE) Std. 802.1D-1998 standard, or 32 bit, which applies to the IEEE Std. 802.1t standard.
Root Path Cost	The cost of the path to the root as seen from this bridge.

Configuring rate limiting

Use the Rate Limiting page to view the current forwarding rate of broadcast and multicast packets, and configure the BES1000 Series switch to limit the forwarding rate of broadcast and multicast packets on each interface. When you configure rate limiting, you set the percentage of port bandwidth allowed for a packet type. When the threshold is exceeded, additional packets are discarded.

Note: To avoid broadcast storms (when the volume of a particular packet type is excessive, placing severe strain on the network), set the forwarding rate of the broadcast packets to a lower percentage value.

Procedure steps

Step	Action
1	From the main menu, choose **Application > Rate Limiting**. The Rate Limiting page appears.
2	Select a type from the **Packet Type** list.
3	Select a bandwidth value to assign from the **Limit** list.
4	Click **Submit**.

—End—

Rate Limiting page items

Variable	Value
Port	Port number. Use the range from 1 to 50
Packet Type	Choose one of the following packet types to view on the table: Multicast Broadcast Both The default setting is Both.
Limit	Choose the percentage, if any, of bandwidth allowed for forwarding the packet type specified in the Packet Type field. When the threshold is exceeded, any additional packets are discarded. Choose None or 1-10%.
Last 5 Minutes	The percentage of packets received by the port in the last 5 minutes (min). This field provides a running average of network activity and is updated every 15 seconds (s). Values range from 0-100%.
Last Hour	The percentage of packets received by the port in the last hour. This field provides a running average of network activity and is updated every 5 min. Values range from 0-100%.

Variable	Value
Last 24 Hours	The percentage of packets received by the port in the last 24 hours. This field provides a running average of network activity and is updated every 15 min.
Note: The Last 5 Minutes, Last Hour, and Last 24 Hours fields indicate the view of network activity of the receiving port regardless of the rate limiting setting.	

BES1000 advanced features configuration using the Web-based interface

Use these procedures to manage the advanced configuration features of your BES1000 Series switch with the Web-based user interface.

Navigation

Configuring switch security

Use these procedures to configure user authentication on the BES1000.

Navigation

Configuring port authentication

Use this procedure to configure port authentication for the BES1000. Extensible Authentication Protocol over LAN (EAPOL) is an 802.1x standard that takes the Extensible Authentication Protocol (EAP), which is written around Point-to-Point Protocol (PPP), and ties it to the physical medium, such as Ethernet, Token Ring, or wireless LAN. The port for the client changes to an unauthorized state and only 802.1x traffic is forwarded. An EAP start message is sent, and the access point (the authenticator) responds with an EAP request identity message to obtain the identity of the client. A response packet containing the identity of the client is forwarded to an authentication server (usually a RADIUS server). Depending on the authentication algorithm received, the packet is either accepted or rejected. An accepted packet changes the port state to authorized, and the traffic is forwarded. At logoff, the client sends an EAP logoff message and the port changes to an unauthorized state.

Procedure steps

Step	Action
1	From the main menu, choose **Application > EAPOL Security**. The EAPOL Security Configuration page appears.
2	Choose information from the lists.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
EAPOL Administrative State Setting	
EAPOL Administrative State	Select to indicate the current administrative status as follows: - Enabled: The port is connected and operational. - Disabled: The port is not connected or is not operational.
EAPOL Security Setting	
Port	The port address.
Administrative status	Select to indicate the current administration status as follows: - Force Unauthorized - Auto - Force Authorized
Operational Status	Indicates the current operating status of the corresponding port.
Re-authenticate Now	Select Yes or No.

Configuring Web security

Use this procedure to configure Web security for the BES1000.

Procedure steps

Step	Action
1	From the main menu, choose **Administration > Security > Web**. The Security > Web page appears.
2	Select a password type.
3	Type a read-only or read-write password.
4	Click **Submit**.

—End—

Variable definitions

Variable	Value
Web Switch Password Setting	
Web Switch Password Type	The password type to use to access the Web interface. The password type is as follows: - None - Local Password - RADIUS Authentication
Read-Only Switch Password	The read-only password for access to the Web interface.
Read-Write Switch Password	The read-write password for access to the Web interface.

Configuring console security

Use this procedure to configure console security for the BES1000.

Procedure steps

Step	Action
1	From the main menu, choose **Administration > Security > Console**. The Security > Console page appears.
2	Type information in the text boxes or choose from a list.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
Console Switch Password Setting	
Console Switch Password Type	Select a password type to use to get console access to the switch. The password type is as follows: - None - Local Password - RADIUS Authentication
Read-Only Switch Password	Specify the read-only password for console access to the switch.
Read-Write Switch Password	Specify the read-write password for console access to the switch.

Configuring RADIUS security

Use this procedure to configure RADIUS security for the BES1000.

Procedure steps

Step	Action
1	From the main menu, choose **Administration > Security > RADIUS**. The Security > RADIUS page appears.
2	Type information in the text boxes or choose from a list.
3	Click **Submit**.

—End—

Variable	Value
RADIUS Authentication Setting	
Primary RADIUS Server	Indicate the address of the primary RADIUS server address.
Secondary RADIUS Server	Indicate the address of the secondary RADIUS server address.
UDP RADIUS Port	Indicate the port number for User Datagram Protocol (UDP).
RADIUS Shared Secret	Type the password string for your RADIUS server. You can use up to 128 characters.

Configuring Internet Group Management Protocol (IGMP) snooping

Configure IGMP snooping to enable the switch to selectively forward multicast traffic only on those ports where particular IP multicast streams are expected.

Procedure steps

Step	Action
1	From the main menu, choose **Application > IGMP > IGMP Configuration**.
2	To enable or disable IGMP on a VLAN, click the **Action** icon in the VLAN row. The IGMP: VLAN Configuration page appears.
3	In the **Snooping** field, choose **Enabled** or **Disabled**.
4	Click **Submit**.

—End—

Configuring flow control

Configure flow control to manage data flow so that your data is not lost when the receiving buffer is near capacity or full.

CAUTION

When flow control is enabled, you receive only partition benefits of the CoS feature.

Procedure steps

Step **Action**

1 From the main menu, choose **Configuration > Flow Control**

2 In the **Flow Control** list, select Enabled or Disabled.

3 Click **Submit**.

—End—

Configuring console port communication speed

Configure the console port communication speed, so you can match the console port baud rate to the baud rate of the console terminal.

Procedure steps

Step **Action**

1 From the main menu, choose **Configuration > Console Port**.

The Console Port page appears.

2 Select the console port speed from the list.

3 Click **Submit**.

—End—

Variable definitions

Variable	Value
Console Port Data Bits	The current console communication port data bit setting.
Console Port Parity	The current console communication port parity setting.
Console Port Stop Bits	The current console communication port stop bit setting.
Console Port Speed	Choose one of the following as the console port speed baud rate: ***Note:*** The default setting is 9600. 2400 4800 9600 19200 38400

Configuring port management properties

Configure management properties to allow control of the port.

Procedure steps

Step Action

1 From the main menu, choose **Configuration > Port Management**.

The Port Management page appears.

2 In the port row of your choice, edit the variables. Refer to the variable definitions table below for details.

3 Click **Submit**.

—End—

Variable definitions

Variable	Value
Port	The switch port number of the corresponding row. The values that you set in each switch row affect all switch ports (except the gigabit interface converter (GBIC) port or fiber optic ports if installed).
Alias	Type in the port name.
Status	Select the port status as Enabled or Disabled.

Variable	Value
Trunk	The trunk group that the switch port belongs to as specified in the Trunk Member fields on the MultiLink Trunk page.
Link	The current link state of the corresponding port as follows: Up: The port is connected and operational. Down: The port is not connected or is not operational.
Link Trap	Choose to control whether link up/down traps are sent to the configured trap receiver from the switch. The default setting is On.
Autonegotiation	Select the autonegotiation status.
Speed / Duplex	Choose the Ethernet speed that the port supports. The default setting is 10 Mb/s half-duplex when autonegotiation is disabled and 1000 Mb/s full-duplex for gigabit ports only.

Configuring Quality of Service (QoS) settings

Use the QoS configuration page to choose a queue.

Procedure steps

Step	Action
1	From the main menu, choose **Application > Quality of Service > Agent > Configuration**. The Agent page appears.
2	In the **Queue Set** list, make a selection.
3	Click **Submit**.

—End—

QoS Agent page item

Item	Description
Queue set	Choose the queue set to use. Values are from 1 to 4.

Displaying the QoS interface configuration

Use this procedure to filter the QoS interface queue on your BES1000 Series switch. Fields found in this page are described in the following Variable definitions table.

Procedure steps

Step	Action
1	From the main menu, choose **Application**.
2	Choose **Quality of Service**.
3	Choose **Interface Configuration**.

—End—

Interface Configuration page items

Item	Description
Set ID	The ID of the queue set.
Queue ID	The number of the hardware queue available. Four queues are available: • 1 • 2 • 3 • 4
General Discipline	The type of scheduling used. Four hardware priority queues are supported using Priority queuing and Weighted Round Robin.
Bandwidth %	The percentage of bandwidth applied to the queue.
Absolute Bandwidth	The amount of absolute bandwidth allocated measured in kilobits per second (Kb/s).
Bandwidth Allocation	The type of bandwidth used. Types are Absolute or Relative.
Service Order	Indicates the order that corresponds to the priority of the queues. Larger packets are transmitted before smaller packets.
Size (Bytes)	The size of the queue in bytes.

Configuring 802.1p priority settings

Use this procedure to configure 802.1P priority QoS settings on your BES1000 Series switch.

Procedure steps

Step Action

1 From the main menu, choose **Application > Quality of Service > Priority Queue Assignment**.

The 802.1p Priority Queue Assignment page appears.

2 In the **802.1p Priority Assignment (View By)** section, select from the list to choose an assignment order.

3 Click **Submit**.

4 In the **802.1p Priority Assignment Table** section, type the queue assignment associated with each priority.

5 Click **Submit**.

—End—

Variable definitions

Variable	Value
Queue Set	Choose the priority from 0 to 7, to map the queue set for the 802.1p-to-queue mapping.
Queue	Assign a queue number for the priority to configure the 802.1p-to-queue mapping.

Enabling Differentiated Services Code Point (DSCP) mapping

Use this procedure to enable DSCP to 802.1p mapping on your BES1000 Series switch.

Procedure steps

Step Action

1 From the main menu, choose **Application > Quality of Service > DSCP Mapping**.

2 To enable mapping, select Enabled from the **DSCP to 802.1p mapping** list.
OR
To disable mapping, select Disabled from the **DSCP to 802.1p mapping** list.

3 Click **Submit**.

—End—

Variable definitions

Variable	Value
Action	Provides a DSCP Mapping Modification area. Choose the 802.1p priority, Drop Precedence, and Service Class for the DSCP you want to modify.
DSCP	The attribute to use internally to determine the appropriate Layer 2 quality of service (QoS) mappings. The range of values is from 0 to 63.
802.1p Priority	Choose the 802.1p priority, from 0 to 7, to use with the specified DSCP value.
Drop Precedence	The relative importance of a packet compared to other packets in cases of congestion. The drop precedence values possible are: • Low Drop Precedence • High Drop Precedence
Service Class	Information regarding the characteristics and performance requirements that are defined for DSCP traffic.

Displaying DSCP queue assignment

Use this procedure to display DSCP queue assignments on your BES1000 Series switch.

Procedure steps

Step	Action
1	From the main menu, choose **Application > Quality of Service > DSCP Queue Assignment**.
2	In the **DSCP Queue Assignment (View by)** list choose a queue set number from one to four.
3	Click **Submit**.

—End—

Variable	Value
DSCP	The DSCP queue assignment.
Queue	The priority of the assigned DSCP value.

Enabling DSCP mapping

Use this procedure to enable DSCP to 802.1p mapping on your BES1000 Series switch.

Procedure steps

Step **Action**

1 From the main menu choose **Application > Quality of Service > DSCP Mapping**.

The DSCP Mapping page appears.

2 To enable QoS mapping globally, select the **DSCP to 802.1p mapping** check box.
OR
To disable QoS mapping globally, clear the **DSCP to 802.1p mapping** check box.

3 Click **Submit**.

—End—

Configuring MAC address learning

You can configure the aging time for MAC Addresses the BES1000 switch has learned.

Procedure steps

Step **Action**

1 From the main menu, choose **Configuration > MAC Address Table**.

The MAC Address Table page appears.

2 In the **Aging Time** box, type a value to indicate a timeout period.

3 In the **Select VLAN** list, make a selection.

4 Click **Submit** to enter the request.

—End—

Variable definitions

Variable	**Value**
MAC Address Setting	
Aging Time	The timeout period, in seconds, for aging out dynamically learned forwarding information. If the entry is inactive for a period of time that exceeds the specified aging time, the address is removed. ***Note:*** Nortel recommends that you use the default value of 300.
Select VLAN	Displays the current active VLANs found on the switch.
MAC Address Table	
MAC Address	Displays the source of the discovered MAC Address.
Source	
Port	Displays the port address.

Configuring MAC address-based security

Configure MAC address security to enable or disable security features on the switch.

Prerequisites

- Ensure that you do not enter the MAC address of the switch you are working on.
- After configuring the switch for MAC address-based security, you must use the Port Configuration page to enable the ports you want.

Procedure steps

Step Action

1 From the main menu, choose **Application > MAC Address Security > Security Configuration**.

The Security Configuration page appears.

2 On the **MAC Address Security** field, select **Enabled** or **Disabled** from the list.

3 Click **Submit**.

—End—

Configuring port lists

Configure the port list feature to create a list of ports, and add ports to or delete ports from each list.

Procedure steps

Step Action

1 From the main menu, choose **Application > MAC Address Security > Port List**.

The Port Lists page appears.

2 Click the **Action**icon in the row you want to include.

The Port Lists page appears.

3 To include ports on the list, select the Port check boxes.

4 To delete ports from the list, clear the Port check boxes.

5 Click **Submit**.

The Port List page reappears.

—End—

Finding MAC address tables

Use this procedure to find MAC address tables.

Procedure steps

Step Action

1 From the main menu, choose **Configuration > Find MAC Address**.

The Find MAC Address Table page appears.

2 Type the MAC Address for which you want to search.

3 Click **Submit** to enter the request.

If the address is located, it is shown in the first row of the MAC Address Table section. If the address is not located, the system response Not Found is shown to the right of the Find MAC Address input field.

—End—

Variable definitions

Variable	Value
Find MAC Address Setting	
Find MAC Address	Displays the unicast MAC address for which the bridge has either forwarding or filtering information.
MAC Address Table	
MAC Address	Displays the source of the discovered MAC Address.
Source	
Port	Displays the port address.

Adding MAC addresses

Add MAC addresses to the MAC address-based security system to allow access to the switch.

Prerequisites

- When you use the Security Table page, you instruct the switch to allow the specified MAC address access only through the specified port or port list.
- Be certain to include the MAC address for the default LAN router as an allowed source MAC address.

Procedure steps

Step Action

1 In the main menu, choose **Application > MAC Address Security > Security Table**.

It may take some time for the required addresses to be learned. Then, the Security Table page appears.

2 Complete the fields as described in the table.

—End—

Variable definitions

Variable	Value
Action	Use to delete a MAC address
MAC Address	Displays the MAC address
Allowed source	Displays the entry through which the MAC address is allowed.
MAC Address Security Table Entry Creation	Enter the MAC address you want to allow to access the switch. Select the Port or port list through which the MAC address is allowed

Deleting MAC DAs

Delete a MAC destination address you have filtered.

Procedure steps

Step	Action
1	From the main menu, choose **Application > MAC Address Security > DA MAC Filtering**. The DA MAC Filtering page appears.
2	In the **Destination MAC Address Filtering Table**, click the **Delete** icon for the entry you want to delete. A message appears prompting you to confirm your request.
3	Click **OK** to delete the target parameter configuration, or **Cancel** to quit without deleting.

—End—

Enabling security on ports

Enable or disable MAC address-based security to change access to the port.

Procedure steps

Step	Action
1	From the main menu, choose **Application > MAC Address Security > Port Configuration**.

2 In the port row of your choice, select the appropriate values from the lists. Refer to the variable definitions table below for details.

3 Click **Submit**.

—End—

Variable definitions

Variable	Value
Port	Lists each port on the switch from 1 to 50.
Trunk	Displays the MultiLink Trunk to which the port belongs. The field can be blank or can display 1 to 6 depending on the configuration.
Security	Enables or disables MAC address-based security on that port. ***Note:*** You must configure the port for MAC address-based security before enabling the security.
Auto-Learning	Enables or disables auto learning on that port.
MAC Address Number	Choose the address number for the MAC address.

Filtering MAC destination addresses

Filter MAC destination addresses to drop all packets from a specified MAC Destination Address (DA).

Procedure steps

Step Action

1 From the main menu, choose **Application > MAC Address Security > DA MAC Filtering**.

The DA MAC Filtering page appears.

2 In the **DA MAC Filtering Entry Creation** area, enter the MAC DA you want to filter.

You can list up to 10 MAC DAs to filter. The address format is xx-xx-xx-xx-xx-xx

ATTENTION

Ensure that you do not enter the MAC address of the management station.

3 Click **Submit**.

The system returns you to the DA MAC Filtering page with the new DA listed in the table.

—End—

Variable definitions

Variable	Value
Action	Use to delete a MAC DA you are filtering.
Index	The number of the MAC address
MAC Address The range is 1 -10.	Displays the MAC address.
DA MAC Filtering Entry Creation	Enter the MAC DA you want to filter.

Filtering MAC Multicast addresses

Use this procedure to filter MAC Multicast addresses.

Procedure steps

Step Action

1 From the main menu, choose **Application > IGMP > Unknown Multicast**.

The Unknown Multicast Filtering page appears.

2 In the **Unknown Multicast Filtering** box, choose a selection from the Enable / Disable list.

3 Click **Submit**.

4 To delete a MAC address, in the **MAC Multicast Filter Table** box, click the **Delete** icon.

5 In the **Allowed Address** box, type the Multicast MAC address to be forwarded.

6 Click **Submit**.

—End—

Variable definitions

Variable	Value
Unknown Multicast Filtering	
Enable / Disable	Choose the Enabled (ON) or Disabled (OFF) state.
MAC Multicast Filter Table	
Action	Allows you to remove the MAC address from the table.
Allowed Address	Identifies the MAC multicast address that is forwarded when the Unknown Multicast Filtering setting is enabled.
Add Multicast MAC Address	
Allowed Address	Type the MAC address to forward, even if Multicast Filtering is enabled. The Multicast MAC Address is made up of the 24 bit Internet Assigned Numbers Authority (IANA) Multicast Organizationally Unique Identifier (OUI) and the 23 least significant bits (LSB) of the Multicast IP Address. The format of the Multicast MAC is: xx-xx-xx-yy-yy-yy, where xx-xx-xx = IANA Multicast OUI and yy-yy-yy = the 23 least significant bits of the Multicast IP Address. ***Note:*** The most significant bit of the three octets is always 0.

Configuring Link Layer Discovery Protocol (LLDP) transmission properties

Use the LLDP configuration page to configure LLDP transmission properties.

Procedure steps

Step	Action
1	From the main menu, choose **Application > 802.1ab > LLDP Configuration**. The LLDP Configuration page appears.
2	Type in the interval for **Tx Interval** and **Tx Hold Multiplier**.
3	Type in the delay for **Re Init Delay** and **Tx Delay**.
4	Type an amount for a **Notification Interval**.
5	Click **Submit**.

—End—

LLDP Configuration page items

Variable	Value
Tx Interval	Sets the interval between successive transmission cycles.
Tx Hold Multiplier	Sets the multiplier for the Tx interval that computes the Time To Live value for the TTL TLV.
Re Init Delay	Sets the delay for the reinitialization attempt if the adminStatus is disabled.
Notification Interval	Sets the interval between successive transmissions of LLDP notifications.
Tx Delay	Sets the minimum delay between successive LLDP frame transmissions.

Configuring LLDP port status

Use the LLDP Local Management page to configure LLDP port status.

Procedure steps

Step	Action
1	From the main menu, choose **Application > 802.1ab > LLDP Local Management**. The LLDP Local Management page appears.
2	Select a status from the Admin Status field for each port.
3	Select a value from the Config Notification Enable field for each port.
4	Click **Submit**.

—End—

LLDP port status page items

Variable	Value
Link Layer Discovery Management	
Mgmt Addr	The string value used to identify the management address component associated with the local system. The purpose of this address is to contact the management entity.

Variable	Value
Mgmt AddrIfId	The integer value used to identify the interface number related to the management address component associated with the local system
Mgmt Addr OID	The Object Identifier (OID) value used to identify the type of hardware component or protocol entity associated with the management address advertised by the local system agent.
Link Layer Discovery Protocol Port System Data	
Port	The port number.
AdminStatus	The desired status for the administrator of the local LLDP agent: • TxOnly: the LLDP agent transmits LLDP frames on this port and does not store any information about the connected remote systems. • RxOnly: the LLDP agent receives, but does not transmit, LLDP frames on this port. • txAndRx: the LLDP agent transmits and receives LLDP frames on this port. • Disabled: the LLDP agent does not transmit or receive LLDP frames on this port. If the port receives remote systems information, which is stored in other tables before AdminStatus is disabled, the information ages out.
Config Notification Enable	Controls, for each port, whether notifications from the agent are enabled. • True: indicates that notifications are enabled. • False: indicates that notifications are disabled.

Configuring LLDP Tx - TLV transmit status

Use the LLDP Tx - TLV page to configure the transmit status for TLVs.

Procedure steps

Step	Action
1	From the main menu, choose **Application > 802.1ab > LLDP Tx - TLV**. The LLDP Tx - TLV page appears.
2	Select either **Enable** or **Disable** from each field you want to modify.
3	Click **Submit**.

—End—

LLDP Tx - TLV page items

Variable	Value
Port	The port number.
PortDesc	Enable or disable the Port Description TLV
SysName	Enable or disable the System Name TLV
SysDesc	Enable or disable the System Description TLV
SysCap	Enable or disable the System Capabilities TLV
MgmtAddr	Enable or disable the Management Address TLV

Configuring remote access

Use the Remote Access page to allow a user at a remote console terminal to communicate with the switch and configure the BES1000.

Procedure steps

Step Action

1 From the main menu, choose **Configuration > Remote Access**.

The Remote Access page appears.

2 In the **Access** list, choose a selection.

3 In the **Use List**, select either Yes or No.

4 Type an IP address in the **Allowed Source IP** field.

5 Type an IP address in the **Allowed Source Mask** field.

6 Click **Submit**.

—End—

Variable definitions

Variable	Values
SNMP	Specifies if SNMP access is allowed. SNMP access includes the Element Manager. To limit SNMP access to the IP addresses in the table, choose Yes in the Use List field.

Variable	Values
WEB Page	Specifies from what IP addresses access to the Web-based management system is allowed (access is always allowed). To limit Web access to the IP addresses in the table, choose Yes in the Use List field.
Allowed Source IP	Specifies up to 10 user-assigned host IP addresses that are allowed Web access and, if specified, SNMP access to the switch. The default value is 0.0.0.0 (no IP address assigned). The range is four-octet dotted-decimal notation, in which each octet is represented as a decimal value, separated by a decimal point.
Allowed Source Mask	Specifies up to 10 user-assigned allowed source address masks. The remote IP address is masked with the Allowed Source Mask and, if the resulting value equals the Allowed Source IP address, the connection is allowed. For example, a connection is allowed with the following settings: • Remote IP address = 192.0.1.5 • Allowed Source IP Address = 192.0.1.0 • Allowed Source Mask = 255.255.255. • The default value is 0.0.0.0 (no IP mask assigned) The range is four-octet dotted-decimal notation, in which each octet is represented as a decimal value, separated by a decimal point.

Configuring Simple Network Time Protocol (SNTP)

The SNTP feature allows the switch to set its internal clock based on periodic updates from a time server. With this feature, the system can obtain the time from any RFC 2030-compliant NTP/SNTP server.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > SNTP**.
2	In the **Primary Server Address** field type a primary IP address.
3	In the **Secondary Server Address** field type a secondary IP address.
4	In the **Sync Interval** field type a number.

5 In the **Synchronize Now** list make a selection.

6 In the **SNTP Status** list, make a selection.

7 Click **Submit**.

—End—

Variable definitions

Variable	Value
Primary Server Address	The IP address of the primary SNTP server.
Secondary Server Address	The IP address of the secondary SNTP server.
Sync Interval	Controls the frequency, in hours, that the device attempts to synchronize with the Network Time Protocol (NTP) servers.
Last Sync Source	Specifies the IP source address of the NTP server with which this device last synchronized.
Primary server sync failures	Specifies the number of times the switch failed to synchronize with the primary server address. However, synchronization with the secondary server address can still occur.
Secondary server sync failures	Specifies the number of times the switch failed to synchronize with the secondary server address.
Last Sync Time	Specifies the Coordinated Universal Time (UTC) when the device last synchronized with an NTP server.
Next Sync Time	Specifies the UTC at which the next synchronization is scheduled.
Current Time	Specifies the current UTC of the switch.

Variable	Value
Synchronize now	Choose Yes to perform an immediate synchronization with the SNTP server.
SNTP status	Controls whether the device uses the Simple Network Time Protocol (SNTP) to synchronize the device clock to the Coordinated Universal Time (UTC). If the value is disabled, the device does not synchronize its clock using SNTP. If the value is enabled, the device synchronizes shortly after boot time when network access becomes available, and periodically thereafter.

Using the Element Manager

The Element Manager is a client-based management application that runs on a Microsoft Windows computer. The Element Manager can connect to BES1000 Series switch devices over an IP network. It is used to configure, administer, and monitor BES1000 Series switch devices.

The following procedures describe how to use the Element Manager to view and configure the BES1000 Series switch.

Navigation

Connecting to a BES1000 Series switch using the Element Manager

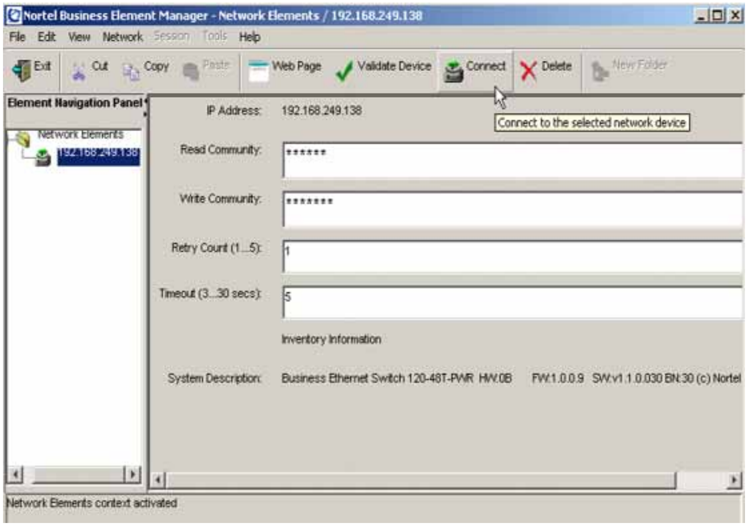
Use this procedure to connect to the BES1000 Series switch using the Element Manager.

Procedure steps

Step	Action
1	Start the Element Manager.
2	In the Navigation Pane, ensure that **Network Elements** is selected.
3	From the Element Manager menu, choose **Network > Find Network Elements > Business Ethernet Switch**. The Network Device Search dialog box appears.
4	Ensure that the Read and Write community strings are set properly. By default, the **Start of IP Address range** field is populated with 192.168.1.0 and the **End of IP Address range** field is populated with 192.168.255. If these values represent the private subnet of the SMB devices, click **OK**.

If these values are incorrect, enter the appropriate IP range.

Network Elements window



Nortel Business Element Manager - Network Elements / 192.168.249.138

IP Address: 192.168.249.138

Read Community: ******

Write Community: *******

Retry Count (1...5): 1

Timeout (3...30 secs): 5

Inventory Information

System Description: Business Ethernet Switch 120-48T-PWR HW:0B FW:1.0.0.9 SW:v1.1.0.030 BN:30 (c) Nortel

Network Elements context activated

If these values do not represent the private subnet of the SMB devices, update the IP address range fields to match the private subnet for your SMB devices, and then click **OK**. A progress bar appears in the Network Device Search dialog box during the search of the private subnet.

If no devices are found, an information dialog box appears to inform you of this fact.

5 From the **Network Elements Tree**, select the BES device.

6 Ensure that the **Read Community** and the **Write Community** strings are set properly.

7 From the **Element Manager** menu, click the **Connect** button, as shown in the above.

—End—

Working with configuration files

Access the Config/Image/Diag file to view information and to upload or download the configuration and image files.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Administration > General > File System**. The Config/Image/Diag file tab appears.
2	In the **TFTPserverIpAddress** field, enter the IP address of the TFTP server you want.
3	In the **BinaryConfigFileName** field, type a name for the file.
4	In the **ImageFileName** field, type a name for the image file.
5	In the **FwFileName(Diagnostics)** field, type the name for the diagnostics file.
6	In the **Action** field, click the option you want to upload or download.
7	Click **Apply**.
8	To reload the information on the page, click **Refresh**.

—End—

Variable definitions

Variable	Value
TFTPServerIpAddress	The IP address of the TFTP server for the configuration file, the image file, or the diagnostics firmware file. If not used, then the value is 0.0.0.0.
BinaryConfigFileName	Name of the configuration file.
ImageFileName	Name of the image file.
FwFileName(Diagnostics)	Specifies the diagnostics firmware file name.
Action	You can specify one of the following: • dnldConfig (download the configuration file) • dnldImage (download the image file) • upldConfig (upload the config file) • dnldDiagnostics (download the diagnostics firmware file)

Variable	Value
	The newly downloaded configuration, image, or diagnostics firmware file does not take effect until the next boot cycle of the device.
Status	This object is used to get the status of the latest file system action. The values that can be read are: • other -- if no action is taken since the boot • inProgress -- the operation is in progress • success -- the operation succeeded • fail -- the operation failed

Configuring EAPOL security

The switch is an Extensible Authentication Protocol Over LAN (EAPOL) Authenticator as defined in 802.1x standards. As an authenticator, it communicates with the user and end-station connected to its port over EAPOL (EAP over LAN) and uses Remote Authentication Dial-In User Service (RADIUS) to communicate with the Authentication Server. The result of the authentication determines the user's access on the port.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, select **Configuration > Data Services > EAPOL Security**.
2	Click the **enabled** or **disabled** option.
3	Click **Apply**.

—End—

Variable definitions

Variable	Value
EapolAdminState	Select the enabled (ON) or disabled (OFF) state.

BES1000 basic configuration using Element Manager

Use these procedures to manage the configuration of your BES1000 Series switch with the Element Manager.

Navigation

Configuring initial settings using the Quick Start feature

Use the Quick Start feature to configure initial settings by consolidating multiple setup pages into a single page. The Quick Start screen allows the administrator to configure the following information:

- Switch IP address
- Subnet mask

- Default gateway
- Management Vlan Id
- Boot mode

During the initial setup mode, all ports in the switch are assigned to the new default VLAN. The ManagementVlanId field only allows the user to assign an existing VLAN as the management VLAN.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, select **Configuration > System > Quick Start**. The Quick Start page appears.
2	Click **Apply** after making the required settings.

—End—

Variable definitions

Variable	Value
Switch IP Address	Specify a new IP address for the switch.
Subnet Mask	Specify a new subnet mask.
Default Gateway	Specify an IP address for the default gateway.
ManagementVlanId	The current management VLAN ID.
BootMode	Sets the BootP mode to use at the next switch boot: • bootpDisabled • bootpAlways • bootpOrDefaultIp • bootpOrLastAddress

Variable	Value
ReBoot	By default, the switch is in the Running mode. The reboot command initiates a hardware reset.
AuthenticationTraps	Click to enable or disable. When you enable, Simple Network Management Protocol (SNMP) traps are sent to trap receivers for all SNMP access authentication. When you disable, no traps are received. To view traps, from the Task Navigation Panel, choose Administration > Logs > Trap Log.

Setting the Element Manager Simple Network Management Protocol (SNMP) properties

The Element Manager communicates with the BES1000 Series switches using Simple Network Management Protocol (SNMP). The software is shipped with default values set for important communication parameters, such as the polling interval, timeout, and retry count. You can set the parameters after you open a switch to manage.

Use this procedure to set the SNMP properties.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > Administrator Access > SNMP**. The SNMP window appears in the information panel.
2	Type the appropriate information and select the appropriate check boxes.
3	Click **OK**.

—End—

Variable definitions

Variable	Value
Status Interval	The interval at which status information is gathered (default is 20 seconds).
Hotswap Detect every	The interval at which Element Manager detects the module information. The default is 1.
Enable	Enables (true) or disables (false) periodic polling of the device for updated status. If polling is disabled, the chassis status is updated only when the device view window is displayed in the information panel and you click Refresh current task on the Element Manager tool bar.
Retry Count	The number of times Element Manager sends the same polling request if a response is not returned.
Timeout	The length of each retry of each polling waiting period. When you access the device through a slow link, you may want to increase the timeout interval and then change the Retransmission Strategy to superlinear.
Trace	The trace field is used to enable and disable SNMP tracing. When Trace is selected, SNMP protocol data units (PDUs) are displayed.
Listen for Traps	When selected (enabled), Element Manager listens for traps from the device. **Note**: The Element Manager provides a default port to receive traps (port 162); therefore, you can select the Listen for Traps option for only one BES1000 Series switch device at a time. After the Business Element Manager binds port 162, it can receive all traps sent by all devices if the Business Element Manager work station is configured as the trap receiver.
Max Traps in Log	The specified number of traps that may exist in the trap log. The default is 500.
Trap Port	Specifies the UDP port to which Element Manager listens to receive SNMP traps. The default is 162.
Confirm row deletion	A dialog box appears (when checked) before deleting a row.

Configuring SNMP Trap Receivers

Use the Trap Receivers tab to view and configure a maximum of four trap receivers for the BES1000 Series switch.

Procedure steps

Step Action

1 From the **Task Navigation Panel**, choose **Administration > General > Hardware Inventory**.

The System tab appears in the information panel.

2 Click the **Trap Receivers** tab.

The Trap Receivers tab appears.

3 Click **Insert**.

The Chassis, Insert Trap Receivers dialog box appears.

4 Complete the fields as described in the Variable definitions table.

5 Click **Insert**.

The new entry appears in the Trap Receivers tab.

—End—

Variable definitions

Variable	Value
Index	Choose the number of the trap receiver to create or modify.
IPAddress	Type the network address for the SNMP manager that is to receive the specified trap.
Community	Type the community string for the specified trap receiver.

Deleting a Trap Receivers entry

Use this procedure to delete a Trap Receiver from the BES1000 Switch.

Procedure steps

Step Action

1 From the **Task Navigation Panel**, choose **Administration > General > Hardware Inventory.**

The System tab appears in the information panel.

2 Click the **Trap Receivers** tab.

The Trap Receivers tab appears.

3 In the **Trap Receivers** tab, select the entry to delete.

4 Click **Delete**.

—End—

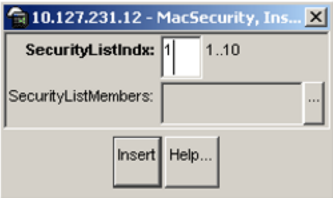
Adding items to the Security List

You can use the MacSecurity, Insert SecurityList dialog box to add items to the security list.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, select **Configuration > Data Services > MAC Address Security**. The General tab appears in the information panel.
2	Click the **Security List** tab. The Security List tab appears.
3	Click **Insert**. The MacSecurity, Insert Security List dialog box appears. See the "Security, Insert SecurityList dialog box" (page 94).

MacSecurity, Insert SecurityList dialog box



10.127.231.12 - MacSecurity, Ins...

SecurityListIndx: 1 1..10

SecurityListMembers:

Step	Action
4	In the **SecurityListIndx** field, enter a number.
5	In the **SecurityListMembers** box, click the button located on the right-hand side.
6	Click a port number.
7	Click **OK**.
8	Click **Insert**. The new entry appears in the Security List tab.

—End—

Deleting a Security List entry

Use the MAC Address Security option to delete a Security List entry.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, select **Configuration > Data Services > MAC Address Security**.
2	Click the **Security List** tab.
3	In the **Security List** tab, select the entry to delete.
4	Click **Delete**.

—End—

Configuring ports

You can use the Element Manager to view and edit port configurations on a BES1000 Series switch.

Navigation

- "Viewing and editing port configurations" (page 95)

Viewing and editing port configurations

Use this procedure to view the basic configuration and status of a single port.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > System > Port**. The switch view appears in the information panel.
2	Select the single or multiple ports that you want to view or edit. To select multiple ports, press **Ctrl**, and select the ports that you want to view or edit. A yellow outline appears around the selected ports, and the information panel updates with the information for all selected ports.
3	Click the tab for the port information that you want to view or edit. (Interface, PoE, or EAPOL).

—End—

Interface tab

The Interface tab shows the basic configuration and status of a single port.

Variable definitions

Variable	Value
Index	Specifies the port number.
Alias	Specifies a name for the port.
Descr	The type of switch and number of ports.
Type	The media type of this interface.
Mtu	The size of the largest packet, in octets, that can be sent on the interface.
PhysAddress	The MAC address assigned to a particular interface.
AdminStatus	The current administrative state of the device, which can be one of the following: • up • down When a managed system is initialized, all interfaces start with AdminStatus in the up state. AdminStatus changes to the down state (or remains in the up state) as a result of either management action or the configuration information available to the managed system.
OperStatus	The current operational state of the interface, which can be one of the following: • up • down • testing If AdminStatus is up, then OperStatus should be up if the interface is ready to transmit and receive network traffic. If AdminStatus is up, the OperStatus should remain in the down state if and only if a physical or other network-impeding condition prevents the link from entering the UP state. The testing state indicates that no operational packets can be passed.
LastChange	The time at which the interface enters its current operational state.
LinkTrap	Specifies whether linkUp/linkDown traps should be generated for this interface

Variable	Value
AdminSpeed	Administrative setting for port speed.
AutoNegotiate	Enables or Disables auto negotiation.
AdminDuplex	Administrative setting for full- or half-duplex speed.
OperDuplex	The current duplex mode of the port (half-duplex or full-duplex).
OperSpeed	The current operating speed of the port.

PoE tab

The **PoE** tab displays the power information for the selected port.

Variable definitions

Variable	Value
AdminEnable	Use to enable or disable PoE on this port. By default, the value of PoE is True.
DetectionStatus	Displays the operational status of the power-device detecting mode on the specified port: • disabled: detecting function disabled. • searching: detecting function is enabled, and the system searches for a valid powered device on this port. • deliveringPower: detection finds a valid powered device and the port delivers power. • fault: power-specific fault detected on port. • test: detecting device in test mode. • otherFault: detecting function is idle due to fault.

EAPOL tab

The **EAPOL** tab displays the authentication information for the selected port.

Variable definitions

Variable	Value
AdminStatus	Use to control the port authentication state: • forceUnauthorized: causes the port to remain in the unauthorized state. • auto: enables authentication and causes the port to begin operating in the unauthorized state.

Variable	Value
	- forceAuthorized: causes the port to transition to the authorized state without requiring any authentication exchange.
OperStatus	Displays the operational status of the specified port. It can be one of the following: authorized unauthorized
PortReauthenticateNow	Use to reauthenticate the port.

Configuring LLDP

Use the 802.1ab option to configure the Link Layer Discovery Protocol (LLDP) (IEEE 802.1ab).

Procedure steps

Step Action

1 From the **Task Navigation Panel**, choose **Administration > Diagnostics > 802.1ab**.

2 Click the tab related to the information that you want to view.

—End—

802.1ab - Globals tab

With the 802.1ab - Globals tab, you can configure LLDP transmit properties and view remote table statistics.

Variable definitions

Variable	Value
lldpMessageTxInterval	Sets the interval between successive transmission cycles.
lldpMessageTxHoldMultiplier	Sets the multiplier for tx-interval used to compute the Time To Live value for the TTL TLV.
lldpReinitDelay	Sets the delay for a reinitialization attempt if the adminStatus is disabled.
lldpTxDelay	Sets the minimum delay between successive LLDP frame transmissions.
lldpNotificationInterval	Sets the interval between successive transmissions of LLDP notifications.

Variable	Value
RemTablesLastChangeTime	The value of the sysUpTime object (defined in Internet Engineering Task Force (IETF) RFC 3418 at the time an entry is created, modified, or deleted in tables associated with the lldpRemoteSystemsData objects and all LLDP extension objects associated with remote systems. A Network Management Software (NMS) can use this object to reduce polling of the lldpRemoteSystemsData objects.
RemTablesInserts	The number of times the complete set of information advertised by a particular media server access point (MSAP) has been inserted into tables contained in lldpRemoteSystemsData and lldpExtensions objects. The complete set of information received from a particular MSAP should be inserted into related tables. If partial information cannot be inserted for a reason, such as lack of resources, all of the information should be removed. This counter must be incremented only once after the complete set of information is successfully recorded in all related tables. Any failures during the insertion of the information set which result in deletion of previously inserted information should not trigger any changes in lldpStatsRemTablesInserts because the insert is not completed yet, or in lldpStatsRemTablesDeletes because the deletion would only be a partial deletion. If the failure is the result of lack of resources, the lldpStatsRemTablesDrops counter must be incremented once.
RemTablesDeletes	The number of times the complete set of information advertised by a particular MSAP has been deleted from tables contained in lldpRemoteSystemsData and lldpExtensions objects. This counter should be incremented only once when the complete set of information is completely deleted from all related tables. Partial deletions, such as the deletion of rows associated with a particular MSAP from some tables but not from all tables, are not allowed, and thus should not change the value of this counter.

Variable	Value
RemTablesDrops	The number of times the complete set of information advertised by a particular MSAP could not be entered into tables contained in lldpRemoteSystemsData and lldpExtensions objects because of insufficient resources.
RemTablesAgeouts	The number of times the complete set of information advertised by a particular MSAP has been deleted from tables contained in lldpRemoteSystemsData and lldpExtensions objects because the information timeliness interval expired. This counter should be incremented only once when the complete set of information is completely invalidated (aged out) from all related tables. Partial aging, similar to the deletion case, is not allowed, and thus, should not change the value of this counter.

802.1ab - Port tab

With the 802.1ab - Port tab, you can set the optional TLVs to include in the LLPDUs transmitted by each port.

- true: indicates that notifications are enabled
- false: indicates that notifications are disabled

Variable definitions

Variable	Value
PortNum	Port number.
AdminStatus	The administratively desired status of the local LLDP agent: • txOnly: the LLDP agent transmits LLDP frames on this port and does not store any information about the remote systems connected. • rxOnly: the LLDP agent receives but does not transmit LLDP frames on this port. • txAndRx: the LLDP agent transmits and receives LLDP frames on this port. • disabled: the LLDP agent does not transmit or receive LLDP frames on this port. If the port receives remote systems information which is stored in other tables before AdminStatus becomes disabled the information ages out.

Variable	Value
NotificationEnable	Controls, on a per port basis, whether notifications from the agent are enabled: true: indicates that notifications are enabled false: indicates that notifications are disabled
TLVsTxEnable	Sets the optional Management time, length, value (TLV) to be included in the transmitted LLDPDUs: • portDesc: Port Description TLV • sysName: System Name TLV • sysDesc: System Description TLV • sysCap: System Capabilities TLV

802.1ab - TX Stats tab

With the 802.1ab - TX Stat tab, you can view LLDP transmit statistics by port.

Variable definitions

Variable	Value
PortNum	Port number.
FramesTotal	The number of LLDP frames transmitted by this LLDP agent on the indicated port.

802.1ab - RX Stats tab

With the 802.1ab - RX Stats tab, you can view LLDP receive statistics by port.

Variable definitions

Variable	Value
PortNum	Port number.
FramesDiscardedTotal	The number of LLDP frames received on the port and discarded for any reason. This counter can provide an indication that LLDP header formatting problems may exist with the local LLDP agent in the sending system, or that LLDPDU validation problems may exist with the local LLDP agent in the receiving system.
FramesErrors	The number of invalid LLDP frames received on the port while the LLDP agent is enabled.
FramesTotal	The number of valid LLDP frames received on the port while the LLDP agent is enabled.
TLVsDiscardedTotal	The number of LLDP TLVs discarded for any reason on the port.

Variable	Value
TLVsUnrecognizedTotal	The number of LLDP TLVs received on the given port that are not recognized by this LLDP agent on the indicated port. An unrecognized TLV is referred to as the TLV whose type value is in the range of reserved TLV types (000 1001 - 111 1110) in Table 9.1 of IEEE 802.1AB-2004. An unrecognized TLV can be a basic management TLV from a later LLDP version.
AgeoutsTotal	The counter that represents the number of age-outs that occurred on a given port. An age-out is the number of times the complete set of information advertised by a particular MSAP has been deleted from tables contained in lldpRemoteSystemsData and lldpExtensions objects because the information timeliness interval expired. This counter is similar to lldpStatsRemTablesAgeouts, except that the counter is on a per port basis. This enables NMS to poll tables associated with the lldpRemoteSystemsData objects and all LLDP extension objects associated with remote systems on the indicated port only. This counter is set to zero during agent initialization. When the admin status of a port status changes from disabled to rxOnly, txOnly, or txAndRx, the counter associated with the same port is reset to zero. The agent also flushes all remote system information associated with the same port. This counter is incremented only once when the complete set of information is invalidated (aged out) from all related tables on a particular port. Partial aging is not allowed, and thus, does not change the value of this counter.

802.1ab - Local System tab

With the 802.1ab - Local System tab, you can view LLDP properties for the local system.

Variable definitions

Variable	Value
ChassisIdSubtype	The type of encoding used to identify the local system chassis: • chassisComponent • interfaceAlias • portComponent • macAddress • networkAddress • interfaceName • local
ChassisId	Chassis ID.
SysName	Local system name.
SysDesc	Local system description.

Variable	Value
SysCapSupported	Identifies the system capabilities supported on the local system.
SysCapEnabled	Identifies the system capabilities that are enabled on the local system.

802.1ab - Local Port tab

With the 802.1ab - Local Port tab, you can view LLDP port properties for the local system.

Variable definitions

Variable	Value
PortNum	Port number.
PortIdSubtype	The type of port identifier encoding used in the associated PortId object.
PortId	The string value used to identify the port component associated with a given port in the local system.
PortDesc	The string value used to identify the port description of the 802 LAN station associated with the local system. If the local agent supports IETF RFC 2863, PortDesc object should have the same value of ifDescr object.

802.1ab - Local Management tab

With the 802.1ab - Local Management tab, you can view LLDP management properties for the local system.

Variable definitions

Variable	Value
AddrSubtype	The type of management address identifier encoding used in the associated Addr object.
Addr	The string value used to identify the management address component associated with the local system. The purpose of this address is to contact the management entity.
AddrIfId	The integer value used to identify the interface number regarding the management address component associated with the local system.
AddrOID	The OID value used to identify the type of hardware component or protocol entity associated with the management address advertised by the local system agent.
AddrPortsTxEnable	Identifies the ports on which the local system management address TLVs are transmitted in the LLPDUs.

802.1ab - Neighbor tab

With the 802.1ab - Neighbor tab, you can view LLDP properties for the remote system.

Variable definitions

Variable	Value
TimeMark	The TimeFilter for this entry. The TimeFilter is used for the index to a table. The TimeFilter lets an application download only those rows changed since a particular time. A row is considered changed if the value of any object in the row changes or if the row is created or deleted. For more information about TimeFilter, see the textual convention within the IETF RFC 2021.
LocalPortNum	Identifies the local port on which the remote system information is received.
Index	An arbitrary local integer value used by this agent to identify a particular connection instance, unique only for the indicated remote system. An agent is encouraged to assign increasing index values to new entries, starting with one, after each reboot. It is unlikely that the Index wraps between reboots.
ChassisIdSubtype	The type of encoding used to identify the remote system chassis: • chassisComponent • interfaceAlias • portComponent • macAddress • networkAddress • interfaceName • local
ChassisId	Remote chassis ID.
SysCapSupported	Identifies the system capabilities supported on the remote system.
SysCapEnabled	Identifies the system capabilities that are enabled on the remote system.
SysName	Remote system name.
SysDesc	Remote system description.
PortIdSubtype	The type of encoding used to identify the remote port.
PortId	Remote port ID.
PortDesc	Remote port description.

802.1ab - Neighbor Mgmt Address tab

With the 802.1ab - Neighbor Mgmt Address tab, you can view LLDP management properties for the remote system.

Variable definitions

Variable	Value
TimeMark	The TimeFilter for this entry. See the TimeFilter textual convention in IETF RFC 2021 for details about TimeFilter.
LocalPortNum	Identifies the local port on which the remote system information is received.
Index	An arbitrary local integer value used by this agent to identify a particular connection instance, unique only for the indicated remote system. An agent is encouraged to assign monotonically increasing index values to new entries, starting with one, after each reboot. It is unlikely that the Index wraps between reboots.
AddrSubtype	The type of encoding used in the associated Addr object.
Addr	The management address associated with the remote system.
AddrIfSubtype	Identifies the numbering method used for defining the interface number associated with the remote system.
AddrIfId	The integer value used to identify the interface number regarding the management address component associated with the remote system
AddrOID	The OID value used to identify the type of hardware component or protocol entity associated with the management address advertised by the remote system agent.

Configuring rate limiting

You can view the current forwarding rate of broadcast and multicast packets, and configure the BES1000 Series switch to limit the forwarding rate of broadcast and multicast packets on each interface. When you configure rate limiting, you set the percentage of port bandwidth allowed for a packet type. When the threshold is exceeded, additional packets are discarded.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > System > Port**.
2	Click a port to begin.
3	Click the **RateLimit** tab.

4 In the **TrafficType** field click the column header to toggle between multicast and broadcast types.

5 In the **AllowedRate** field double-click to select a number to indicate the percentage of bandwidth allowed for multicast or broadcast packets.

6 In the **Enable** field double-click to select a value to assign.

7 Click **Apply**.

8 Click **Reset** to update the page.

—End—

Rate Limit tab

Variable	Value
TrafficType	The traffic type: multicast or broadcast.
AllowedRate	The percentage, if any, of bandwidth allowed for forwarding the packet type specified in the TrafficType field. The . When the threshold, which is in the range from zero to ten percent, is exceeded, any additional packets are discarded. To avoid broadcast storms (when the volume of a particular packet type is extreme, placing severe strain on the network), set the forwarding rate of the packet type to not exceed a lower percentage of the total available bandwidth.
Enable	Enables (true) or disables (false) rate limiting for the specified traffic type on the port.

Creating a port-based VLAN

Use this procedure to create port-based VLANs for your BES1000 Series switch.

Procedure steps

Step Action

1 From the **Task Navigation Panel**, choose **Configuration > Data Services > VLAN/IGMP**.

The VLAN tab appears.

2 Click **Insert**.

The VLAN, Insert VLAN dialog box appears.

3 Type the VLAN ID.

The value can be from 1 to 4094, if it is not already in use. (The default VLAN has a VID=1.)

4 Type the VLAN name (optional).

If no name is entered, a default name is created.

5 Click **Insert**.

The new VLAN appears in the **VLAN** tab.

6 Double-click on the **Port Members** field.

The PortMembers dialog box appears.

7 Click the ports you want to include in the VLAN.

8 Click **OK**.

9 Click **Apply**.

—End—

Modifying a VLAN

After a VLAN is created, you can modify the VLAN properties from the **VLAN** tab.

Procedure steps

Step **Action**

1 From the **Task Navigation Panel**, choose **Configuration > Data Services > VLAN/IGMP**.

2 Choose **Configuration**.

3 Choose **Data Services**.

4 Choose **VLAN/IGMP**.

The Data Services VLAN tab displays the properties of the existing VLANs. See the "VLAN tab" (page 153) for a description of the tab fields.

—End—

Deleting a VLAN

Use this procedure to delete VLAN settings from your BES1000 Series switch.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > Data Services > VLAN/IGMP**. The VLAN tab appears.
2	Select the VLAN that you want to delete.
3	Click **Delete**. Element Manager deletes the selected VLAN. **Note**: You cannot delete the default VLAN, which is VLAN #1.

—End—

Configuring Link Aggregation Control Protocol (LACP) ports

Use this procedure to configure LACP ports for your BES1000 Series switch.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > System > Port**.
2	Click a port. The Interface tab appears.
3	Choose the **LACP** tab. The LACP tab appears.
4	Set the desired values for the configurable parameters.
5	Click **Apply**.

—End—

Variable definitions

Variable	Value
AdminEnabled	Enables or disables LACP on the port.

Variable	Value
OperEnabled	Displays the current operational status of LACP on the port. A value of true means the port is participating in LACP. A value of false means the port is not participating in LACP.
ActorAdminKey	The current administrative value of the Key for the Aggregator.
ActorOperKey	The current operational value of the Key for the Aggregator.
AttachedAggID	The identifier value of the Aggregator to which this Aggregation Port is currently attached. Zero indicates that the Aggregation Port is not currently attached to an Aggregator. This value is read-only.
ActorPort	The port number locally assigned to the Aggregation Port.
ActorPortPriority	The priority value assigned to this Aggregation Port. This 16-bit value is read-write.
ActorAdminState	A string of 8 bits corresponding to the administrative values of Actor_State.
TrunkId	The trunk ID.
PartnerOperPort	The operational port assigned to this aggregation.

BES1000 advanced features configuration using Element Manager

Use these procedures to manage the configuration of your BES1000 Series switch with the Element Manager.

Prerequisites

- Install the Element Manager before you perform these procedures.

Navigation

Configuring Simple Network Time Protocol (SNTP)

The SNTP feature allows the switch to set its internal clock based on periodic updates from a time server. With this feature, the system can obtain the time from any RFC 2030-compliant NTP/SNTP server.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > System > SNTP**.
2	In the **PrimaryServerAddress** field type a primary IP address.

3. In the **SecondaryServerAddress** field type a secondary IP address.
4. In the **State** field click the option you want.
5. In the **SyncInterval** field type a number.
6. In the **ManualSyncRequest** field click the **synchronizeNow** option to perform manual synchronization.
7. Click **Apply**.

—End—

Variable definitions

Variable	Value
PrimaryServerAddress	The IP address of the primary SNTP server.
SecondaryServerAddress	The IP address of the secondary SNTP server.
State	Controls whether the device uses the Simple Network Time Protocol (SNTP) to synchronize the device clock to the Coordinated Universal Time (UTC). If the value is disabled, the device does not synchronize its clock using SNTP. If the value is enabled, the device synchronizes shortly after boot time when network access becomes available, and periodically thereafter.
SyncInterval	Controls the frequency, in hours, that the device attempts to synchronize with the Network Time Protocol (NTP) servers.
ManualSyncRequest	Lets you perform an immediate synchronization with the SNTP server.
LastSyncTime	Specifies the Coordinated Universal Time (UTC) when the device last synchronized with an NTP server.
LastSyncSource	Specifies the IP source address of the NTP server with which this device last synchronized.
NextSyncTime	Specifies the UTC at which the next synchronization is scheduled.
PrimaryServerSyncFailures	Specifies the number of times the switch failed to synchronize with the primary server address. However, synchronization with the secondary server address can still occur.
SecondaryServerSyncFailures	Specifies the number of times the switch failed to synchronize with the secondary server address.
CurrentTime	Specifies the current UTC of the switch.

Configuring Internet Group Management Protocol (IGMP) snooping

Use this procedure to configure IGMP snooping for your BES1000 Series switch.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > Data Services > VLAN/IGMP**. The VLAN tab appears.
2	Click the **IGMP Snoop** tab. The IGMP Snoop tab appears.
3	To enable IGMP on a VLAN, double-click the **SnoopEnable** field, and choose **true**.
4	To disable IGMP on a VLAN, double-click the **SnoopEnable** field, and choose **false**.
5	Click **Apply**.

—End—

Enabling Multicast filtering

Use this procedure to enabling Multicast filtering for your BES1000 Series switch.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > Data Services > VLANS/IGMP**. The VLAN tab appears.
2	Click the **Unknown Multicast Filtering** tab. The Unknown Multicast Filtering tab appears.
3	Select the **UnknownMulticastFilteringEnabled** check box.
4	Click **Apply**.

—End—

Configuring MAC address learning

Use this procedure to configure the aging time for MAC addresses that the BES1000 Series switch has learned.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > System > MAC Address Table**.
2	Click the **Setting** tab.
3	Type a value in the **AgingTime** field to indicate the timeout period.
4	Click **Apply**.

—End—

Variable definitions

Variable	Value
LearnedEntryDiscards	The total number of Forwarding Database entries that are discarded due to a lack of space to store them in the Forwarding Database. An increasing count indicates the Forwarding Database is filling up regularly. A significant count that does not increase indicates that the problem occurs but is not persistent.
Aging Time	The timeout period, in seconds, for aging out dynamically learned forwarding information. If the entry is inactive for a period of time that exceeds the specified aging time, the address is removed. **Note**: Nortel recommends that you use the default value of 300.

Filtering MAC multicast addresses

Use this procedure to add MAC multicast filter addresses for your BES1000 Series switch.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > Data Services > VLAN/IGMP**. The VLAN tab appears.

2 Click the **MAC Multicast Filter Table** tab.

The MAC Multicast Filter Table tab appears.

3 Click **Insert**.

The VLAN_IGMP, Insert MAC Multicast Filter Table dialog box appears.

4 Type a MAC address in the AllowedAddressMacAddr field.

5 Click Insert.

The new AllowedAddressMacAddr appears in the MAC Multicast Filter Table.

—End—

Deleting a MAC Multicast address

Use this procedure to delete entries in the MAC multicast filter table on your BES1000 Series switch.

Procedure steps

Step Action

1 From the **Task Navigation Panel**, choose **Configuration > Data Services > VLAN/IGMP**. The VLAN tab appears.

2 Click the **MAC Multicast Filter Table** tab.

The MAC Multicast Filter Table tab appears.

3 In the table select the entry that you want to delete.

4 Click **Delete**.

—End—

Configuring Quality of Service (QoS)

Use these procedures to configure the QoS on your BES1000 Series switch using the Element Manager.

Navigation

- "Configuring a queue set " (page 116)
- "Filtering the QoS interface queue" (page 116)
- "Configuring 802.1p Priority Settings" (page 117)

- "Enabling DSCP mapping" (page 118)
- "Configuring DSCP mapping" (page 118)
- "Filtering DSCP queue assignments" (page 119)

Configuring a queue set

Use the QoS Agent Configuration tab to choose a queue set.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > Data Services > QoS > QoS Agent**.
2	Choose a **QueueSet** option.
3	Click **Apply**.

—End—

Variable definitions

Variable	Value
QueueSet	Choose a value from one to four.

Filtering the QoS interface queue

Use this procedure to filter the QoS interface queue on your BES1000 Series switch using the Element Manager.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > Data Services > QoS > QoS**. The Interface Queue tab appears.
2	Click **Filter**.
3	Enter the required criteria to view more specific information.

—End—

Variable definitions

Variable	Value
SetId	An index that uniquely identifies a specific queue set. Members of the queue set all have the same set ID. The queue set identified with this value is associated with an interface through the QueueSet object in the AssignmentTable.
QueueId	The number of the hardware queue available. Four queues are available: • 1 • 2 • 3 • 4
Discipline	Identifies the queuing discipline that is associated with the specified queue; the queuing can be priority Queueing or WeightedRoundRobin.
Bandwidth%	The percentage of bandwidth applied to the queue.
AbsBandwidth	The amount of absolute bandwidth allocated measured in kilobits per second (Kb/s).
BandwidthAllocation	The type of bandwidth used. Types are Absolute or Relative.
ServiceOrder	Indicates the priority order that corresponds to the order in which the queues are serviced. Larger packets are transmitted before smaller packets.
Size	The size of the queue in bytes.

Configuring 802.1p Priority Settings

Use this procedure to configure 802.1P priority QoS settings on your BES1000 Series switch using the Element Manager.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > Data Services > QoS > QoS**. The Interface Queue tab appears.
2	Choose the **802.1p Priority Q Assign** tab. The 802.1p Priority Q Assign tab appears.

3 Type the queue number that represent the priority you want to apply.

4 Click **Apply**.

—End—

Variable definitions

Variable	Value
Qset	The integer ID of the queue set.
802.1pPriority	The 802.1p priority from zero to seven.
Queue	The specific hardware queue. Values are from one to four.

Enabling DSCP mapping

Use this procedure to enable DSCP to 802.1p mapping on your BES1000 Series switch using the Element Manager.

Procedure steps

Step Action

1 From the **Task Navigation Panel**, choose **Configuration > Data Services > QoS > QoS**.

The Interface Queue tab appears.

2 Click the **DSCP Mapping Global** tab.

3 To enable QoS mapping, select the **DscpTo802.1pMappingEnabled** check box.
OR
To disable QoS mapping, clear the **DscpTo802.1pMappingEnabled** check box.

4 Click **Apply**.

—End—

Configuring DSCP mapping

Use this procedure to configure DSCP mapping on your BES1000 Series switch using the Element Manager.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > Data Services > QoS > QoS**. The Interface Queue tab appears.
2	Choose the **DSCP Mapping** tab. The DSCP Mapping tab appears.
3	Double-click the **802.1pPriority** field to select a priority value from the list.
4	Double-click the **DropPrecedence** field to select a drop precedence value from the list.
5	Click **Apply**.

—End—

Variable	Value
Dscp	The attribute to use internally to determine the appropriate Layer 2 quality of service (QoS) mappings. The DSCP range of values is from 0 to 63.
802.1pPriority	Choose the 802.1p priority, from 0 to 7, to use with the specified DSCP value.
DropPrecedence	The relative importance of a packet compared to other packets in cases of congestion. The following are possible drop precedence values: • Low Drop Precedence • High Drop Precedence

Filtering DSCP queue assignments

Use this procedure to filter DSCP queue assignments on your BES1000 Series switch using the Element Manager.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > Data Services > QoS > QoS**.

The Interface Queue tab appears.

2 Choose the **DSCP Q Assign** tab.

The DSCP Q Assign tab appears showing DSCP Queue Assign information.

3 Click **Filter**.

4 Enter the required criteria to view more specific information.

—End—

Variable	**Value**
Qset	The integer ID of the Queue set.
Dscp	The Dscp value. The range is from 0 to 63.
Queue	The specific hardware queue. Values are from one to four.

BES1000 administration

Use these procedures to manage the administration of your BES1000 Series switch.

Navigation

Changing a PC IP address

Use the procedures in this section to change the IP address of your PC.

For users of systems other than Windows 2000™ or Windows XP™, refer to your system documentation for information about changing the PC IP address.

Procedure steps to change the IP address of a Windows 2000 PC

Step	Action
1	From the PC start menu, choose **Start > Settings > Network > Dial-up Connections**.
2	For the IP address you want to change, right-click the network connection icon, and then click **Properties**.
3	In the list of components used by this connection on the **General** tab, select **Internet Protocol (TCP/IP)**, and then click **Properties**.

4 In the Internet Protocol (TCP/IP) Properties dialog box, click **Use the following IP address**. Then type your intended IP address, subnet mask, and default gateway in the provided boxes.

5 Click **OK** to save the changes.

—End—

Procedure steps to change the IP address of a Windows XP PC

Step	Action
1	From the PC start menu, choose **Start > Control Panel > Network Connections**.
2	For the IP address you want to change, right-click the network connection icon, and then click **Properties**.
3	In the list of components used by this connection on the **General** tab, select **Internet Protocol (TCP/IP)**, and then click **Properties**.
4	In the Internet Protocol (TCP/IP) Properties dialog box, click **Use the following IP address**. Then type your intended IP address, subnet mask, and default gateway in the provided boxes.
5	Click **OK** to save the changes.

—End—

System Administration using the Web-based user interface

Use these procedures to manage the administration of your BES1000 Series switch using the Web management interface.

Navigation

- "Using the virtual cable tester" (page 123)
- "Running a copper cable extended test" (page 124)
- "Viewing Link Aggregation Control Protocol (LACP) Bridge configuration" (page 125)
- "Viewing LACP port statistics" (page 126)
- "Displaying multicast group membership" (page 127)
- "Viewing the system log" (page 128)
- "Viewing statistics" (page 129)

- "Viewing port statistics" (page 129)
- "Zeroing ports" (page 131)
- "Viewing all port errors" (page 131)
- "Viewing interface statistics" (page 132)
- "Viewing Ethernet error statistics" (page 133)
- "Viewing transparent bridging statistics" (page 135)
- "Viewing VLAN port information" (page 136)
- "RMON Fault threshold page" (page 137)
- "Viewing the RMON fault event log" (page 137)
- "Viewing RMON Ethernet statistics" (page 138)
- "Viewing RMON history" (page 139)
- "Viewing LLDP local system data" (page 140)
- "Displaying LLDP Neighbor properties" (page 142)
- "Displaying LLDP Neighbor Management properties" (page 143)
- "Displaying LLDP statistics" (page 144)
- "Configuring switch security" (page 60)

Using the virtual cable tester

Use this procedure to test cable through the Web-based management interface.

> ***Note:*** The port is disabled during the test.

Procedure steps

Step	Action
1	From the main Web management interface menu, choose **Device Monitoring >Virtual Cable Tester**. The Virtual Cable Tester page appears.
2	In the port row you want to test, click **Test**.

—End—

Variable definitions

Variable	Value
Port	The port being tested.
Test Result	Indicates whether the cable is functioning, opens, shorts, has impedance mismatch, or is not attached.
Cable Fault Distance	Indicates the distance to the fault. Accuracy is within one meter.
Last Update	Displays the timestamp of the last diagnostic test performed. An empty row indicates that a test is not executed on that interface.

Running a copper cable extended test

Use this procedure to run a copper cable extended test through the Web-based management interface. These tests run only on a port that has a speed of 1G, when the link is up, and only reads the data from registers. Prior to running a test, ensure the port is in full-duplex mode, with a speed of 1Gbps.

If a cable fails, this diagnostic provides no information about why the network link is not established. This page displays results of passive tests that are run on the wire. The most common results are:

- Polarity – crossed pairs, in which the polarity is reversed at one end
- Pair Swap – split pairs, in which wires from two different pairs are used
- Skew between pairs – delay in arrival time of data measured in nanoseconds, which results from the different twist ratios.

Procedure steps

Step Action

1 From the main menu, choose **Device Monitoring > Virtual Cable Tester**.

The Virtual Cable Tester page appears.

2 In the row that you want to check, click the **Advanced** icon.

The Copper Cable Extended Test page appears.

3 Click **Test**.

—End—

Variable definitions

Variable	Value
Pair	The pair being tested.
Distance to Fault	Indicates the distance to the fault.
Status	Indicates
Cable length	The result of the test performed using the Digital Signal Processing (DSP) method.
Channel	Indicates the channel being tested.
Polarity	Indicates the polarity is reversed at one end.
Pair Skew	Indicates the delay in arrival time of data.

Viewing Link Aggregation Control Protocol (LACP) Bridge configuration

View the LACP bridge configuration to monitor LACP activity. Fields found in this page are described in the following Variable definitions table.

Procedure steps

Step Action

1 From the main menu, choose **Application**.

2 Choose **Link Aggregation Protocol**.

3 Choose **Bridge Configuration**.

The Bridge Configuration page appears.

—End—

Variable definitions

Variable	Value
Aggregator ID	The unique identifier that the local system assigns to this aggregator. This attribute identifies an aggregator instance among the subordinate managed objects of the containing object.
Trunk ID	The ID of the trunk associated with this aggregator.
Operate	Indicates whether the aggregation port can aggregate or can operate only as an individual link.

Variable	Value
Actor Lag ID	The combined information of Actor System Priority, Actor System ID, and Actor Operational Key in Actor SystemPriority-ActorSystemID-ActorOperationalKey hexadecimal format.
Actor System ID	The MAC address value that defines the value of the System ID for the system that contains this aggregation port.
Actor Operational Key	The current operational value of the key for the aggregation port.
Actor Administrative Key	The current administrative value of the key for the aggregation port.
Partner Lag ID	The combined information of Partner System Priority, Partner System ID, and Partner Operational Key in PartnerSystemPriority-PartnerSystemID-PartnerOperationalKey hexadecimal format.
Partner System Priority	The value that indicates the priority value associated with the Partner System ID.
Partner System ID	The MAC address value consisting of the unique identifier for the current protocol partner of this aggregator.
Partner Operational Key	The current operational value of the key for the current protocol partner of this aggregator.

Viewing LACP port statistics

View LACP port statistics to monitor a trunk group. Fields found in this page are described in the following Variable definitions table.

Procedure steps

Step	Action
1	From the main menu, choose **Device Monitoring**.
2	Choose **Statistics**.
3	Choose **Link Aggregation Port Statistics**. The Link Aggregation Port Statistics page appears.

—End—

Variable definitions

Variable	Value
LACPDUs Rx	The number of valid LACPDUs received on the aggregation port.
MarkerPDUs Rx	The number of valid MarkerPDUs received on the aggregation port.
Marker ResponsePDUs Rx	The number of valid MarkerResponsePDUs received on the aggregation port.
UnknownPDUs Rx	The number of frames received that: • can carry the Slow Protocols Ethernet Type value, but contain an unknown PDU • are addressed to the Slow Protocols group MAC Address, but do not carry the Slow Protocols Ethernet Type
IllegalPDUs Rx	The number of frames received that carry the Slow Protocols Ethernet Type value, but contain a badly formed PDU or an illegal value of Protocol Subtype.
LACPDUs Tx	The number of LACPDUs transmitted on the aggregation port.
MarkerPDUs Tx	The number of MarkerPDUs transmitted on the aggregation port.
MarkerResponsePDUs Tx	The number of MarkerResponsePDUs transmitted on the aggregation port.

Displaying multicast group membership

You can use the Multicast Group Membership screen to view configured IP Multicast group addresses for specific VLANs. The screen displays the IP Multicast group addresses associated with ports that are configured within the switch. The displayed addresses are dynamic and can change as clients join (or leave) the various IP Multicast groups. You can have up to 128 multicast groups with the BES1000 Series switch.

Procedure steps

Step	Action
1	From the main menu, choose **Application > IGMP > Multicast Group**. The Multicast Group page appears.
2	To view multicast groups for a VLAN, in the **VLAN** field, choose the desired VLAN and click **Submit**.

—End—

Variable definitions

Variable	Value
VLAN	Lets you view multicast group addresses on specified VLANs. Select an existing VLAN from the list to view Multicast group addresses associated with the VLAN.
Multicast Group Address	Displays all of the IP Multicast group addresses that are currently active on the associated port.
Port	Displays the port numbers that are associated with the IP Multicast group addresses displayed in the IP Multicast group address field.

Viewing the system log

You can view a display of messages contained in Non-Volatile Random Access Memory (NVRAM) or Dynamic Random Access Memory (DRAM) and NVRAM.

Procedure steps

Step Action

1 From the main menu, choose **Device Monitoring > System Log**.

The System Log page appears.

2 To update the window with the latest system log messages, click **Update**.

3 To clear the system log messages, click **Clear messages**.

The results of your request are displayed in the System Log section.

—End—

Variable definitions

Variable	Value
System Log (View By)	
Display Messages From	Specifies that the system log displays messages from Volatile (DRAM) and Non-Volatile memory.
System Log	
Index	The number of the event.

Variable	Value
Time Stamp	The time, in hundredths of a second, between system initialization and the time the log messages entered the system.
Message Type	The type of message. The options are: (1) Critical (2) Serious (3) Informational
Message	A character string that identifies the origin of the message and the reason why the message is generated.

Viewing statistics

The options available to monitor system statistical data using Web-based management are:

- "Viewing port statistics" (page 129)
- "Viewing interface statistics" (page 132)
- "Viewing Ethernet error statistics" (page 133)
- "Viewing VLAN port information" (page 136)

Viewing port statistics

You can view detailed statistics about a selected switch port. Both received and transmitted statistics are displayed so that you can compare throughput or other port parameters.

Procedure steps

Step Action

1 From the main menu, choose **Device Monitoring > Statistics > Port**.

The Port page appears.

2 In the **Port Statistics** section, choose the port number.

3 Click **Submit**.

The Port Statistics Table is updated with information about the selected device and port.

4 To update the statistical information, click **Update**.

—End—

Variable definitions

Variable	Value
Port Statistics (View By)	
Port	Choose the port number of the switch to monitor.
Port Statistics Table	
Multicasts	The number of good multicast packets received/transmitted on this port, excluding broadcast packets.
Packets	The number of valid-size packets received on this port with proper framing but discarded because of cyclic redundancy check (CRC) errors.
Broadcasts	The number of good broadcast packets received/transmitted on this port.
Total Octets	The number of octets of data received/transmitted on this port, including data in bad packets and frame check sequence (FCS) octets, and framing bits.
Pause Frames	The number of pause frames received/transmitted on this port.
FCS/Frame Errors	The number of valid-size packets received on this port with proper framing but discarded because of cyclic redundancy check (CRC) errors.
Undersized Packets	The number of packets received on this port with fewer than 64 bytes and with proper CRC and framing (also known as short frames or runts).
Oversized Packets	The number of packets received on this port with proper CRC and framing that meet the following requirements: 1518 bytes if no VLAN tag exists; 1522 bytes if a VLAN tag exists.
Filtered Packets	The number of packets discarded on this port when the capacity of the port transmit buffer is exceeded.
Collisions	The number of collisions detected on this port.
Single Collisions	The number of packets transmitted successfully on this port after a single collision.
Multiple Collisions	The number of packets transmitted successfully on this port after more than one collision.
Excessive Collisions	The number of packets lost on this port due to excessive collisions.
Deferred Packets	The number of frames delayed on the first transmission attempt, without incurring a collision.

Variable	Value
Late Collisions	The number of packet collisions occurring after a total length of time that exceeds 512 bit-times of packet transmission.
Packets Received and Transmitted 64 bytes 65-127 bytes 128-255 bytes 256-511 bytes 512-1023 bytes 1024-1518 bytes	The number of packets of the specified size range received/transmitted successfully on this port.

Zeroing ports

Use to clear the statistical information for the currently displayed port.

Procedure steps

Step	Action
1	Click **Zero Port**. Clear the statistical information for all ports in a switch configuration.
2	Click **Zero All Ports** (if necessary).

—End—

Viewing all port errors

You can view all ports in the switch that have an error. If a particular port has no errors, it is not displayed.

Use this procedure to view a summary of the port errors for the switch.

Procedure steps

Step	Action
1	From the main menu, choose **Device Monitoring > Statistics > Port Error Summary**. The Port Error Summary page appears.
2	To refresh the page with the latest information, click **Update**.

—End—

Variable definitions

Variable	Value
Port	Displays the number of the port that received the error.
Status	Displays the status of the port (Enabled/Disabled).
Link	Displays the link status of the port (Up/Down).
Speed/Duplex	Displays the speed at which the port is operating, as well as whether it is in half- or full-duplex mode.
FCS/Frame Errors	Displays the number of frame errors and frame check sequence (FCS) errors received on this port.
Collisions	Displays the number of collisions errors received on this port.
Single Collisions	Displays the number of single collisions errors received on this port.
Multiple Collisions	Displays the number of multiple collisions errors received on this port.
Excessive Collisions	Displays the number of excessive collisions errors received on this port.
Late Collisions	Displays the number of late collisions errors received on this port.

Viewing interface statistics

You can view selected switch interface statistics.

Procedure steps

Step Action

1 From the main menu, choose **Device Monitoring > Statistics > Interface**.

The Interface page appears.

2 To update the statistical information, click **Update**.

—End—

Variable definitions

Variable	Value
Port	The port number corresponding to the selected switch.

Variable	Value
In Octets	The number of octets received on the interface, including framing characters.
Out Octets	The number of octets transmitted out of the interface, including framing characters.
In Unicast	The number of unicast packets ingressing the port.
Out Unicast	The number of unicast packets destined to be sent out of this port, including those that are discarded or not sent.
In Non-Unicast	The number of nonunicast (broadcast and multicast) packets ingressing the port.
Out Non-Unicast	The number of nonunicast (broadcast and multicast) packets destined to be sent out of this port, including those that are discarded or not sent.
In Discards	The number of inbound packets that are selected to be discarded even though no errors are detected to prevent their delivery to a higher-layer protocol. One reason for discarding packets is to provide more buffer space.
Out Discards	The number of outbound packets that are selected to be discarded even though no errors are detected to prevent their transmission. One reason for discarding packets is to provide more buffer space.
In Errors	The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.
Out Errors	The number of outbound packets that cannot be transmitted because of errors.
In Unknown Protos	The number of packets received through the interface which are discards due to an unknown or unsupported protocol.

Viewing Ethernet error statistics

You can view Ethernet error statistics for each monitored interface linked to the BES1000 Series switch.

Procedure steps

Step	Action
1	From the main menu, choose **Device Monitoring > Statistics > Ethernet Errors**. The Ethernet Errors page appears.

2 To refresh the statistical information, click **Update**.

—End—

Variable definitions

Variable	Value
Port	The port number corresponding to the selected switch.
FCS/Frame Errors	The number of frames received on a particular interface that are an integral number of octets in length, but do not pass the FCS check.
Internal MAC Transmit Errors	The number of frames for which transmission on a particular interface fails due to an internal MAC sublayer transmit error. A frame only is counted by an instance of this object if it is not counted by the corresponding instance of either the dot3StatsLateCollisions object, the dot3StatsExcessiveCollisions object, or the dot3StatsCarrierSenseErrors object.
Internal MAC Receive Errors	The number of frames for which reception on a particular interface fails due to an internal MAC sublayer transmit error. A frame only is counted by an instance of this object if it is not counted by the corresponding instance of either the dot3StatsLateCollisions object, the dot3StatsExcessiveCollisions object, or the dot3StatsCarrierSenseErrors object.
Carrier Sense Errors	The number of times that the carrier sense condition was lost or never asserted when attempting to transmit a frame on a particular interface.
SQE Test Errors	The number of times that the Signal Quality Error (SQE) TEST ERROR message is generated by the physical signaling sublayer (PLS) for a particular interface. The SQE Test is a function that tests the transceiver and its ability to detect collisions. SQE Test is implemented by generating a test signal on the collision pair following every transmission of the network. For more information, see section 7.2.2.2.4 of ANSI/IEEE 802.3-1985, and section 7.2.4.6 of the same document.
Deferred Transmissions	The number of frames for which the first transmission attempt on a particular interface is delayed because the medium is busy.

Variable	Value
Single Collision Frames	The number of successfully transmitted frames on a particular interface for which transmission is inhibited by more than one collision.
Multiple Collision Frames	The number of successfully transmitted frames on a particular interface for which transmission is inhibited by a single collision.
Late Collisions	The number of times a collision is detected on a particular interface later than 512 bit-times into the transmission of a packet.
Excessive Collisions	The number of frames for which transmission on a particular interface fails due to excessive collisions.

Viewing transparent bridging statistics

You can view the transparent bridging statistics measured for each monitored interface on the device.

Procedure steps

Step Action

1 From the main menu, choose **Device Monitoring > Statistics > Transparent Bridging**.

The Transparent Bridging page appears.

2 To refresh the statistical information, click **Update**.

—End—

Variable definitions

Variable	Value
Port	The port number that corresponds to the selected switch.
In Frames	The number of frames that are received by this port from its segment. A frame received on the interface corresponding to this port is counted only if it is for a protocol processed by the local bridging function, including bridge management errors.

Variable	Value
Out Frames	The number of frames that are transmitted by this port from its segment. A frame received on the interface corresponding to this port is counted only if it is for a protocol processed by the local bridging function, including bridge management errors.
In Discards	The number of valid frames received which were discarded by the forwarding process.

Viewing VLAN port information

View VLAN port information to monitor the name assigned, type, and number for the VLAN.

Procedure steps

Step	Action
1	From the main menu choose **Application > VLAN > Port Information**. The **VLAN Port Information** page appears.
2	Select from the list.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
VLAN Port Information (View By)	Select the port number from the list.
Port	The range is from 1 to 50.
Port Name	The name assigned to the Port.
PVID	The number of the VLAN ID assigned to untagged frames received on this trunk port.
VLAN Port Information Table	The number assigned to the VLAN when the VLAN is created.
VLAN	The range is from 1 to 4094.
VLAN Name	The name assigned to the VLAN when the VLAN is created.
VLAN Type	The type of the VLAN.

RMON Fault threshold page

Use the Remote Monitor (RMON) Fault threshold page to view alarms that tell you when the value of a variable goes out of range. You can define RMON alarms on any Management Information Base (MIB) variable that resolves to an integer value. You cannot use string variables (such as system description) as alarm variables.

Viewing the RMON fault event log

RMON events and alarms work together to notify you when values in your network go out of a specified range. When values pass the specified ranges, the alarm triggers and fires. The event specifies how the activity is recorded.

An event specifies whether a trap, a log, or a trap and a log are generated due to alarm activity. When RMON is globally enabled, two default events are generated:

- Rising Event
- Falling Event

Default events specify that when an alarm goes out of range, the firing of the alarm is tracked in both a trap and a log. For example, when an alarm fires at the rising threshold, the rising event specifies that this information be sent to both a trap and a log. The RMON Event Log page works in conjunction with the RMON Threshold page to enable you to view a history of RMON fault events.

Procedure steps

Step	Action
1	From the main menu, choose **Device Monitoring**.
2	Choose **Events**.
3	Choose **RMON Event Log**. The RMON Event Log page appears.

—End—

RMON Event Log page items

Item	Description
Time Stamp	The time the event occurred.
Description	A description of the event that activated this log entry.
Triggered By	A comment describing the source of the event.
ID	The event that generated this log entry.

Viewing RMON Ethernet statistics

Use the RMON Ethernet statistics page to gather and graph Ethernet statistics in a variety of formats.

Procedure steps

Step	Action
1	From the main menu, choose **Device Monitoring > Events > RMON Ethernet**. The RMON Ethernet page appears.
2	To refresh the information on the page, click **Update**.

—End—

Variable definitions

Variable	Value
Port	The port number that corresponds to the selected switch.
Drop Events	The number of events in which packets are dropped by the interface due to a lack of resources.
Octets	The number of octets of data (including those in bad packets) received on the network (excluding framing bits, but including Frame Check Sequence [FCS] octets).
Packets	The number of packets received/transmitted on a port, including bad, broadcast, and multicast packets.
Broadcast	The number of good packets received that are directed to the broadcast address. This does not include multicast packets.
Multicast	The number of good packets received that are directed to the multicast address. This does not include packets sent to the broadcast address.
CRC Align Errors	The number of packets received that are less than 1518 octets long, but had either a bad Frame FCS with an integral number of octets (FCS errors) or a bad FCS with a nonintegral number of octets (alignment error).
Undersize	The number of packets received that are less than 64 octets long (excluding framing bits, but including FCS octets) and are otherwise well formed.

Variable	Value
Fragments	The number of packets received that are less than 64 octets long (excluding framing bits, but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (alignment error).
Collisions	The best estimate number of collisions on this Ethernet segment.
Jabbers	The number of packets received that are longer than 1522 octets in length (excluding framing bits, but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).
Packets < = 64 bytes 65-127 bytes 128-255 bytes 256-511 bytes 512-1023 bytes 1024-1518 bytes 1522-9216 bytes	The number of octets received (including bad packets) in length (excluding framing bits, but including FCS octets).

Viewing RMON history

Use the RMON history page to view a periodic statistical sampling of data from various types of networks.

Procedure steps

Step **Action**

1 From the main menu, choose **Device Monitoring > Events > RMON History**.

The RMON History page appears.

2 In the **Port** list, choose a selection.

3 Click **Submit**.

—End—

RMON History page items

Variable	Value
RMON History Statistics Table (View By)	
Port	The port number to be monitored.
Start	The value of the sysUPTime at the start of the interval over which this sample is measured.
Drop Events	The number of events in which packets are dropped by the interface due to a lack of resources.
Octets	The number of octets of data (including those in bad packets) received on the network (excluding framing bits, but including Frame Check Sequence [FCS] octets).
Packets	The number of packets received or transmitted on a port, including bad, broadcast, and multicast packets.
Broadcast	The number of good packets received that are directed to the broadcast address. This does not include multicast packets.
Multicast	The number of good packets received that are directed to the multicast address. This does not include packets sent to the broadcast address.
CRC Align Errors	The number of packets received that are less than 1518 octets long, but had either a bad Frame FCS with an integral number of octets (FCS errors) or a bad FCS with a nonintegral number of octets (alignment error).
Undersize	The number of packets received that are less than 64 octets long (excluding framing bits, but including FCS octets) and are otherwise well formed.
Oversize	The number of packets received that are longer than 1518 octets long (excluding framing bits, but including FCS octets) and are otherwise well formed.

Viewing LLDP local system data

Use the Local Link Discovery Protocol (LLDP) local system data page to view LLDP local system data.

Procedure steps

Step	Action
1	From the main menu, choose **Application > 802.1ab > LLDP Local System Data**. The LLDP Local System Data page appears.
2	To refresh the information on the page, click **Submit**.

—End—

LLDP Local System Data page items

Variable	Value
Link Layer Discovery Protocol Configuration	
ChassisIdSubtype	The type of encoding used to identify the local system chassis: • chassisComponent • interfaceAlias • portComponent • macAddress • networkAddress • interfaceName • local
LocChassisId	Chassis ID.
LocSysName	Local system name.
LocSysDesc	Local system description.
LocSysCapSupported	Specifies the system capabilities that are supported on the local system.
LocSysCapEnabled	Specifies the system capabilities that are enabled on the local system.
Link Layer Discovery Protocol Port System Data	
Port	Port number.
PortIdSubtype	The type of port identifier encoding used in the associated PortId object.
PortId	The string value used to identify the port component associated with a given port in the local system.
PortDesc	The string value used to identify the port description of the 802 LAN station associated with the local system. If the local agent supports IETF RFC 2863, PortDesc object should have the same value as ifDescr object.

Displaying LLDP Neighbor properties

Use the LLDP Neighbor page to display the LLDP properties for the switch neighbor. Fields found in this page are described in the LLDP Neighbor page items table.

Procedure steps

Step	Action
1	From the main menu, choose **Application**.
2	Choose **802.1ab**.
3	Choose **LLDP Neighbor**. The LLDP Neighbor page appears.

—End—

LLDP Neighbor page items

Variable	Value
Port	Identifies the local port on which the remote system information is received.
Time	The TimeFilter for this entry. See the TimeFilter textual convention in IETF RFC 2021 for details about TimeFilter.
Index	An arbitrary local integer value used by this agent to identify a particular connection instance, unique only for the indicated remote system. An agent is encouraged to assign increasing index values to new entries, starting with one, after each reboot. It is unlikely that the Index wraps between reboots.
ChassisIdSubtype	The type of encoding used to identify the remote system chassis: • chassisComponent • interfaceAlias • portComponent • macAddress • networkAddress • interfaceName • local
ChassisId	Remote chassis ID.
SysCapSupported	Identifies the system capabilities supported on the remote system.
SysName	Remote system name.

Variable	Value
PortDesc	Remote port description.
PortIdSubtype	The type of port identifier encoding used in the associated PortId object.
PortId	The string value used to identify the port component associated with a given port in the local system.
SysDesc	Remote system description.

Displaying LLDP Neighbor Management properties

Use the LLDP Neighbor Management page to display the LLDP management properties for the switch neighbor. Fields found in this page are described in the LLDP Neighbor Management page items table.

Procedure steps

Step Action

1 From the main menu, choose **Application**.

2 Choose **802.1ab**.

3 Choose **LLDP Neighbor Management**.

The LLDP Neighbor Management page appears.

—End—

LLDP Neighbor Management page items

Variable	Value
Port	Identifies the local port on which the remote system information is received.
Time	The time stamp for the entry.
Index	MAC service access point (MSAP) identifier.
ChassisIdSubtype	The type of encoding used to identify the remote system chassis: • chassisComponent • interfaceAlias • portComponent • macAddress • networkAddress • interfaceName • local
ChassisId	Remote chassis ID.

Variable	Value
PortIdSubtype	The type of port identifier encoding used in the associated PortId object.
PortId	The string value used to identify the port component associated with a given port in the local system.
Mgmt Addr	The management address associated with the remote system.
MgmtIf	The OID value used to identify the type of hardware component or protocol entity associated with the management address advertised by the remote system agent.
Mgmt Addr OID	The object identifier (OID) for the management address associated with the remote system.

Displaying LLDP statistics

Use the LLDP Rx - Tx Statistics page to display LLDP statistics.

Procedure step

Step **Action**

1 From the main menu, choose **Application > 802.1ab > LLDP Rx - Tx Statistics**.

The LLDP Rx -Tx page appears.

2 To refresh the information on the page, click **Update**.

—End—

LLDP statistics page items

Variable	Value
Rx Inserted	The number of LLDP frames received.
Rx Deleted	The number of LLDP frames deleted.
Rx Droped	The number of dropped LLDP frames.
Age Out	The number of LLDP frames that exceed their time limit.
Tx Frames	The number of transmitted LLDP frames.
Rx Frames Discarded	The number of received LLDP frames that are discarded.

Variable	Value
Rx Frames Errors	The number of received LLDP frames that have errors.
Rx Frames Total	The total number of LLDP frames received.
Rx Frames TLVs Discarded	The number of LLDP TLV frames that are discarded.
Rx Frames TLVs Unrecognized	The number of received LLDP TLV frames that are unrecognized.
Rx Frames Age Out	The number of received LLDP frames that exceed their time limit.

System Administration using the Element Manager

Use these procedures to manage the administration of your BES1000 Series switch using the Element Manager.

Navigation

- "Viewing statistics" (page 179)
- "Viewing Alarm settings" (page 191)

Configuring the Virtual Cable Tester

Use these procedures to run a virtual cable tester (VCT) on your BES1000 Series switch using the Element Manager.

Procedure steps

Step Action

1 From the **Task Navigation Panel**, choose **Administration > General > Diagnostics > Virtual Cable Tester**.

The VCT tab appears.

2 In the **VirtualCableTest** field double-click to choose to start a test or not to start a test.

3 Click **Apply**.

—End—

Variable	Value
Port	The port number.
VirtualCableTest	Displays noTest when the table is displayed. For the selected port, you can double-click **noTest** and select **startTest** to activate the Virtual Cable Test action.

Viewing VCT test results

Use this procedure to filter virtual cable tester (VCT) results on the BES1000 Series switch using the Element Manager.

Procedure steps

Step Action

1 From the **Task Navigation Panel**, choose **Administration > General > Diagnostics > Virtual Cable Tester**.

The VCT tab appears.

2 Click the **VCT Test Results** tab.

The VCT Test Results tab appears and displays the VCT test results.

3 Click **Filter**.

4 Enter the required criteria to view more specific information.

—End—

Variable definitions

Variable	Values
Port	The port that was tested.
Type	The type of test.
Status	Indicates the status of the most recently completed test. If no tests were requested since the last reset, the value of the status is none.
Result	Indicates the test result that the object holds.
ResultUnits	The test result unit of measure. The units can be standard units or special units that are designed for special tests.
TimeStamp	Indicates when the test ran.
TestResultsDescription	Describes the test results which are derived from Result & ResultUnits columns and are in a readable format.

Viewing switch power information

Access the Unit option to view Power over Ethernet (PoE) information for the BES1000 switch.

Procedure steps

Step **Action**

1 From the **Task Navigation Panel**, choose **Configuration > System > Unit**.

2 Click a unit, and then click the **PoE** tab.

The PoE page appears.

—End—

PoE tab

Variable	Value
Power	Displays the total power available to the switch in watts.
OperStatus	Displays the Power-Over-Ethernet state of the switch: • on • off • faulty
ConsumptionPower	Displays the power used by the switch in watts.

Viewing device properties

Access the Hardware Inventory option to view device properties.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Administration > General > Hardware Inventory**. The System tab appears.
2	Click the tab related to the information that you to view.

—End—

System tab

The System tab displays device properties, such as system name, system contact, and so on.

System tab

Variable	Value
SystemDescription	The assigned system name.
SystemUpTime	The time since the system was last booted.
SystemObjectID	The unique sysObjectID (OID) assigned to the device.
SystemContact	Type the contact information (in this case, an e-mail address) for the system administrator.
SystemName	Type the name of this device.
Location	Type the physical location of this device.

Variable	Value
SerialNumber	The switch serial number.
CurrentImageVersion	The version number of the agent image that is currently used on the switch.
SwitchIpAddress	Specify a new IP address for the switch.
SubnetMask	Type an IP address for a new subnet mask.
DefaultGateway	Type an IP address for the default gateway.
ManagementVlanId	The current management VLAN ID.
BootMode	Sets the BootP mode to use at the next switch boot: • bootpDisabled • bootpPAlways • bootpOrDefaultIp • bootpOrLastAddress
ReBoot	By default, the switch is in the Running mode. Select this option to reboot the switch.
AuthenticationTraps	Click to enable or disable. When you enable, SNMP traps are sent to trap receivers for all SNMP access authentication. When you disable, no traps are sent. To view traps, from the Task Navigation Panel, choose **Administration > Logs > Trap Log**.

Base Unit Info tab

The Base Unit Info tab provides read-only information about the operating status of the hardware.

Base Unit Info tab

Variable	Value
Description	A description of the switch hardware, including number of ports and IP address.
Version	The switch hardware version number.
SerialNumber	The base unit serial number.
LastChange	The value of sysUpTime at the time this unit component enters its current operational state.
OperState	The operational state of the switch.
TotalNumPorts	The total number of ports on the switch.
IpAddress	The unit IP address.

Flow Control tab

The Flow Control tab displays whether flow control is enabled.

Variable definitions

Variable	Value
GlobalFlowControlEnabled	Select the check box to enable flow control. Flow control manages the data flow so that your data is not lost when the receiving buffer is near capacity or full.

PowerSupply tab

The PowerSupply tab provides read-only information about the operating status of the switch power supplies.

PowerSupply tab

Variable	Value
Chassis 1 Primary Power Supply	Provides the operational state of the specified power supply. Possible values include: • other: Some other state. • notAvail: State not available. • removed: Component is removed. • disabled: Operation disabled. • normal: State is in normal operation. • resetInProg: There is a reset in progress. • testing: System is doing a self test. • warning: System is operating at a warning level. • nonFatalErr: System is operating at error level. • fatalErr: A fatal error stopped operation. • notConfig: A module needs to be configured. The allowable values are determined by the component type.

Fan tab

The Fan tab provides read-only information about the operating status of the switch fans.

Fan tab

Variable	Value
Chassis 1 Fan 1 Chassis 1 Fan 2 Chassis 1 Fan 3 Chassis 1 Fan 4 Chassis 1 Fan 5	The operational state of the fan. Values include • other: Some other state. • notAvail: This state is not available. • removed: Fan is removed. • disabled: Fan is disabled. • normal: Fan is operating in normal operation. • resetInProg: A reset of the fan is in progress. • testing: Fan is doing a self test. • warning: Fan is operating at a warning level. • nonFatalErr: Fan is operating at error level. • fatalErr: An error stopped the fan operation. • notConfig: Fan needs to be configured. The allowable values are determined by the component type.

Viewing the trap log

Traps are sent in SNMP V2c format and recorded in the trap log to a preset maximum number of entries. The default number of trap log entries is 500.

The Element Manager provides a default port (port 162) to receive traps; therefore, you can only view the Element Manager trap log from the BES Series switch device that has the Listen for Traps option selected.

Use this procedure to view the trap log.

Prerequisites

- The BES1000 Series switch must be configured to send SNMP traps.
- The Element Manager must be running.

ATTENTION

The Element Manager receives traps on port 162. If this port is used by another application, you can not view the trap log until the other application is disabled and Element Manager is restarted.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Administration**.
2	Choose **Logs**.
3	Choose **Trap Log**.

—End—

Viewing switch IP information

Access the IP Subsystem option to view Internet Protocol (IP) address information for the BES1000 switch.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > System > IP Subsystem**. The Addresses tab appears.
2	Click the tab related to the IP information that you want to view.

—End—

Addresses tab

The Addresses tab displays the IP address information for the device.

Addresses tab

Variable	Value
Address	The device IP address.
NetMask	The subnet mask address.

Variable	Value
BcastAddr	The value of the least-significant bit in the IP broadcast address used for sending datagrams on the (logical) interface associated with the IP address of this entry. When the Internet standard all-ones broadcast address (255.255.255.255) is used, the value is 1. This value applies to both the subnet and network broadcasts addresses used by the entity on this (logical) interface.
ReasmMaxSize	The size of the largest IP datagram that this entity can reassemble from incoming IP fragmented datagrams received on this interface.

ARP tab

The ARP (Address Resolution Protocol) tab shows the MAC addresses and their associated IP addresses for the switch.

ARP tab

Variable	Value
Interface	The unit and port number.
MacAddress	The unique hardware address of the device.
IpAddress	The Internet Protocol address of the device.
Type	The type of mapping. This is a read-only field.

Viewing VLAN properties

A VLAN is a collection of ports on one or more switches that define a broadcast domain. The BES1000 Series switch supports port-based VLANs.

Use Element Manager to view the VLAN properties on your BES1000 Series switch.

VLAN tab

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration**.
2	Choose **Data Services** .
3	Choose **VLAN/IGMP**. The Data Services VLAN tab displays the properties of existing VLANs.

—End—

VLAN tab

Variable	Value
Id	Number of the VLAN ID.
Name	Name of the VLAN.
Type	Indicates the type of VLAN.
PortMembers	Ports that are members of the VLAN.
ActiveMembers	Set of ports that are currently active in the VLAN. Active ports include all static ports and any dynamic ports where the VLAN policy is met.
State	Indicates whether the VLAN is active or inactive.
LearningConstraint	Displays the VLAN learning constraint. All BES1000 Series switch VLANs have a learning constraint of independent.

Port-based VLAN tab

The **Port** option **VLAN** tab lets you display the properties of port-based VLANs.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > System > Port**.
2	Click a port and then click the **VLAN** tab.
3	Modify the priority and egress tagging as required.
4	Click **Apply**.
5	To update the information on the page, click **Refresh**.

—End—

Port-based VLAN tab

Variable	Value
UntaggedPriority	Choose a priority value. The values range from 0 to 7.
EgressTagging	Choose whether to enable or disable tagging for the port.

Variable	Value
VlanIds	Displays the port VLAN membership.
DefaultVlanId	The VLAN ID assigned to untagged frames received on a trunk port. The default value is 1.

Viewing learned MAC addresses by VLAN

Access the MAC Address Table option to view the MAC addresses that the switch has learned, listed by the associated VLAN port.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > System > MAC Address Table**. The Setting tab appears.
2	Click the **MAC Address Table** tab.
3	To refresh the information on the page, click **Refresh**.

—End—

MAC address table

The MAC Address Table displays status, address, and port information for the VLAN.

MAC address table

Variable	Value
Status	The values of this field include: • invalid: Entry is no longer valid but is not removed from the table. • learned: The MAC address entry is learned by the switch. • self: The MAC address entry is an internal MAC address of the BES1000 switch. • mgmt: The MAC address entry is for the management address of the BES1000 switch. • other: none of the preceding. This would include the case where some other MIB object (not the corresponding instance of dot1dTpFdbPort

Variable	Value
	or an entry in the dot1dStaticTable) is used to determine if frames addressed to the value of dot1dTpFdbAddress are forwarded.
Address	The unicast MAC address for which the bridge has forwarding and/or filtering information.
Port	The port number on which a frame is seen. A value of "0" indicates an internal MAC address.

Viewing Unit information

Access the Unit option to view the description, version and serial number for the switch.

Unit tab

The Unit tab displays hardware information about the unit.

Procedure steps

Step Action

1 From the **Task Navigation Panel**, choose **Configuration > System > Unit**.

2 Click a unit.

The Unit tab appears.

3 Click the **Unit** tab.

4 To refresh the information on the page, click **Refresh**.

—End—

Variable definitions

Variable	Value
Description	Specifies the type of unit.
Version	Specifies the hardware version number of the unit.
SerialNumber	Specifies the serial number of the unit.

Displaying STP properties

You can use the Element Manager to display system parameters for Spanning Tree Protocol (STP), the industry standard for avoiding loops in switched networks.

STP resolves duplicate paths in networks and is not necessary for ports that have workstations directly attached to the switch. When STP is enabled on these ports (the default), workstations are unable to attach to servers for a few seconds while STP goes through its learning steps (listening, learning, and forwarding).

The BES1000 supports the following Spanning Tree Protocol modes:

- nortelStpg (IEEE 802.1D)
- RSTP (IEEE 802.1w)

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > Data Services > Spanning Tree**. The Bridge Information tab appears.
2	Click the tab related to the STP information that you want to view.

—End—

Bridge Information tab

The Bridge Information tab displays details about how efficiently the bridge works.

Variable definitions

Variable	Value
StpPriority	Select the priority value of the bridge ID in hexadecimal notation, which is the most significant two bytes of the bridge ID. The Spanning Tree Algorithm uses this parameter to determine the root bridge (or designated bridge). For example, the bridge with the lowest bridge ID becomes the root bridge, with Bridge Priority values compared first, followed by the hardware addresses. The values displayed for Bridge Priority are in decimal.
StpVersion	The version of STP running on the switch.
DesignatedRoot	The bridge identifier of the root of the spanning tree. This value is used as the Root Identifier parameter in all Configuration Bridge PDUs originated by this node.

Variable	Value
BridgeMaxAge	The value that all bridges use for the maximum age of a bridge when it acts as the root.
BridgeHelloTime	The value that all bridges use for HelloTime when this bridge acts as the root.
BridgeForwardDelay	The value that all bridges use for ForwardDelay when this bridge acts as the root.
TxHoldCount	The maximum number of bridge protocol data units transmitted in any BridgeHelloTime.
PathCostDefault	The default path cost for this bridge. The default value is a 16-bit default path cost, which applies to the IEEE 802.1D Std.
RootPathCost	The cost of the path to the root as seen from this bridge.

Port Information tab

The Port Information tab displays details about the port.

Variable definitions

Variable	Value
Port	The port number.
PathCost	The bridge spanning tree parameter that determines the lowest path cost to the root.
AdminEdgePort	The administrative value of the Edge Port parameter. A value of True indicates that this port is an edge port. A value of False value assumes that this port is a non edge-port.
OperEdgePort	A value of True indicates that the spanning tree can assume this port as an edge-port. A value of False indicates that the spanning tree can assume this port as a non edge-port. The switch software sets this object to False when it receives a BPDU.
OperPointToPoint	The administrative point-to-point status of the LAN segment attached to this port: A value of True indicates that the spanning tree treats this port as if it is connected to a point-to-point link. A value of False indicates that the spanning tree treats this port as having a shared media connection. A value of Auto indicates that this port is considered to have a point-to-point link if it is an aggregator and all of its members are aggregatable, or if the MAC entity is configured for full-duplex operation, either through autonegotiation or by management means.

Variable	Value
OperProtocolVersion	Indicates the STP version in which the port participates.
Role	Indicates the role of the port in the Spanning Tree instance.
State	Used to identify the STP and RSTP port states. Port state is cataloged as Discarding, Learning, or Forwarding.

Displaying LACP

Use this procedure to view the Link Aggregation Control Protocol (LACP) bridge configuration information.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration**.
2	Choose **Data Services**.
3	Choose **LACP**.

—End—

LACP tab

The LACP tab displays bridge configuration details.

Variable definitions

Variable	Value
Index	The unique identifier that the local system assigns to this aggregator. This attribute identifies an aggregator instance among the subordinate managed objects of the containing object.
MacAddress	The MAC address used by this bridge when it must be referred to in a unique fashion.
AggregateOrIndividual	Indicates whether the aggregation port can aggregate or can operate only as an individual link.
ActorLagID	The combined information of Actor System Priority, Actor System ID, and Actor Operational Key in ActorSystemPriority-ActorSystemID-ActorOperationalKey hexadecimal format.

Variable	Value
ActorSystemPriority	A 2-octet read-write value used to define the priority value associated with the System ID of the Actor.
ActorSystemID	The MAC address value that defines the value of the System ID for the system that contains this aggregation port.
ActorOperKey	The current operational value of the key for the aggregation port.
ActorAdminKey	The current administrative value of the key for the aggregation port.
PartnerLagID	The combined information of Partner System Priority, Partner System ID, and Partner Operational Key in PartnerSystemPriority-PartnerSystemID-PartnerOperationalKey hexadecimal format.
PartnerSystemPriority	A 2-octet read-only value that indicates the priority value associated with the System ID of the Partner.
PartnerSystemID	The MAC address value that consists of the unique identifier for the current protocol partner of this aggregator. A value of zero indicates that Partner does not exist.
PartnerOperKey	The current operational value of the key for the current protocol partner of this aggregator.

Viewing Security settings

You can use the MAC Address Security option to set the security features for a switch so that the right actions are performed by the software when a violation occurs. The security actions you specify are applied to all ports of the switch.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Configuration > Data Services > MAC Address Security**.
2	Click the tab related to the information that you want to view.

—End—

General tab

Use the General tab to set and view general security information for the switch.

Variable definitions

Variable	Value
MacAddressSecurity	Specifies whether MAC Address-based security is enabled (selected) or disabled (cleared).
PortConfiguration	Displays the ports for which security is enabled.
CurrSecurityLists	Current number of security entries listed in the SecurityList tab.

Port Auto-Learning tab

Use the Port Auto-Learning tab to access a list of auto-learned MAC addresses for the port.

Variable definitions

Variable	Value
Unit	The unit number.
Port	The port number.
AutoLearningEnabled	Indicates True if auto-learning is enabled on the port. The value indicates False if auto-learning is disabled on the port.
MacAddressNumber	Indicates the maximum number of MAC addresses that can be learned on the port. The range is from 1 to 25.

Security List tab

Use the Security List tab to access a list of Security port fields. You can also manage this list from this location. See "Adding items to the Security List" (page 94) and "Deleting a Security List entry" (page 95).

Variable definitions

Variable	Value
SecurityListIndx	An index of the security list. This corresponds to the Security port list that you can use as an index for the AuthConfig tab.
SecurityListMembers	The set of ports that are currently members in the Port list.

Security Table tab

Use the Security Table tab to set and view general security information for the switch.

Variable definitions

Variable	Value
Unit	Index of the unit where the port is located. If you specify SecureList, this field must be zero.
Port	Index of the port on the switch. If you specify SecureList, this field must be zero.
MacAddress	MAC Addresses that are designated as allowed (station).
SecureList	The index of the security list. This value is meaningful only if Unit and Port values are set to zero. Other Unit and port index value should have the value of zero. The corresponding MAC address of the entry is allowed or blocked on all ports of this port list.

Security Status tab

The Security Status tab displays authorization information for ports.

Variable definitions

Variable	Value
Unit	The unit number.
Port	The port number on the switch.
MACAddress	The MAC address on the port.
CurrentAccessCtrlType	Displays whether the node entry is allowed or blocked. In this case the value is always allowed.
CurrentActionMode	A value representing the type of information contained, including: noAction: Port does not have any security assigned to it, or the security feature is turned off. partitionPort: Port is partitioned. partitionPortAndsendTrap: Port is partitioned and traps are sent to the trap receiver. Filtering: Port filters out the frames, where the destination address field is the MAC address of unauthorized station. FilteringAndsendTrap: Port filters out the frames, where the destination address field is the MAC address of unauthorized station. Trap are sent to trap receiver.

Variable	Value
	sendTrap: A trap is sent to trap receiver(s). partitionPortAnddaFiltering: Port is partitioned and will filter out the frames with the destination address field is the MAC address of unauthorized station. partitionPortdaFilteringAndsendTrap: Port is partitioned and will filter out the frames with the destination address field is the MAC address of unauthorized station. Traps are sent to trap receiver(s).
CurrentPortSecurStatus	Displays the security status of the current port, including: notApplicable: the port is disabled portSecure: the port is in a normal state portPartition: the port is partitioned

Security Violation tab

The Security Violation tab contains a list of ports where network access violations have occurred, and also identifies the offending MAC addresses.

Variable definitions

Variable	Value
Unit	The unit number.
Port	The number of the port that experiences a security violation.
MACAddress	The MAC address of the device that attempts unauthorized network access (MAC address-based security).

Viewing statistics

Use Element Manager to configure system logging and to display chassis and port statistics for the BES1000 Series switch.

Navigation

- "Graphing Chassis statistics" (page 163)
- "Graphing port statistics" (page 167)

Graphing Chassis statistics

Use the Chassis Metrics option to graph statistics for SNMP and IP. You can view a graphical representation of statistics when you select a packet or a port, and choose a Line chart icon, a Bar Chart icon, or an Area Chart icon.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Administration > System Metrics > Chassis Metrics**.
2	Click the tab related to the information that you want to view.

—End—

SNMP tab You can use the SNMP tab to graph SNMP statistics.

Variable definitions

Variable	Value
InPkts	The total number of messages delivered to SNMP from the transport service.
OutPkts	The total number of SNMP messages passed from the SNMP protocol to the transport service.
InTotalReqVars	The total number of MIB objects retrieved successfully by the SNMP protocol as the result of receiving valid SNMP Get-Request and Get-Next PDUs.
InTotalSetVars	The total number of MIB objects altered successfully by the SNMP protocol as the result of receiving valid SNMP Set-Request PDUs.
InGetRequests	The total number of SNMP Get-Request PDUs that are accepted and processed by the SNMP protocol.
InGetNexts	The total number of SNMP Get-Next PDUs accepted and processed by the SNMP protocol.
InSetRequests	The total number of SNMP Set-Request PDUs accepted and processed by the SNMP protocol.
InGetResponses	The total number of SNMP Get-Response PDUs accepted and processed by the SNMP protocol.
OutTraps	The total number of SNMP Trap PDUs generated by the SNMP protocol.
OutTooBigs	The total number of SNMP PDUs generated by the SNMP protocol for which the value of the error-status field is tooBig.
OutNoSuchNames	The total number of SNMP PDUs generated by the SNMP protocol for which the value of the error-status field is noSuchName.

Variable	Value
OutBadValues	The total number of SNMP PDUs generated by the SNMP protocol for which the value of the error-status field is badValue.
OutGenErrs	The total number of SNMP PDUs generated by the SNMP protocol for which the value of the error-status field is genErr.
InBadVersions	The total number of SNMP messages delivered to the SNMP protocol for an unsupported SNMP version.
InBadCommunityNames	The total number of SNMP messages delivered to the SNMP protocol that use an unknown SNMP community name.
InBadCommunityUses	The total number of SNMP messages delivered to the SNMP protocol that represents an SNMP operation not allowed by the SNMP community named in the message.
InASNParseErrs	The total number of ASN.1 or BER errors encountered by the SNMP protocol when decoding received SNMP messages.
InTooBigs	The total number of SNMP PDUs delivered to the SNMP protocol for which the value of the error-status field is tooBig.
InNoSuchNames	The total number of SNMP PDUs delivered to the SNMP protocol for which the value of the error-status field is noSuchName.
InBadValues	The total number of SNMP PDUs delivered to the SNMP protocol for which the value of the error-status field is badValue.
InReadOnlys	The total number of SNMP PDUs delivered to the SNMP protocol for which the value of the error-status field is readOnly. It is a protocol error to generate an SNMP PDU containing the value readOnly in the error-status field. This object detects incorrect implementations of the SNMP.
InGenErrs	The total number of SNMP PDUs delivered to the SNMP protocol for which the value of the error-status field is genErr.

IP tab You can use the IP tab to graph IP statistics.

Variable definitions

Variable	Value
InReceives	The total number of input datagrams received from interfaces, including those received in error.
InHdrErrors	The number of input datagrams discarded due to errors in their IP headers, including bad checksums, version number mismatch, other format errors, time-to-live exceeded, and errors discovered in processing the IP options for the input datagrams.
InAddrErrors	The number of input datagrams discarded because the IP address in the IP header destination field is not a valid address. This count includes invalid addresses (for example, 0.0.0.0) and addresses of unsupported Classes (for example, Class E). For addresses that are not IP Gateways and therefore do not forward datagrams, this counter includes datagrams discarded because the destination address is not a local address.
ForwDatagrams	The number of input datagrams for which the entity is not their final IP destination, as a result of which an attempt is made to find a route to forward them to that final destination. For addresses that do not act as IP Gateways, this counter includes only those packets that are Source-Routed by way of this address and have successful Source-Route option processing.
InUnknownProtos	The number of locally addressed datagrams received successfully but are discarded because of an unknown or unsupported protocol.
InDiscards	The number of input IP datagrams for which no problems are encountered to prevent their continued processing but that are discarded (for example, for lack of buffer space). Note that this counter does not include any datagrams discarded while awaiting reassembly.
InDelivers	The total number of input datagrams successfully delivered to IP user-protocols (including ICMP).
OutRequests	The total number of IP datagrams that local IP user-protocols (including ICMP) supplied to IP in requests for transmission. Note that this counter does not include any datagrams counted in ipForwDatagrams.

Variable	Value
OutDiscards	The number of output IP datagrams for which no problem is encountered to prevent their transmission to their destination, but that are discarded (for example, for lack of buffer space). Note that this counter includes datagrams counted in ipForwDatagrams if any such packets meet this (discretionary) discard criterion.
OutNoRoutes	The number of IP datagrams discarded because no route could be found to transmit them to their destination. Note that this counter also includes any packets counted in ipForwDatagrams that have no route. This includes any datagrams that a host cannot route because all of its default gateways are down.
FragOKs	The number of IP datagrams that are successfully fragmented at this entity.
FragFails	The number of IP datagrams that are discarded because they needed to be fragmented at this entity but could not be, for example, because their Don't Fragment flag was set.
FragCreates	The number of IP datagram fragments that are generated as a result of fragmentation at this entity.
ReasmReqds	The number of IP fragments received that needed to be reassembled at this entity.
ReasmOKs	The number of IP datagrams successfully reassembled.
ReasmFails	The number of failures detected by the IP reassembly algorithm (for whatever reason: timed out, or errors, for example). Note that this is not necessarily a count of discarded IP fragments because some algorithms (notably the algorithm in RFC 815) can lose track of the number of fragments by combining them as they are received.

Graphing port statistics

You can graph statistics for either a single port or multiple ports from the Port Metrics window by using the following:

- AbsoluteValue
- Cumulative
- Average/sec
- Minimum/sec
- Maximum/sec

- LastVal/sec

The windows that appear when you configure a single port differ from the ones that appear when you configure multiple ports. However, the options are similar.

When either single or multiple ports are displayed, you can specify the desired polling interval from the Poll Interval list.

When multiple ports are displayed, only the AbsoluteValue statistics are initially displayed. Choose from the Show list to modify the type of statistics to display.

Use this procedure to access the Port Metrics option.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Administration > System Metrics > Port Metrics**. The switch view appears in the information panel.
2	Select the single or multiple ports that you want to graph. To select multiple ports, press Ctrl and select the ports that you want to configure. A yellow outline appears around the selected ports.
3	Click the tab related to the information that you want to view.

—End—

Interface tab The Interface tab shows interface parameters for graphing a port or ports.

Variable definitions

Variable	Value
InOctets	The total number of octets received on the interface, including framing characters.
OutOctets	The total number of octets transmitted out of the interface, including framing characters.
InUcastPkts	The number of unicast packets ingressing the port.
OutUcastPkts	The number of unicast packets egressing the port.
InNUcastPkts	The number of nonunicast (broadcast or multicast) packets ingressing the port.

Variable	Value
OutNUcastPkts	The number of nonunicast (broadcast or multicast) packets egressing the port.
InDiscards	The number of inbound packets that are chosen to be discarded even though no errors are detected to prevent their delivery to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space.
OutDiscards	The number of outbound packets which are chosen to be discarded even though no errors are detected to prevent their transmission. One possible reason for discarding such a packet could be to free up buffer space.
InErrors	For packet-oriented interfaces, the number of inbound packets that contain errors that prevent packet delivery to a higher-layer protocol.
OutErrors	For packet-oriented interfaces, the number of outbound packets that could not be transmitted because of errors.
InUnknownProtos	For packet-oriented interfaces, the number of packets received through the interface that are discarded because of an unknown or unsupported protocol. For any interface that does not support protocol multiplexing, this counter is always zero.

Ethernet Errors tab The Ethernet Errors tab shows port Ethernet Errors statistics.

Variable definitions

Variable	Value
AlignmentErrors	A count of frames received on a particular interface that are not an integral number of octets in length and do not pass the FCS check. The count represented by an instance of this object is incremented when the alignmentError status is returned by the MAC service to the LLC (or other MAC user). Received frames for which multiple error conditions occur are counted exclusively, according to the conventions of IEEE 802.3 Layer Management, in reference to the error status presented to the LLC.

Variable	Value
FCSErrors	A count of frames received on a particular interface that are an integral number of octets in length but do not pass the FCS check. The count represented by an instance of this object is incremented when the frameCheckError status is returned by the MAC service to the LLC (or other MAC user). Received frames for which multiple error conditions occur are counted exclusively, according to the conventions of IEEE 802.3 Layer Management, in reference to the error status presented to the LLC.
InternalMacTransmitErrors	A count of frames for which transmission on a particular interface fails due to an internal MAC sublayer transmit error. A frame is only counted by an instance of this object if it is not counted by the corresponding instance of either the LateCollisions object, the ExcessiveCollisions object, or the CarrierSenseErrors object.
InternalMacReceiveErrors	A count of frames for which reception on a particular interface fails due to an internal MAC sublayer receive error. A frame is only counted by an instance of this object if it is not counted by the corresponding instance of either the FrameTooLongs object, the AlignmentErrors object, or the FCSErrors object. The precise meaning of the count represented by an instance of this object is implementation specific. In particular, an instance of this object may represent a count of receive errors on a particular interface that are not otherwise counted.
CarrierSenseErrors	The number of times that the carrier sense condition is lost or never asserted when attempting to transmit a frame on a particular interface. The count represented by an instance of this object is incremented at most once per transmission attempt, even if the carrier sense condition fluctuates during a transmission attempt.

Variable	Value
FrameTooLongs	A count of frames received on a particular interface that exceed the maximum permitted frame size. The count represented by an instance of this object is incremented when the frameTooLong status is returned by the MAC service to the LLC (or other MAC user). Received frames for which multiple error conditions occur are counted exclusively, according to the conventions of IEEE 802.3 Layer Management, in reference to the error status presented to the LLC.
SQETestErrors	A count of the times that the SQE TEST ERROR message is generated by the PLS sublayer for a particular interface. The SQE TEST ERROR message is defined in section 7.2.2.2.4 of ANSI/IEEE 802.3-1985, and its generation is described in section 7.2.4.6 of the same document.
DeferredTransmissions	A count of frames for which the first transmission attempt on a particular interface is delayed because the medium is busy. The count represented by an instance of this object does not include frames involved in collisions.
SingleCollisionFrames	A count of successfully transmitted frames on a particular interface for which transmission is inhibited by exactly one collision. A frame that is counted by an instance of this object is also counted by the corresponding instance of either the ifOutUcastPkts, ifOutMulticastPkts, or ifOutBroadcastPkts, but is not counted by the corresponding instance of the MultipleCollisionFrames object.

Variable	Value
MultipleCollisionFrames	A count of successfully transmitted frames on a particular interface for which transmission is inhibited by more than one collision. A frame that is counted by an instance of this object is also counted by the corresponding instance of either the ifOutUcastPkts, ifOutMulticastPkts, or ifOutBroadcastPkts, but is not counted by the corresponding instance of the SingleCollisionFrames object.
LateCollisions	The number of times that a collision is detected on a particular interface later than 512 bit-times into the transmission of a packet. Five hundred and twelve bit-times corresponds to 51.2 microseconds on a 10 Mb/s system. A late collision included in a count represented by an instance of this object is also considered as a generic collision for purposes of other collision-related statistics.
ExcessiveCollisions	A count of frames for which transmission on a particular interface fails due to excessive collisions.

Bridge tab The Bridge tab displays port frame statistics.

Variable definitions

Variable	Value
InFrames	The number of frames that are received by this port from its segment.
OutFrames	The number of frames that are received by this port from its segment.
InDiscards	Count of valid frames received which are discarded (filtered) by the Forwarding Process.

EAPOL Stats tab The EAPOL Stats tab displays information about the EAPOL-related statistics on the port.

Variable definitions

Variable	Value
EapolFramesRx	The number of valid Eapol frames received.
EapolFramesTx	The number of valid Eapol frames sent.
EapolStartFramesRx	The number of valid Eapol-start frames received.
EapolLogoffFramesRx	The number of Eapol-logoff frames received.
EapolRespIdFramesRx	The number of EAP-response/identity frames received.
EapolRespFramesRx	The number of EAP-response frames received.
EapolReqIdFramesTx	The number of request/identity frames sent.
EapolReqFramesTx	The number of request frames sent.
InvalidEapolFramesRx	The number of Eapol frames received that have an unrecognized frame type.
EapLengthErrorFramesRx	The number of Eapol frames received in which the packet body length field is invalid.

EAPOL Diag tab The EAPOL Diag tab displays information about the diagnostic statistics on the port.

Variable definitions

Variable	Value
EntersConnecting	Counts the number of times the state machine transitions to the connecting state from any other state.
EapLogoffsWhileConnecting	Counts the total number of times the state machine changed from connecting to disconnected after receiving a logoff message.

Variable	Value
EntersAuthenticating	Counts the total number of times the state machine changed from connecting to authenticating after receiving an Eap-Response/Identity message.
AuthSuccessWhileAuthenticating	Counts the total number of times the state machine changed from authenticating to authenticated.
AuthFailWhileAuthenticating	Counts the total number of times the state machine changed from AUTHENTICATING to HELD.
AuthTimeoutsWhileAuthenticating	Counts the total number of times the state machine transitions from authenticating to aborting because of authentication timeout.
AuthReauthsWhileAuthenticating	Counts the total number of times the state machine transitions from authenticating to aborting after a reauthentication request.
AuthEapStartsWhileAuthenticating	Counts the total number of times the state machine transitions from authenticating to aborting after receiving an EAPOL-Start message.
AuthLogoffWhileAuthenticating	Counts the total number of times the state machine transitions from authenticating to aborting after receiving a logoff message.
AuthReauthsWhileAuthenticated	Counts the total number of times the state machine transitions from authenticating to connecting.

Variable	Value
AuthEapStartsWhileAuthenticated	Counts the total number of times the state machine transitions from authenticating to connecting after receiving a start message.
AuthEapLogoffWhileAuthenticated	Counts the total number of times the state machine transitions from authenticating to disconnecting after receiving a logoff message.
BackendReponses	Counts the number of times the state machine sends an initial Access-Request packet to the Authentication server.
BackendAccessChallenges	Counts the number of times the state machine sends an initial Access-Challenge packet from the Authentication server.
BackendOtherRequestsToSupplicant	Counts the number of times the state machine sends an EAP-Request packet.
BackendNonNakResponsesFromSupplicant	Counts the number of times the state machine receives a response to an initial EAP-Request and the response is something other than an EAP-NAK.
BackendAuthSuccesses	Counts the number of times the state machine receives an EAP-Success message.
BackendAuthFails	Counts the number of times the state machine receives an EAP-Failure message.

LACP statistics tab The LACP tab displays LACP diagnostics statistics.

Variable definitions

Variable	Value
LACPDUsRX	Denotes the number of valid LACPDUs received on this Aggregation Port. This value is read-only.
MarkerPDUsRX	Signifies the number of valid Marker PDUs received on this Aggregation Port. This value is read-only.
MarkerResponsePDUsRX	The number of valid Marker Response PDUs received on this Aggregation Port. This value is read-only.
UnknownRX	Indicates the number of frames received that can carry the Slow Protocols Ethernet Type value (43B.4), but contain an unknown PDU are addressed to the Slow Protocols group MAC Address (43B.3) but do not carry the Slow Protocols Ethernet Type. This value is read-only.
IllegalRX	Denotes the number of frames received that carry the Slow Protocols Ethernet Type value (43B.4) but contain a badly formed PDU or an illegal value of Protocol Subtype (43B.4). This value is read-only.
LACPDUsTX	Signifies the number of LACPDUs that are transmitted on this Aggregation Port. This value is read-only.
MarkerPDUsTX	Displays the number of Marker PDUs transmitted on this Aggregation Port. This value is read-only.
MarkerResponsePDUsTX	Indicates the number of Marker Response PDUs that are transmitted on this Aggregation Port. This value is read-only.

Viewing RMON history statistics

You can use the Business Element Manager to view RMON history statistics.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Administration > General > Alarm Control**.
2	Click the **History** tab.

3 Highlight an entry.

4 Click the **Graph** button.

—End—

RMON History tab

Variable definitions

Variable	Value
SampleIndex	An index that uniquely identifies the particular sample this entry represents among all the samples associated with the same entry. This index starts at one and increases by one as each new sample is taken.
Utilization	The best estimate of the mean physical layer network utilization on this interface during the sampling interval (in hundredths of a percent).
Octets	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). You can use this object as a reasonable estimate of Ethernet utilization. For greater precision, sample the etherStatsPkts and etherStatsOctets objects before and after a common interval.
Pkts	The total number of packets (including bad packets, broadcast packets, and multicast packets) received.
BroadcastPkts	The total number of good packets received that are directed to the broadcast address. Note that this does not include multicast packets.
MulticastPkts	The total number of good packets received that are directed to a multicast address. Note that this number does not include packets directed to the broadcast address.
DropEvents	The total number of events in which packets are dropped by the switch due to lack of resources during this sampling. This number is not necessarily the number of packets dropped. It is the number of times this condition is detected.

Variable	Value
CRCAlignErrors	The total number of packets received that have a length (excluding framing bits, but including FCS octets) between 64 and 1518 octets, inclusive, but have either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).
UndersizePkts	The total number of packets received that are less than 64 octets long (excluding framing bits but including FCS octets) and are otherwise well formed.
OversizePkts	The total number of packets received that were longer than 1518 octets (excluding framing bits but including FCS octets) and were otherwise well formed.
Fragments	The number of packets received during the sampling interval are less than 64 octets long (including FCS octets, but not framing bits). The packets have a bad FCS with either an integral number of octets (FCS Error) or a nonintegral number of octets (Alignment Error).
Collisions	The best estimate of the number of collisions on an Ethernet segment during a sampling interval.

Viewing RMON Events

Access the Alarms option to view a table of RMON events.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Administration > General > Alarms**.
2	Click the **Events** tab.

—End—

Events tab

The Events tab provides a detailed list of notifications that values have fallen outside of the specified range for the Element Manager.

Variable definitions

Variable	Value
Index	This index uniquely identifies an entry in the event table. Each entry defines one event that is to be generated when the appropriate conditions occur.
Description	Specifies whether the event is a rising or a falling event.
Type	The type of notification that the Element Manager provides about this event. In the case of a log, an entry is made in the log table for each event. In the case of a trap, an SNMP trap is sent to one or more management stations. Possible notifications are as follows: • none • log • trap • log-and-trap
Community	The SNMP community string acts as a password. Only those management applications with this community string can view the alarms.
LastTimeSent	The value of sysUpTime at the time this event entry last generated an event. If this entry has not generated any events, this value is zero.
Owner	If traps are specified to be sent to the owner, then this is the name of the machine that receives alarm traps.

RMON Ether Stats tab for graphing ports

Use these procedures to graph statistics for your BES1000 Series switch using the Element Manager.

Navigation

- "RMON tab for graphing ports" (page 180)
- "RMON tab - columns- for graphing ports" (page 182)

Viewing statistics

Element Manager gathers Ethernet statistics you can graph in a variety of formats, or you can save them to a file and export the statistics to an outside presentation or graphing application.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Administration > System Metrics > Port Metrics**. The switch view appears in the information panel.
2	Select the single or multiple ports that you want to graph. The Interface tab appears in the information panel.
3	Click the **RMON Ether Stats** tab. The RMON Ether Stats tab appears.
4	Select one or more kinds of Packets to show the graph.
5	Click the **Line Chart icon**, the **Area Chart icon**, or the **Bar Chart icon** to show a graphical representation.

—End—

Variable definitions

Variable	Value
Octets	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). You can use this object as a reasonable estimate of Ethernet utilization. For greater precision, sample the etherStatsPkts and etherStatsOctets objects before and after a common interval.
Pkts	The total number of packets (including bad packets, broadcast packets, and multicast packets) received.
BroadcastPkts	The total number of good packets received that are directed to the broadcast address. Note that this does not include multicast packets.
MulticastPkts	The total number of good packets received that are directed to a multicast address. Note that this number does not include packets directed to the broadcast address.
CRCAlignErrors	The total number of packets received that have a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but have either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).

Variable	Value
UndersizePkts	The total number of packets received that are less than 64 octets long (excluding framing bits but including FCS octets) and are otherwise well formed.
Fragments	The total number of packets received that are less than 64 octets in length (excluding framing bits but including FCS octets) and have either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error). It is entirely normal for etherStatsFragments to increment because it counts both runts (which are normal occurrences due to collisions) and noise hits.
Collisions	The best estimate of the total number of collisions on this Ethernet segment.
Jabbers	The total number of packets received that are longer than 1518 octets (excluding framing bits, but including FCS octets) and have either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). Jabber is defined as "the condition where any packet exceeds 20 ms." The allowed range to detect jabber is between 20 ms and 150 ms. In this case, the packet length of more than 1522 is recorded in the Jabber field, and the length is between 1518 and 1522 (1518>Packet length>=1522). The length is recorded in the field of >1518.
1..64	The total number of packets (including bad packets) received that are greater than 1 but less than 64 octets in length (excluding framing bits but including FCS octets).
65..127	The total number of packets (including bad packets) received that are greater than 64 octets in length (excluding framing bits but including FCS octets) but less than 127.
128..255	The total number of packets (including bad packets) received that are greater than 127 octets in length (excluding framing bits but including FCS octets) but less than 255.
256..511	The total number of packets (including bad packets) received that were greater than 255 octets in length (excluding framing bits but including FCS octets), but less than 511.

Variable	Value
512..1023	The total number of packets (including bad packets) received that are greater than 511 octets in length (excluding framing bits but including FCS octets) but less than 1023.
1024..1518	The total number of packets (including bad packets) received that are greater than 1023 octets in length (excluding framing bits but including FCS octets) but less than 1518.
>1518	The total number of packets received that are greater than 1518 octets (excluding framing bits but including FCS octets) and are otherwise well formed.

RMON tab - columns- for graphing ports

You can graph Ethernet statistics by column.

Variable definitions

Variable	Value
Absolute	The total count since the last time counters are reset. A system reboot resets all counters.
Cumulative	The total count since the statistics tab is first opened. The elapsed time for the cumulative counter is displayed at the lower right-hand corner of the information panel.
Average/sec	The cumulative count divided by the cumulative elapsed time.
Min/sec	The minimum average for the counter for a given polling interval over the cumulative elapsed time.
Max/sec	The maximum average for the counter for a given polling interval over the cumulative elapsed time.
LastVal/sec	The average for the counter over the last polling interval.

Configuring RMON

This section details the procedures for configuring the RMON as it relates to the Element Manager.

Navigation

- "Configuring RMON history" (page 183)
- "Enabling Ethernet statistics gathering" (page 185)
- "Configuring RMON alarms" (page 186)
- "Configuring RMON events" (page 189)

- "Creating an RMON Event" (page 189)
- "Deleting an RMON Event" (page 190)
- "Disabling RMON history statistics" (page 190)
- "Disabling Ethernet statistics gathering" (page 195)

Configuring RMON history

Ethernet history records periodic statistical samples from a network. A sample is called a *history* and is gathered in time intervals referred to as *buckets*. Histories establish a time-dependent method for gathering RMON statistics on a port. The default values for history are:

- buckets are gathered at 30-minute intervals
- number of buckets gathered is 50

Both the time interval and the number of buckets is configurable. However, when the last bucket is reached, bucket 1 is dumped and recycled to hold a new bucket of statistics. Then, bucket 2 is dumped, and so forth.

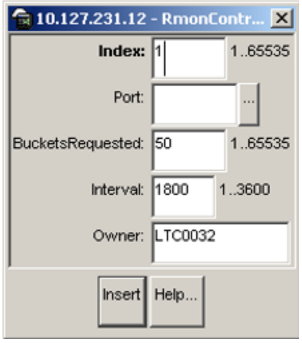
You can use RMON to collect statistics at intervals. For example, if you want RMON statistics to be gathered over the weekend, you need enough buckets to cover two days. To do this, set the history to gather one bucket each hour, thus covering a 48-hour period. After you set history characteristics, you cannot modify them; you must delete the history and create a new one.

Use this procedure to establish a history for a port and to set the bucket interval.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Administration > General > Alarm Control**. The History tab appears.
2	Click **Insert**. The **RmonControl, Insert History** dialog box appears. See"RmonControl, Insert History dialog box" (page 184).

RmonControl, Insert History dialog box



Index: 1 1..65535

Port:

BucketsRequested: 50 1..65535

Interval: 1800 1..3600

Owner: LTC0032

3 Select the port from the port list or type the port number.

4 Set the number of buckets.

The default is **50**.

5 Set the interval.

The default is **1800** (seconds).

6 Type the owner, the network management system that creates this entry.

7 Click **Insert**.

RMON collects statistics using the index, port, bucket, and interval that you specify.

—End—

Variable definitions

Variable	Value
Index	A unique value assigned to each interface. An index identifies an entry in a table.
Port	Any Ethernet interface on the device.
BucketsRequested	The requested number of discrete time intervals over which data is to be saved in the part of the media-specific table associated with this entry.

Variable	Value
BucketsGranted	The number of discrete sampling intervals over which data is saved in the part of the media-specific table associated with this entry. There are instances when the actual number of buckets associated with this entry is less than the value of this object. In this case, at the end of each sampling interval, a new bucket is added to the media-specific table.
Interval	The interval in seconds over which the data is sampled for each bucket in the part of the media-specific table associated with this entry. You can set this interval to any number of seconds between 1 and 3600 (1 hour). Because the counters in a bucket may overflow at their maximum value with no indication, note the possibility of overflow in any of the associated counters. It is important to consider the minimum time in which any counter can overflow on a particular media type and set the historyControlInterval object to a value less than this interval. This is typically most important for the octets counter in any media-specific table. For example, on an Ethernet network, the etherHistoryOctets counter can overflow in about one hour at the maximum utilization of the Ethernet.
Owner	The network management system that creates this entry.

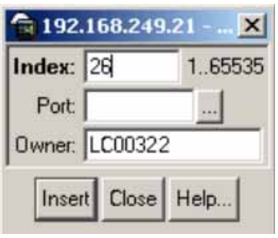
Enabling Ethernet statistics gathering

You can use RMON to gather Ethernet statistics.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Administration > General > Alarm Control**. The History tab appears.
2	Click the **Ether Stats** tab. The Ether Stats tab appears.
3	Click **Insert**. The **RmonControl, Insert Ether Stats** dialog box appears. See"RmonControl, Insert Ether Stats dialog box" (page 186)).

RmonControl, Insert Ether Stats dialog box



Index: 26 1..65535

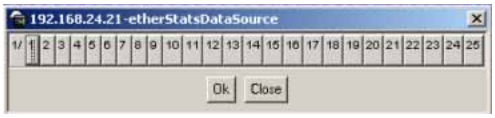
Port:

Owner: LC00322

4 Select the port.

Enter the port number you want or select the port from the list menu. "RmonControl, Insert Ether Stats dialog box port list" (page 186). Element Manager assigns the index.

RmonControl, Insert Ether Stats dialog box port list



5 Click **OK**.

6 Click **Insert**.

The new Ethernet Statistics entry is displayed in the Ether Stats tab.

—End—

Variable definitions

Variable	Value
Index	A unique value assigned to each interface. An index identifies an entry in a table.
Port	Any Ethernet interface on the device.
Owner	The network management system which created this entry.

Configuring RMON alarms

You can use the Element Manager to create and delete an RMON alarm.

Navigation

- "Creating an alarm" (page 187)
- "Deleting an alarm" (page 188)

Creating an alarm

The example alarm described in the following procedure generates at least one alarm every five minutes. The example is intended only to demonstrate how alarms fire; it is not a useful alarm. Because of the high frequency, you may want to delete this alarm and replace it with a practical setting.

Use this procedure to create an alarm to receive statistics and history using the default values.

Navigation

- "Alarm settings window" (page 192)
- "Procedure job aid" (page 187)

Procedure steps

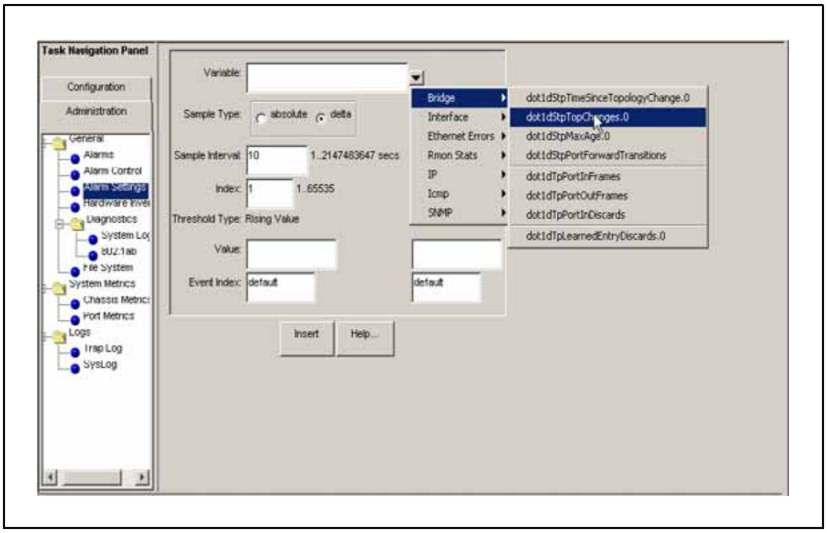
Step	Action
1	From the **Task Navigation Panel**, choose **Administration > General > Alarm Settings**. The **Alarm Settings** window appears.
2	In the variable field, select a variable for the alarm from the list and a port (or other ID) on which you want to set an alarm (See "Procedure job aid" (page 187)).
3	For this example, select Bridge > dot1dStpTopChanges.0 from the variable list. This example is a chassis alarm, indicated by the “.0” in the variable. For this example, select a rising value of 4 and a falling value of 0.
4	Leave the remaining fields at their default values, including a sample type of Delta.
5	Click **Insert**.

—End—

Procedure job aid

The following job aid provides information about the alarm variable formats.

Alarm variable list



Variable:

Sample Type: ○ absolute ● delta

Sample Interval: 10 1..2147483647 secs

Index: 1 1..65535

Threshold Type: Rising Value

Value:

Event Index: default default

Alarm variables are available in three formats:

- A chassis alarm ends in .x where the x index is hard-coded. No further information is required.
- A Spanning Tree Group (STG) or EtherStat alarm ends with a dot (.). You must enter an STG ID, IP address, or EtherStat information.
- A port alarm does not end with a dot or index and requires using the port shortcut menu. An example of a port alarm is ifInOctets (interface incoming octet count).

For this example, select Bridge > dot1dStpTopChanges.0 from the variable list. This example is a chassis alarm, indicated by the “.0” in the variable.

Deleting an alarm

Use this procedure to delete an alarm from the configuration.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Administration > General > Alarms**. The Alarms tab appears.
2	Click any field for the alarm that you want to delete.
3	Click **Delete**.

—End—

Configuring RMON events

The Remote Network Monitoring (RMON) MIB is an interface between the RMON agent on a BES1000 Series switch and an RMON management application, such as the Element Manager.

The RMON agent defines objects that are suitable for the management of any type of network, but some groups are targeted for Ethernet networks in particular.

The RMON agent continuously collects statistics and proactively monitors switch performance. You can view this data through the Element Manager.

RMON has three major functions:

- creating and displaying alarms for user-defined events
- gathering cumulative statistics for Ethernet interfaces
- tracking a history of statistics for Ethernet interfaces

How events work

An event specifies whether a trap, a log, or a trap and a log is generated to view alarm activity. When RMON is globally enabled, two default events are generated:

- RisingEvent
- FallingEvent

The default events specify that when an alarm goes out of range, the firing of the alarm is tracked in both a trap and a log. For example, when an alarm fires at the rising threshold, the rising event specifies that this information be sent to both a trap and a log. Likewise, when an alarm passes the falling threshold, the falling event specifies that this information be sent to a trap and a log.

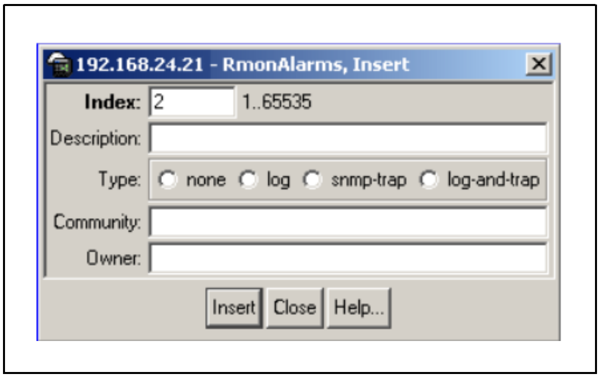
Creating an RMON Event

Use this procedure to create an RMON event.

Procedure steps

Step	Action
1	In the **Events** tab click **Insert**. The RmonAlarms, Insert Events dialog box appears "RmonAlarms Insert Events dialog box" (page 190)). For additional information, see "Events tab " (page 179)

RmonAlarms Insert Events dialog box



192.168.24.21 - RmonAlarms, Insert

Index: 2 1..65535

Description:

Type: ○ none ○ log ○ snmp-trap ○ log-and-trap

Community:

Owner:

2 In the **Description** field, type a name for the event.

3 Select the type of event you want.

You can set the event type to log to save memory or to snmp-trap to reduce traffic from the switch or for better CPU utilization.

If you select snmp-trap or log-and-trap, you must set trap receivers.

4 Click **Insert.**

The new event is displayed in the Events tab.

—End—

Deleting an RMON Event

Use this procedure to delete an event.

Procedure steps

Step Action

1 In the **Events** tab, highlight an event **Description**.

2 Click **Delete**.

The event is removed from the table.

—End—

Disabling RMON history statistics

Use this procedure to disable RMON history on a port.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Administration > General > Alarm Control**. The History tab appears.
2	Highlight the row that contains the port ID you want to delete.
3	Click **Delete**. The entry is removed from the table.

—End—

Viewing Alarm settings

Use the Element Manager to view alarms and alarm settings.

Procedure steps

Step	Action
1	From the **Task Navigation Panel**, choose **Administration > General > Alarm Settings**.
2	Choose **Administration**.
3	Choose **General**.
4	Choose **Alarm Settings**.

—End—

Navigation

- "Alarm settings window" (page 192)
- "Alarms tab" (page 193)

Alarm settings window

Variable definitions

Field	Description
Variable	Name and type of alarm indicated by the format: • alarmname.x, where x=0 indicates a chassis alarm. • alarmname. An alarm where the user must specify the index. This is a card number for module-related alarms, an STG ID for spanning tree group alarms (the default STG is 1, other STG IDs are user-configured), or the Ether Statistics Control Index for RMON Stats alarms. An alarmname without a dot or index is a port-related alarm and appears in the display of the port selection tool.
Sample Type	Can be either absolute or delta. For more information about sample types, see RMON alarms.
Sample Interval	Time period (in seconds) over which the data is sampled and compared with the rising and falling thresholds.
Index	Uniquely identifies an entry in the alarm table. Each such entry defines a diagnostic sample at a particular interval for an object on the device.

Threshold type	Rising value	Falling value
Value	When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval is less than this threshold, the value generates a single event.	When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval is greater than this threshold, the value generates a single event.
Event Index	Index of the event entry that is used when a rising threshold is crossed. The event entry identified by a particular value of this index is the same as identified by the same value of the event index	Index of the event entry that is used when a falling threshold is crossed. The event entry identified by a particular value of this index is the same as identified by the same value of the event index

Threshold type	Rising value	Falling value
	object. (Generally, accept the default that is already filled in.)	object. (Generally, accept the default that is already filled in.)

Alarms tab

The Alarms tab displays the RMON statistics and history for the port for which you create an alarm.

Variable definitions

Variable	Value
Index	Uniquely identifies an entry in the alarm table. Each such entry defines a diagnostic sample at a particular interval for an object on the device
Interval	The interval in seconds over which data is sampled and compared with the rising and falling thresholds. When setting this variable, in the case of deltaValue sampling, set the interval short enough so that the sampled variable is unlikely to increase or decrease by more than 2^31 - 1 during a single sampling interval.
Variable	The object identifier of the particular variable to be sampled. Only variables that resolve to an ASN.1 primitive type of INTEGER (INTEGER, Counter, Gauge, or TimeTicks) can be sampled.
Sample Type	The method of sampling the selected variable and calculating the value to be compared against the thresholds. If the value of this object is absoluteValue(1), the value of the selected variable is compared directly with the thresholds at the end of the sampling interval. If the value of this object is deltaValue(2), the value of the selected variable at the last sample is subtracted from the current value, and the difference is compared with the thresholds.
Value	The value of the statistic during the last sampling period. For example, if the sample type is deltaValue, this value is the difference between the samples at the beginning and end of the period. If the sample type is absoluteValue, this value is the sampled value at the end of the period. This is the value that is compared with the rising and falling thresholds. The value during the current sampling period is not made available until the period is completed and remains available until the next period completes.

Variable	Value
StartupAlarm	The alarm that may be sent when this entry is first set to valid. If the first sample after this entry becomes valid is greater than or equal to the risingThreshold, and alarmStartupAlarm is equal to risingAlarm(1) or risingOrFallingAlarm(3), then a single rising alarm is generated. If the first sample after this entry becomes valid is less than or equal to the fallingThreshold, and alarmStartupAlarm is equal to fallingAlarm(2) or risingOrFallingAlarm(3), then a single falling alarm is generated.
RisingThreshold	A threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval is less than this threshold, a single event is generated. A single event is also generated if the first sample after this entry becomes valid is greater than or equal to this threshold, and the associated alarmStartupAlarm is equal to risingAlarm(1) or risingOrFallingAlarm(3). After a rising event is generated, another such event is not generated until the sampled value falls below this threshold and reaches the alarmFallingThreshold.
RisingEventIndex	The index of the eventEntry that is used when a rising threshold is crossed. The eventEntry identified by a particular value of this index is the same as identified by the same value of the eventIndex object. If there is no corresponding entry in the eventTable, then no association exists. In particular, if this value is zero, no associated event is generated because zero is not a valid event index.
FallingThreshold	A threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval is greater than this threshold, a single event is generated. A single event is also generated if the first sample after this entry becomes valid is less than or equal to this threshold, and the associated alarmStartupAlarm is equal to fallingAlarm(2) or risingOrFallingAlarm(3). After a falling event is generated, another such event is not generated until the sampled value rises above this threshold and reaches the alarmRisingThreshold.

Variable	Value
FallingEventIndex	The index of the eventEntry that is used when a falling threshold is crossed. The eventEntry identified by a particular value of this index is the same as identified by the same value of the eventIndex object. If there is no corresponding entry in the eventTable then no association exists. In particular, if this value is zero, no associated event is generated, because zero is not a valid event index.
Owner	The network management system which creates this entry.
Status	The status of this alarm entry.

Disabling Ethernet statistics gathering

Use this procedure to disable set Ethernet statistics gathering parameters.

Procedure steps

Step **Action**

1 From the **Task Navigation Panel**, choose **Administration > General > Alarm Control**.

The History tab appears.

2 Click the **Ether Stats** tab.

The Ether Stats tab appears.

3 Highlight the row that contains the port ID you want to delete.

4 Click **Delete**.

The Ether Stats entry is removed from the table.

—End—

Fault management

Use this information to learn how to isolate and diagnose problems with your BES1000 Series switch.

Navigation

- "Interpreting the LEDs" (page 196)
- "Diagnosing and correcting problems" (page 196)
- "Creating an RMON fault threshold" (page 199)

- "Deleting an RMON threshold configuration" (page 200)
- "Viewing RMON history" (page 200)

Interpreting the LEDs

For information about interpreting the LEDs for the BES1000, see "LED display panel" (page 213).

Diagnosing and correcting problems

Before you execute the problem-solving steps described in this section, cycle the power to the BES1000 Series switch (disconnect and then reconnect the AC power cord); then, verify that the switch follows the normal power-up sequence.

CAUTION
To avoid injury from hazardous electrical current, do not remove the top cover of the device. There are no user-serviceable components inside.

Vorsicht
Um Verletzungsgefahr durch einen elektrischen Stromschlag auszuschließen, nehmen Sie niemals die obere Abdeckung vom Gerät ab. Im Geräteinnern befinden sich keine Komponenten, die vom Benutzer gewartet werden können.

Avertissement
Pour éviter tout risque d'électrocution, ne jamais retirer le capot de l'appareil. Cet appareil ne contient aucune pièce accessible par l'utilisateur.

Advertencia
A fin de evitar daños personales por corrientes eléctricas peligrosas, no desmonte nunca la cubierta superior de este dispositivo. Los componentes internos no son reparables por el usuario.

Avvertenza
Per evitare lesioni fisiche dovute a scariche pericolose di corrente, non rimuovere mai il coperchio superiore del dispositivo. I componenti interni non possono essere manipolati dall'utente.

Caution:

警告：危険な電流から身体を保護するために、ディバイスの
上部カバーを決して取り外さないでください。内部には、
ユーザが扱うコンポーネントはありません。

Normal power-up sequence

In a normal power-up sequence, the LEDs appear as follows:

Procedure steps

Step	Action
1	After power is applied to the switch, the Pwr (Power) LED turns on within 5 seconds (s).
2	The switch initiates a self-test during which the port LEDs display various patterns to indicate the progress of the self-test.
3	After the self-test, the remaining port LEDs indicate their operational status, as described in the following table.

—End—

In a normal power-up sequence, the LEDs appear as follows:

Corrective actions

Symptom	Probable cause	Corrective action
All LEDs are off.	The switch is not receiving AC power.	Verify that the AC power cord is fastened securely at both ends and that power is available at the AC power outlet.

Symptom	Probable cause	Corrective action
	The fans are not operating or the airflow is blocked, causing the unit to overheat.	Verify that there is sufficient space for adequate airflow on both sides of the switch. **Note**: The operating temperature for the switch must not exceed 40°C (104°F). Do not place the switch in areas where it can be exposed to direct sunlight or near warm air exhausts or heaters.
The Activity LED for a connected port is off or does not blink (and you have reason to believe that traffic is present).	The switch is experiencing a port connection problem.	See Port connection problems.
	The link partner for the switch is not autonegotiating properly.	

Port connection problems

You can usually trace port connection problems to either a poor cable connection or an improper connection of the port cables at either end of the link. To remedy these types of problems, make sure that the cable connections are secure and that the cables connect to the correct ports at both ends of the link. Port connection problems are also traceable to the autonegotiation mode or the port interface.

Autonegotiation modes

Port connection problems can occur when a port (or station) is connected to another port (or station) that is not operating in a compatible mode (for example, connecting a full-duplex port on one station to a half-duplex port on another station). The BES1000 Series switch negotiates port speeds according to the IEEE 802.3u autonegotiating standard. The switch adjusts (autonegotiates) its port speed and duplex mode to match the best service provided by the connected station. Autonegotiation is a two-way protocol that requires participation from both ends of the link to operate properly. If both ends of the link are not configured for autonegotiation, the switch autosenses. When it is in autosense mode, the switch can determine the proper speed (100 Mb/s or 10 Mb/s) but not the duplex. As a result, it defaults to half-duplex mode:

- If autonegotiation is enabled on the switch port and the end station, the switch successfully negotiates the best port speed and duplex mode available from the connected station, up to 100 Mb/s in full-duplex mode.
- If the connected station uses a form of autonegotiation that is not compatible with the IEEE 802.3u autonegotiating standard, the BES1000 Series switch cannot negotiate a compatible mode for correct operation and reverts to autosensing.
- If the autonegotiation feature is not present or not enabled at the connected station, the BES1000 Series switch reverts to autosensing.

Correcting mode mismatches If the autonegotiation feature is not present or not enabled, or if the connected station uses a form of autonegotiation that is not compatible, you can correct the mode mismatch problem.

Procedure steps

Step	Action
1	Disable the autonegotiation feature at the connected station.
2	Manually set the speed/duplex mode of the connected station to the same speed/duplex mode set for the BES1000 Series switch port.

—End—

Port interface

Ensure that the devices are connected using the appropriate crossover or straight-through cable, and that autonegotiation is active. See "Connector and pin assignments " (page 256).

Creating an RMON fault threshold

Create the RMON threshold parameters to receive notification of fault conditions (alarms). RMON threshold configurations are not modifiable. They must be deleted and the information recreated.

Procedure steps

Step	Action
1	From the main menu, choose **Device Monitoring > Events > RMON Threshold**. The RMON Threshold page appears.

2 In the RMON Threshold Creation section, type information in the text boxes or select from a list.

3 Click **Submit**.

The new configuration is displayed in the RMON Threshold Table.

—End—

Deleting an RMON threshold configuration

Delete an existing RMON threshold configuration to create new threshold information.

Procedure steps

Step Action

1 From the main menu, choose **Device Monitoring > Events > RMON Threshold**.

The RMON Threshold page appears.

2 In the RMON Threshold table, click the **Delete** icon for the entry you want to delete.

A message appears prompting you to confirm your request.

3 To delete the RMON threshold configuration click **Yes**.

4 To return to the RMON Threshold page without making changes, click **Cancel**.

—End—

Viewing RMON history

View a periodic statistical sampling of data from the network.

Procedure steps

Step Action

1 From the main menu, choose **Device Monitoring > Events > RMON History**. The RMON History page appears.

2 In the **RMON History Statistics** section, choose the port number to be monitored.

3 Click **Submit**.

The RMON History Statistics Table is updated with information about the selected device and port.

—End—

Installing SFPs

CAUTION
SFPs are keyed to prevent incorrect insertion. If an SFP resists pressure, do not force it; turn it over and reinsert it.

Use this procedure to install an SFP.

Procedure steps

Step **Action**

1 Remove the SFP from its protective packaging.

2 Verify that the SFP is the correct model for your network configuration.
See "1000BASE-SFP models" (page 223) for information about the SFPs models supported.

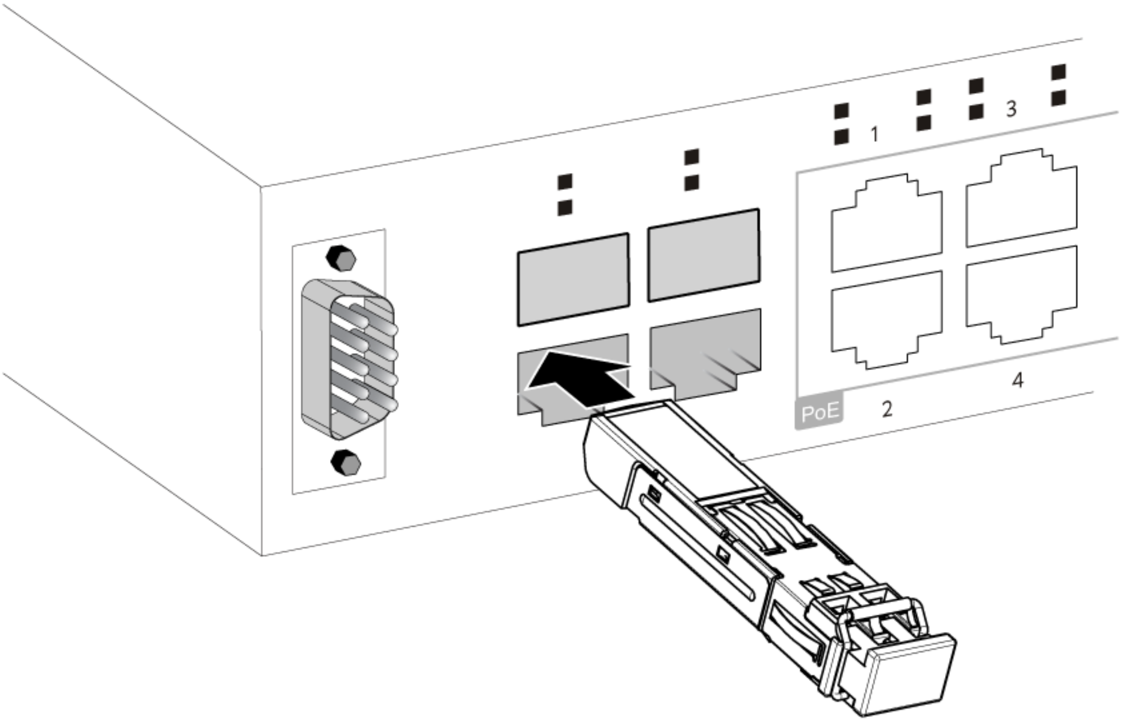
3 Grasp the SFP between your thumb and forefinger.

4 Insert the SFP into the SFP slot on the module.

See Inserting an SFP. Apply light pressure to the SFP until the device clicks and locks into position in the module.

—End—

Inserting an SFP



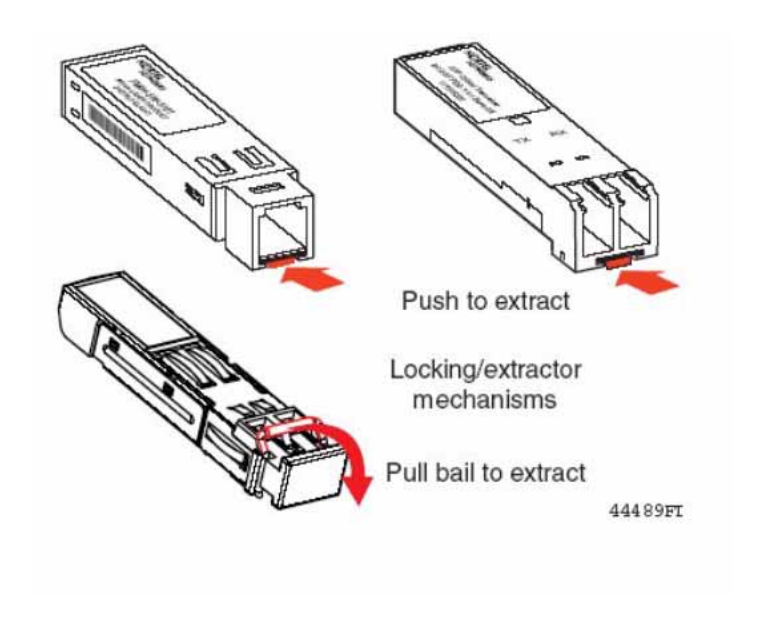
Removing an SFP

Use this procedure to remove an SFP. Your SFP locking/extractor mechanism may be different than the models shown.

Procedure steps

Step	Action
1	Disconnect the network fiber cable from the SFP connector.

Removing an SFP



2 Depending on your SFP model, press the locking/extractor mechanism on the SFP to release the SFP.

3 Slide the SFP out of the module SFP slot.

4 If the SFP does not slide easily from the module slot, use a gentle side-to-side rocking motion while firmly pulling the SFP from the slot.

5 Attach a dust cover over the fiber optic bores and store the SFP in a safe place until needed.

—End—

Managing the BES System Software

Use these procedures to manage the BES1000 system software.

Navigation

- "Downloading switch images" (page 204)
- "Modifying system settings" (page 32)
- "Rebooting the BES1000 Series switch" (page 205)
- "Rebooting the BES1000 Series switch to system defaults" (page 206)
- "Storing and retrieving a switch configuration file from a TFTP server" (page 206)

Downloading switch images

Download the BES1000 Series switch software image to nonvolatile flash memory to save the image on the device.

Prerequisites

- Take care not to interrupt the download process until after it runs to completion (the process can take up to 10 min, depending on network conditions).

> **CAUTION**
> Do not interrupt power to the device during the software download process. A power interruption can corrupt the firmware image.

- The policy switch must have an IP address. For information about configuring the switch IP address, see "Configuring IP and gateway settings" (page 249).
- The policy switch needs a configured Trivial File Transfer Protocol (TFTP) or HTTP server in your network. For information about TFTP, see "Storing and retrieving a switch configuration file from a TFTP server" (page 206).

Procedure steps

Step Action

1 From the main menu, choose **Configuration > Software Download**.

The Software Download page appears.

2 Type information in the text boxes, or select from a list.

3 Click **Submit**.

The switch downloads the new software image and programs it. When the download completes, the switch resets, and the new software image initiates the switch self-test.

> **ATTENTION**
> The LEDs display various patterns to indicate that the tests are in progress.

—End—

Variable definitions

Variable	Value
Current Running Version	The version of the current running software.
Local Store Version	The software version that is stored.
Software Image Filename	Type the software image file name.
Diagnostics Image Filename	Type the diagnostics file name from 1 to 30 characters long.
TFTP Server IP Address	Type the IP address of your TFTP load host. The format of the IP address is XXX.XXX.XXX.XXX
Start TFTP Load of New Image	Choose the software image to load: (1) No image (2) Software Image (3) Diagnostics (4) Software Image If Newer (5) Download Without Reset
HTTP Software Download Settings	
Software Image Filename	Type a filename or browse to find the file to download.
Start HTTP Load of New Image	Choose Yes or No.

Rebooting the BES1000 Series switch

You can reboot a standalone switch without erasing any configured switch parameters. While rebooting, the switch initiates a self-test that comprises various diagnostic routines and subtests. The LEDs display various patterns to indicate that the subtests are in progress.

Procedure steps

Step Action

1 From the main menu, choose **Administration > Reset**.

The Reset page appears. The reset warning message appears.

2 Click **OK**.

ATTENTION

If you have not configured system password security, a reset returns you to the home page. If you have configured system password security, a reset returns you to a log on page.

—End—

Rebooting the BES1000 Series switch to system defaults

Reboot the switch to replace all configured switch parameters with the factory default values. During the process of changing to default settings, the switch initiates a self-test that comprises various diagnostic routines and subtests.

Prerequisites

- Ensure that you want to replace configured settings with factory default settings before you perform this procedure.

CAUTION

If you choose change to default settings, all configured settings are replaced with factory default settings when you click Submit. For more information about factory default settings, see "Configuring IP and gateway settings" (page 249).

Procedure steps

Step	Action
1	From the main menu, choose **Administration**.
2	Choose **Reset to Default**. The reset to default warning message appears.

—End—

The LEDs display various patterns to indicate that the subtests are in progress.

Storing and retrieving a switch configuration file from a TFTP server

Store switch configuration parameters on a Trivial File Transfer Protocol (TFTP) server, so you can retrieve the configuration parameters of a switch and use the retrieved parameters to automatically configure a replacement switch.

To store a switch configuration you must set up the file on your TFTP server and set the filename read/write permission to enabled.

A properly configured TFTP server must be present in your network, and the BES1000 Series switch must have an IP address to download the BES1000 Series switch configuration file.

Prerequisites

- The Configuration File feature can only be used to copy standalone switch configuration parameters to other standalone switches.
- A configuration file obtained from a standalone switch can be used only to configure other standalone switches that have the same firmware revision and model type as the donor standalone switch.

Configuration File page items

These parameters are not saved	Configured in this Web page	See
Switch IP Address	IP page	"Configuring initial settings by using the Quick Start feature" (page 37)
Subnet Mask		
Default Gateway		
Configuration Image Filename	Configuration File page	"Procedure steps" (page 207)
TFTP Server IP Address		
Read-Only Switch Password	Passwords page	"Configuring initial settings by using the Quick Start feature" (page 37)
Read-Write Switch Password		
Console Switch Password Type		
Web Switch Password Type		

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > Configuration File**. The Configuration File page appears.
2	Type information in the text boxes, or select from a list.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
Configuration Image Filename	Type the configuration file name. The range is from 1 to 30 characters.
TFTP Server IP Address	Type the IP address of the TFTP load host.
Copy Configuration Image to Server	Choose whether to copy the configuration image to the server. Possible values are : Yes, No.
Retrieve Configuration Image from Server	Choose whether to retrieve the configuration image from a server. If you choose Yes, the download process begins immediately and, when completed, causes the switch to reset with the new configuration parameters. Possible values: Yes, No
HTTP Configuration File Upload / Download	
Configuration Image Filename	Type a filename or browse to find the location of the image to download.
Save Configuration Image	Choose to download and save the image to the location you choose.

BES1000 fundamentals

Use this information to understand the Business Ethernet Switch 100 Series hardware and software release 1.0.

You can manage the switch using one of the following methods:

- Console interface—You can use the console interface to configure and manage the switch locally. Access the console interface (CI) menus and screens locally through a console terminal that is attached to the Ethernet switch.
- Web-based management—You can manage the network from the World Wide Web. Access the Web-based graphical user interface (GUI) through the HTML-based browser on your network. You can use the GUI to configure, monitor, and maintain your network through Web browsers. You can also download software by using the Web.
- Business Element Manager—The Element Manager is a client-based management application that runs on a Microsoft Windows-based computer. With the Element Manager, you can connect to BES1000 Series switch devices over an IP network. The Element Manager is used to configure, administer, and monitor BES1000 Series switch devices.

Version 1.0 of the BES1000 Series switch software supports the following devices:

- BES1010-24T
- BES1010-48T
- BES1020-24T PWR
- BES1020-48T PWR

Navigation

- For information about the hardware components of the BES1000 Series switches, see "Hardware components of the BES1000 Series switch" (page 210)
- "Network configuration examples" (page 218)

- "SFP transceiver" (page 220)
- "Configuring an IP address using BootP" (page 224)
- "Configuration and switch management" (page 223)
- "SNMP" (page 228)
- "MAC address-based security" (page 228)
- "SNTP" (page 229)
- "Virtual local area networks" (page 229)
- "Spanning Tree Protocol" (page 240)
- "802.1p Class of Service support" (page 246)
- "IEEE 802.3ad Link Aggregation" (page 247)
- "IGMP Snooping" (page 249)

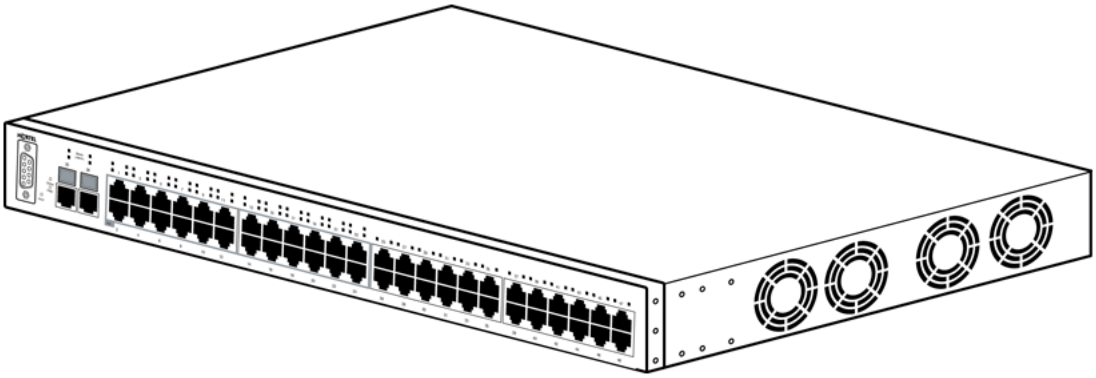
Hardware components of the BES1000 Series switch

Hardware components found in the BES1000 Series switch are described by the information that follows.

Front panel

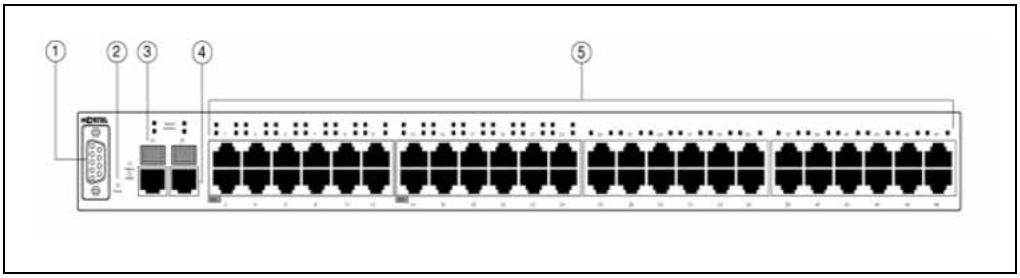
"BES1020-48T PWR" (page 210) shows the front and side views of the BES1020-48T PWR.

BES1020-48T PWR



"BES1020-48T PWR front panel" (page 211) shows the configuration of the front panel on the BES1020-48T PWR. "Components on the BES1000 Series switch front panel" (page 211) describes the components on the front panel of all BES1000 Series switches.

BES1020-48T PWR front panel



Components on the BES1000 Series switch front panel

Item	Description
1	Console port
2	Reset button—resets the switch to factory defaults
3	SFP GBIC slots
4	1000 BaseT RJ-45 connector ports
5	10/100/1000 RJ-45 port connectors

Console port

The console port lets you access the CI screens and customize your network using the console menu and screens.

The Console port is a DB-9, RS-232-D male serial port connector. You can use this connector to connect a management station, console, or terminal to the BES1000 Series switch by using a straight-through DB-9 to DB-9 standard serial port cable. You must use a VT100/ANSI-compatible terminal (for cursor control and to enable cursor and functions keys) to use the console port.

ATTENTION

The console port is configured as a Data Communications Equipment (DCE) connector. Ensure that your RS-232 cable pinouts are configured for DCE connections. For more information, see "Connector and pin assignments " (page 256)

The default settings of the Console port are:

- 9600 baud with eight data bits
- one stop bit
- no parity as the communications format
- flow control set to disabled

Reset button - for reset to factory default

The reset button resets the switch and sets all switch properties to the factory default values.

> ***Note:*** In order to reset the switch, you must press and hold the reset button for approximately four seconds.

SFP gigabit interface converters

Small form factor pluggable gigabit interface converters (SFP GBIC) are input/output enhancement components that are hot-swappable. SFP GBICs are designed for use with Nortel products to allow gigabit Ethernet ports to link with other gigabit Ethernet ports over various media types, including fiber optics.

The BES1000 Series switch supports the following SFPs:

- 1000Base-SX SFP GBIC (mini-GBIC, connector type: LC)
- 1000Base-SX SFP GBIC (mini-GBIC, connector type: MT-RJ)
- 1000Base-LX SFP GBIC (mini-GBIC, connector type: LC)

For more information about the SFP GBICs, see "SFP transceiver" (page 220).

10, 100, and 1000 RJ-45 port connectors

The BES1000 Series switch uses 10BASE-T/100BASE-TX RJ-45 (8-pin modular) port connectors.

The 10BASE-T/100BASE-TX port connectors are configured as MDI-X (Media Dependent Interface-crossover), which means that the port connectors enable connections between like devices. The ports are connected by straight cables to the network interface card (NIC) in a node or a server. If you want to connect the port connectors to an Ethernet hub or Ethernet switch, you need to use a crossover cable because those cables are specifically designed for Ethernet use. If you already have an MDI connection on the corresponding port on the Ethernet device, you only need a straight cable to connect the switch.

The BES1000 Series switch uses autosensing ports designed to operate at 10 megabits per second (Mbits/s) or at 100 megabits per second (Mbits/s), depending on the connecting device. These ports support the IEEE 802.3u autonegotiation standard, which means that when a port is connected to another device that also supports the IEEE 802.3u standard, the two devices negotiate the best speed and duplex mode

The 10BASE-T/100BASE-TX switch ports also support half- and full-duplex mode operation.

The 10BASE-T/100BASE-TX RJ-45 switch ports can connect to 10 Mb/s or 100 Mb/s Ethernet segments or nodes.

ATTENTION
Use Category 3, 4, or 5 copper unshielded twisted pair (UTP) cable connections when connecting 10BASE-T/100BASE-TX ports.

For more information about RJ-45 port connectors, see "Connector and pin assignments " (page 256).

Auto-MDI and MDI-X

The 10/100BASE-TX port connectors support auto-MDI/MDI-X. Typical MDI-X ports connect straight-through cables to the NIC in a node or server, similar to a conventional Ethernet repeater hub. However, with the auto-MDI/MDI-X feature and autonegotiation enabled, you can still use straight-through cables while connecting to an Ethernet hub or switch.

Power over Ethernet on BES1020

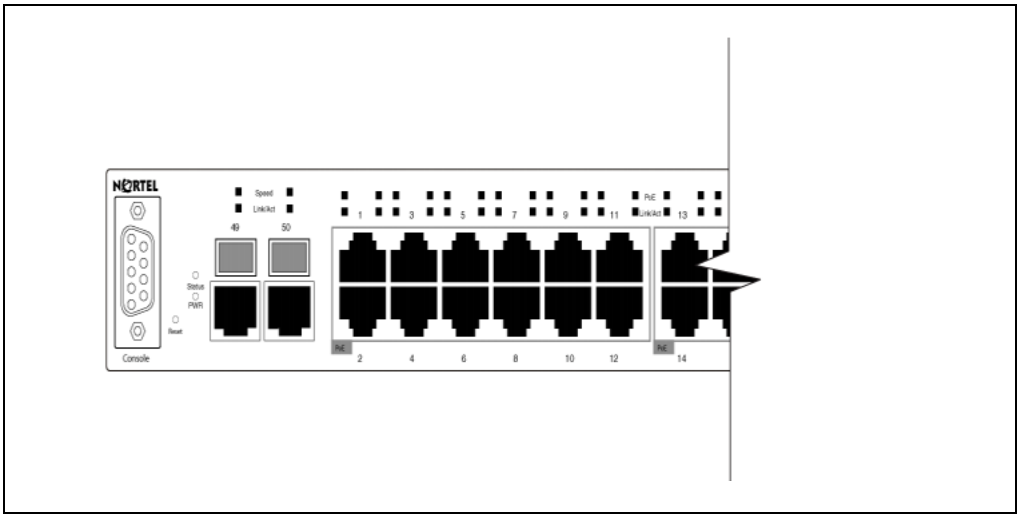
The BES1020 provides IEEE 802.3af-compliant power over the PoE-labeled front-panel RJ-45 ports. The switch provides power discovery and power management on a per port basis. You can use the BES1020 to provide power to network appliances, such as IP telephones, wireless access points, and video devices.

You can enable or disable power to an individual port using the Web-based management interface. For more information about PoE, see"Configuring Power over Ethernet (PoE) management" (page 52) and "Viewing switch power information" (page 147).

LED display panel

"BES1020-48T PWR LED display panel" (page 214) shows a sample display of the LED panel for the BES1020-48T PWR. See "BES1000 Series switch LED descriptions" (page 214) for a description of the BES1000 Series switch LEDs.

BES1020-48T PWR LED display panel



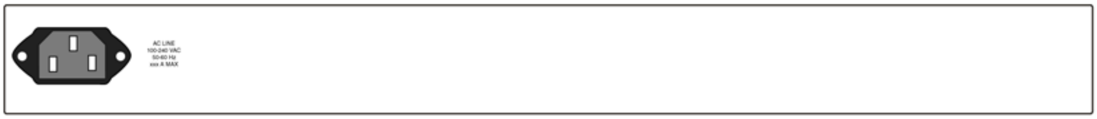
BES1000 Series switch LED descriptions

Label	Color/Status	Meaning
(Left) Link/Act	Green/Steady	This port is linked at 1000 Mbps, and the link is good.
	Green/Flashing	This port is operating at 1000 Mbps.
	Amber/Steady	This port is linked at 10/100 Mbps.
	Amber/Flashing	This port is operating at 10/100 Mbps.
	Off	The link is bad, or nothing is connected to this port.
(Right) LED PoE versions only	Green/Steady	The PoE feature is operating.
	Amber/steady	A PoE fault has occurred.
	Off	No power is being supplied to the port.
Status	Green/Flashing	The switch is booting up and is performing a self-test.
	Green	Self-test passed, and switch is operational.
	Off	The switch failed the self-test.
PWR	Green	Power on.
	Off	Switch is not connected to a power source.

Back panel

The back panel of the BES1000 Series switch is shown in "BES1000 Series switch back panel" (page 215). "Components on the BES1000 Series switch back panel" (page 215) describes the components on the back panel.

BES1000 Series switch back panel



Components on the BES1000 Series switch back panel

Item	Description
1	AC power receptacle

Cooling fans

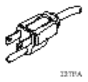
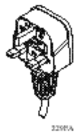
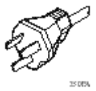
Two cooling fans are located on one side of the BES1010-24T unit in the BES1000 Series switch to provide cooling for the internal components. Other models in the BES1000 Series switch have four cooling fans. See "BES1020-48T PWR" (page 210). When you install the switch, be sure to allow enough space on both sides of the switch for adequate ventilation. For more information about installing the BES1000 Series switch, see the *Quick Installation Guide for the Nortel Business Ethernet Switch 100* (NN47920-300).

AC power receptacle

The AC power receptacle accepts the AC power cord, which is supplied with the switch. For installation outside North America, make sure that you have the proper power cord for your region. Any cord used must have a CEE-22 standard V female connector on one end and must meet the IEC 320-030 specifications. "International power cord specifications" (page 215) lists specifications for international power cords.

International power cord specifications

Country/Plug description	Specifications	Typical plug
Continental Europe: CEE7 standard VII male plug Harmonized cord (HAR marking on the outside of the cord jacket to comply with the CENELEC Harmonized Document HD-21)	220 or 230 VAC 50 Hz Single phase	

Country/Plug description	Specifications	Typical plug
U.S./Canada/Japan: NEMA5-15P male plug UL recognized (UL stamped on cord jacket) CSA certified (CSA label secured to the cord)	100 or 120 VAC 50–60 Hz Single phase	
United Kingdom: BS1363 male plug with fuse Harmonized cord	240 VAC 50 Hz Single phase	
Australia: AS3112-1981 Male plug	240 VAC 50 Hz Single phase	

CAUTION
Please read immediately.

Inspect the power cord to determine if it provides the proper plug and is appropriately certified for use with your electrical system. Immediately discard this power cord if it is inappropriate for the electrical system of your country and obtain the proper cord as required by your national electrical codes or ordinances.

Refer to the technical documentation of this product for the detailed installation procedures to be followed by qualified service personnel.

Vorsicht: Bitte sofort lesen.
Sehen Sie nach, ob dieses Netzkabel über den richtigen Stecker verfügt und für die Verwendung in Ihrem Stromversogungsnetz zertifiziert ist. Falls dieses Kabel nicht für das Stromversorgungsnetz in Ihrem Land geeignet ist, darf es nicht verwendet werden. Besorgen Sie sich ein Kabel, das die Vorschriften der Zulassungsbehörden in Ihrem Land erfüllt.

Die technische Dokumentation dieses Produkts enthält ausführliche Installationsanweisungen, die nur von qualifiziertem Kundendienstpersonal ausgeführt werden dürfen.

Attention: Lisez ceci immédiatement.
Examinez ce cordon d’alimentation pour déterminer s’il dispose de la fiche appropriée et s’il est bien agréé pour utilisation sur votre installation électrique. Débarrassez-vous en immédiatement s’il ne convient pas à l’utilisation sur le secteur électrique en usage dans votre pays et procurez-vous un cordon conforme à la réglementation nationale en vigueur.

Reportez-vous à la documentation technique de ce produit pour obtenir des instructions détaillées d’installation, destinées à un technicien qualifié.

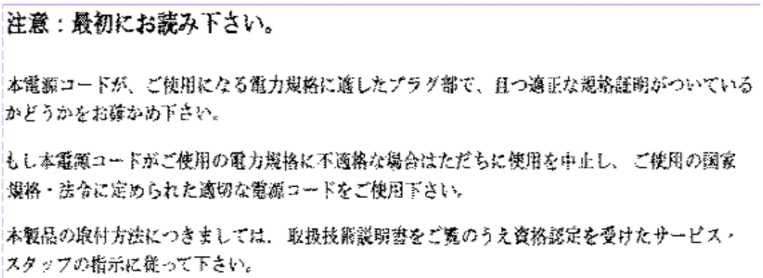
Attenzione: Leggere attentamente.
Controllare questo cavo di alimentazione, verificarne il collegamento con la presa appropriata nonché la certificazione per l’uso nell’impianto elettrico posseduto. Non utilizzare assolutamente in caso tale cavo non sia adatto al sistema elettrico del paese in cui viene utilizzato e richiederne un altro certificato dall’ente nazionale di fornitura elettrica.

Per le procedure di installazione che devono essere seguite dal personale di servizio, consultare questa documentazione tecnica del prodotto.

Advertencia: Sírvase leer inmediatamente.
Inspeccione este cable de alimentación eléctrica y determine si viene con el enchufe apropiado y está debidamente certificado para el uso con su sistema eléctrico. Si no cumple con los reglamentos del sistema eléctrico de su país, despójese de este cable de alimentación inmediatamente y obtenga el cable requerido, según las ordenanzas y códigos eléctricos nacionales.

Refiérase a la documentación técnica de este producto para recibir información detallada sobre los procedimientos que el personal calificado de reparaciones deberá seguir.

Caution:



注意：最初にお読み下さい。

本電源コードが、ご使用になる電力規格に適したプラグ部で、且つ適正な規格証明がついているかどうかをお確かめ下さい。

もし本電源コードがご使用の電力規格に不適格な場合はただちに使用を中止し、ご使用の国家規格・法令に定められた適切な電源コードをご使用下さい。

本製品の取付方法につきましては，取扱技術説明書をご覧のうえ資格認定を受けたサービス・スタッフの指示に従って下さい。

WARNING
Removal of the power cord is the only way to turn off power to this device. The power cord must always be connected in a location that can be accessed quickly and safely in case of an emergency.

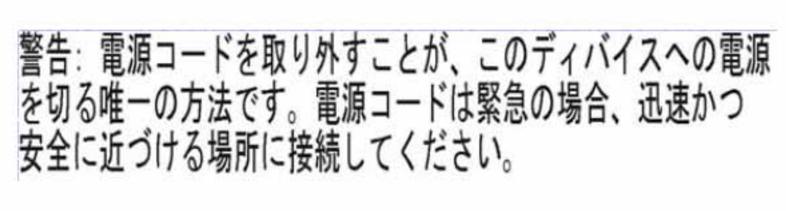
Vorsicht:
Die Stromzufuhr zu diesem Gerät kann nur durch Ziehen des Netzstromkabels unterbrochen werden. Die Netzsteckdose, an die das Netzstromkabel angeschlossen ist, muß sich stets an einem Ort befinden, der bei einem Notfall schnell und einfach zugänglich ist

Avertissement
Le débranchement du cordon d'alimentation constitue le seul moyen de mettre cet appareil hors tension. Le cordon d'alimentation doit donc toujours être branché dans une prise accessible pour faciliter la mise hors tension en cas d'urgence.

Advertencia:
La única forma de desconectar la alimentación de este dispositivo es desenchufar el cable de alimentación. El cable de alimentación siempre debe estar conectado en una ubicación que permita acceder al cable de forma rápida y segura en caso de emergencia

Avvertenza:
Estrarre il cavo di alimentazione è l'unico sistema per spegnere il dispositivo. Il cavo di alimentazione deve essere sempre collegato in una posizione che permetta l'accesso facile e sicuro in caso di emergenza.

WARNING



警告：電源コードを取り外すことが、このディバイスへの電源を切る唯一の方法です。電源コードは緊急の場合、迅速かつ安全に近づける場所に接続してください。

Network configuration examples

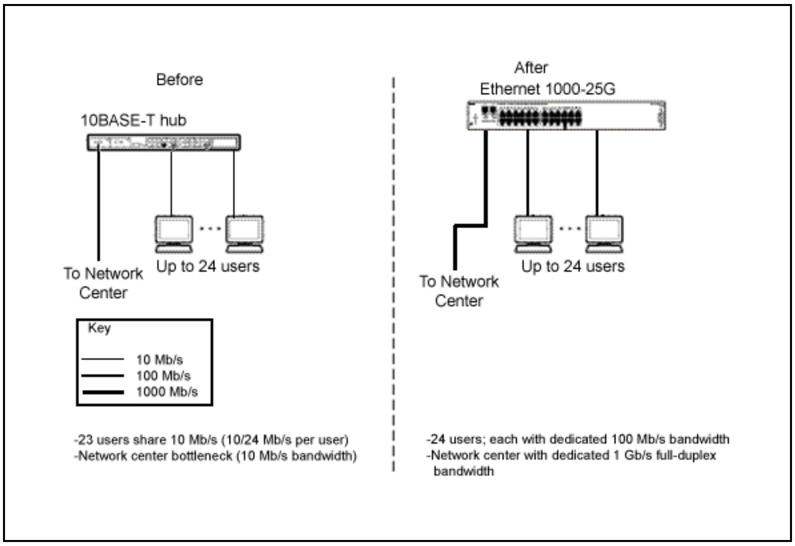
This section provides network configuration examples using the BES1000 Series switch. In these examples, the packet classification feature can be used to prioritize the traffic of the network to ensure uninterrupted traffic of critical applications. The examples are:

- "Desktop switch application" (page 218)
- "Segment switch application" (page 219)
- "High-density switched workgroup application" (page 220)

Desktop switch application

BES1000 Series switch used as a desktop switch shows the BES1000 Series switch used as a desktop switch. The desktop workstations are connected directly to switch ports.

BES1000 Series switch used as a desktop switch



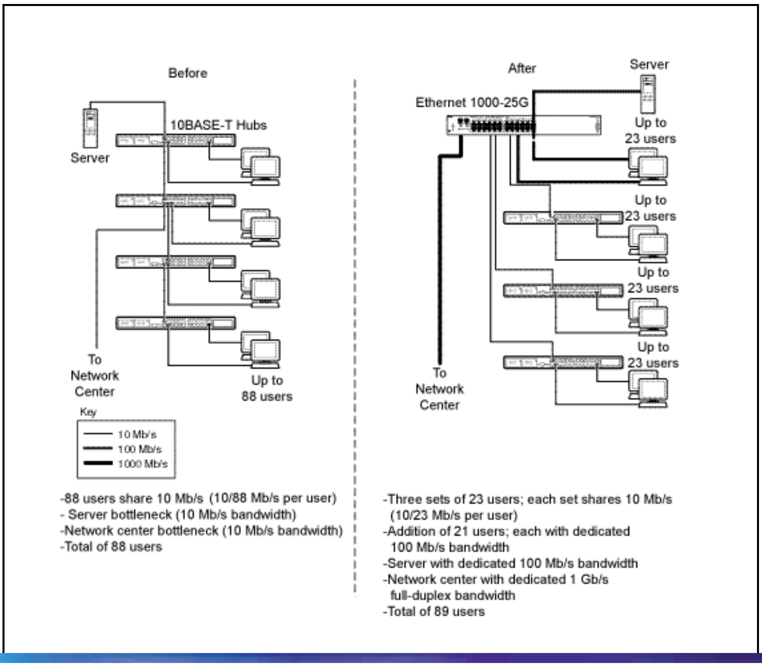
-23 users share 10 Mb/s (10/24 Mb/s per user)
-Network center bottleneck (10 Mb/s bandwidth)

-24 users; each with dedicated 100 Mb/s bandwidth
-Network center with dedicated 1 Gb/s full-duplex bandwidth

Segment switch application

BES1000 Series switch used as a segment switch shows the BES1000 Series switch used as a segment switch to alleviate user contention for bandwidth and to eliminate server and network congestion. Before segmentation, 88 users had a total bandwidth of only 10 Mb/s available. After segmentation, 92 users have 40 Mb/s, four times the previous bandwidth; the segment switch adds 22 dedicated 100 Mb/s connections. This configuration can be extended to add more segments without degrading performance.

BES1000 Series switch used as a segment switch



-88 users share 10 Mb/s (10/88 Mb/s per user)
- Server bottleneck (10 Mb/s bandwidth)
-Network center bottleneck (10 Mb/s bandwidth)
-Total of 88 users

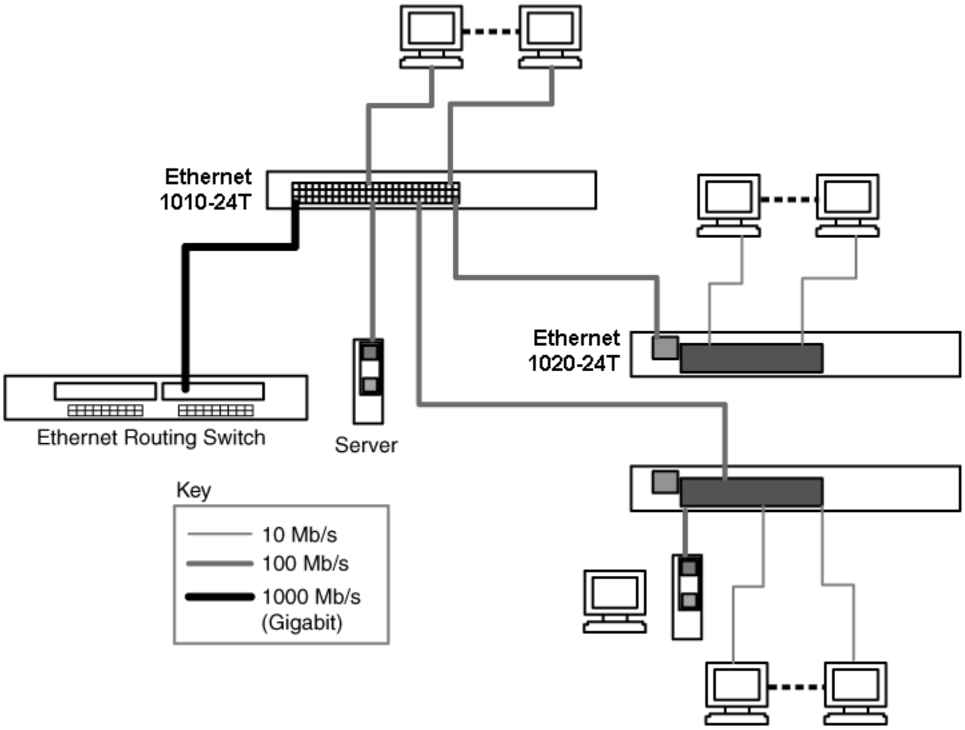
-Three sets of 23 users; each set shares 10 Mb/s (10/23 Mb/s per user)
-Addition of 21 users; each with dedicated 100 Mb/s bandwidth
-Server with dedicated 100 Mb/s bandwidth
-Network center with dedicated 1 Gb/s full-duplex bandwidth
-Total of 89 users

High-density switched workgroup application

The"Configuring power workgroups and a shared media hub " (page 220) graphic shows an example of using an Ethernet Switch 1010 with a high-speed (gigabit) connection to a Nortel Ethernet Routing Switch. Ethernet Switch 1010 and Ethernet Switch 1020 are also shown in this example of a high-density switched workgroup.

As shown in Configuring power workgroups and a shared media hub, the Ethernet Routing Switch is used as a backbone switch, connecting to the Ethernet Switch 1010-24T with an optional (1000BASE-SX) GBIC for maximum bandwidth. The Ethernet Switch 1010-24T and the Ethernet Switch 1020-24T have 100 Mb/s connections to the Ethernet Switch 1020-24T, a 100BASE-TX hub, and a 100 Mb/s server as well as 10 Mb/s connections to data terminal equipment (DTE).

Configuring power workgroups and a shared media hub



SFP transceiver

SFPs are hot-swappable products that enhance input and output and allow gigabit Ethernet ports to link to Short Wavelength (SX) and Long Wavelength (LX) fiber optic networks.

The BES1000 Series switch has two front-panel ports. They are port numbers 25 and 26 on the 24T models, and port numbers 49 and 50 on the 48T models.

If you insert an SFP GBIC into one on these ports, that port handles gigabit Ethernet speed only. If there are no optional SFPs inserted into these ports, they function as 10/100/1000 Mbps ports.

The SPF GBIC ports operate at gigabit (1000 Megabits per second) speed when an appropriate SFP GBIC is inserted. If an SFP GBIC is not inserted, the 1000 BaseT RJ-45 connector ports can be used, and they operate at 10/100/1000M.

This information describes technical specifications and installation instructions on Small Form Factor Pluggable (SFP) transceivers that are supported by the BES1000 Series switch.

ATTENTION
The term SFP is used in this chapter to describe features or technical specifications of an SFP.

Guidelines

Before installing an SFP, read the following guidelines:

- SFP GBICs are static sensitive.

  To prevent damage from ElectroStatic Discharge (ESD), follow your normal board and component handling procedures.
- SFP GBICs are dust sensitive.

  When you store an SFP GBIC, or when you disconnect it from a fiber optic cable, always keep the dust cover over the SFP GBIC optical bore.
- To clean contaminants from the optical bores of a SFP GBIC, use an alcohol swab or equivalent to clean the ferrules of the optical connector.
- Dispose this product (if necessary) according to all national laws and regulations.

WARNING
Fiber-optic equipment can emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber-optic cables are connected to a light source.

Product description

This section describes the SFP and label, and provides a model list for 1000BASE-SX SFPs and 1000BASE-LX SFPs.

This section includes the following topics:

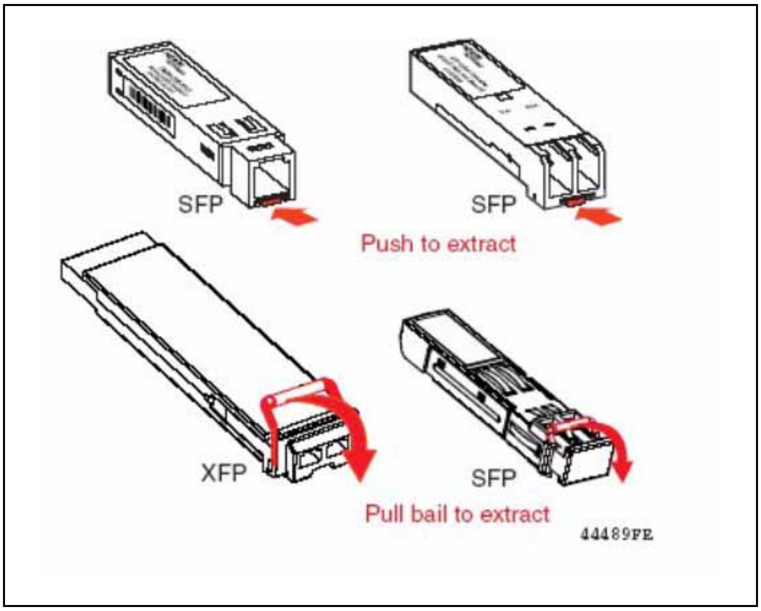
- "Locking and extractor mechanisms" (page 222)
- "SFP labeling" (page 222)
- "SFP models" (page 223)

Locking and extractor mechanisms

Depending on the transceiver manufacturer, an SFP transceiver can have various types of locking and extractor mechanisms.

"Locking and extracting mechanisms" (page 222) shows two types of locking/extractor mechanisms used on SFP and XFP transceivers.

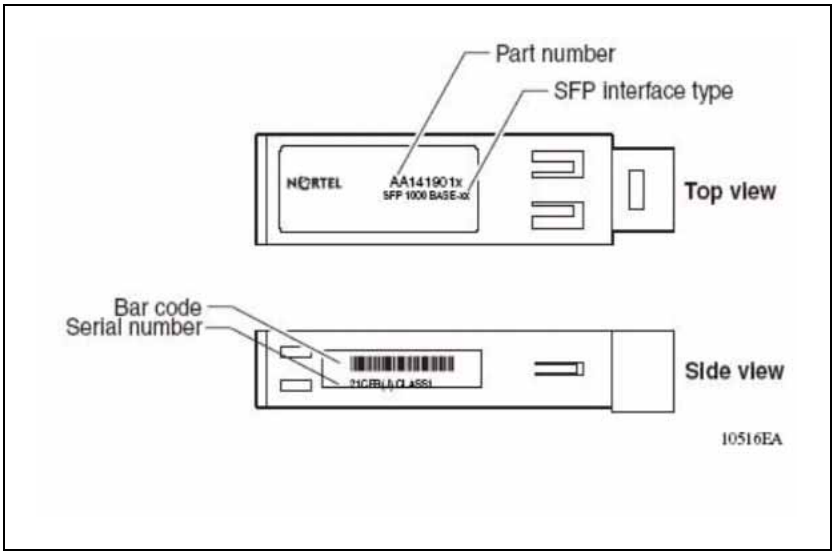
Locking and extracting mechanisms



SFP labeling

The Nortel label on a typical SFP contains a Nortel serial number, a bar code, a manufacturer’s code, an interface type, and a part number. See "Nortel SFP label" (page 223).

Nortel SFP label



SFP models

SFPs are hot-swappable products that enhance input and output and allow gigabit Ethernet ports to link with other gigabit Ethernet ports over various media types. "1000BASE-SFP models" (page 223) lists and describes the Nortel SFP models that are supported by the BES1000 Series switch. The BES1000 Series switch has two front-panel ports: port numbers 25 and 26 on the 24T models, and port numbers 49 and 50 on the 48T models. These ports correspond to port 1 and 2 for all platforms.

1000BASE-SFP models

Model number	Product number	Description
1-port 1000Base-SX SFP GBIC (mini-GBIC, connector type: MT-RJ).	AA1419014	Small Form Factor Pluggable, short wavelength 550 m
1-port 1000Base-LX SFP GBIC (mini-GBIC, connector type: LC).	AA1419015	Small Form Factor Pluggable, long wavelength 5 km

Configuration and switch management

The BES1000 Series switch that is shipped directly from the factory is ready to operate in any 10BASE-T or 100BASE-TX standard network.

You can manage the switch using one of the following:

- Console interface

  You can use the console interface to configure and manage the switch locally. Access the CI menus and screens locally through a console terminal attached to the BES1000 Series switch.

- Web-based management

  You can manage the network from the World Wide Web. Access the Web-based graphical user interface (GUI) through the HTML-based browser located on your network. The GUI lets you configure, monitor, and maintain your network through Web browsers. You can also download software using the Web.

- Business Element Manager

  The Element Manager is a client-based management application that runs on a Microsoft Windows computer. With the Element Manager you can connect to BES1000 Series switch devices over an IP network. It is used to configure, administer, and monitor BES1000 Series switch devices.

Configuring an IP address using BootP

With BootP or Boot Protocol, you can administer the IP addresses of network devices from a central location. Along with the IP address, the BootP protocol identifies the default gateway, subnet mask, and other configuration parameters that can be managed by the BootP server.

The BES1000 Series switch has a unique 48-bit hardware address, or MAC address, that is printed on a label on the back panel. You use this MAC address when you configure the network BootP server to recognize the BES1000 Series switch BootP requests.

A properly configured BootP server enables the switch to automatically learn its assigned IP address, subnet mask, and the IP address of the default router (default gateway).

BootP Configuration Requirements

To use the BootP protocol, you need a BootP server that adheres to the IETF standard RFC 951.

That BootP server must be accessible through the Management VLAN.
If the BootP server is not located on the same subnet as the BES1000 Series switch, but is located on another IP subnet, there must be a router on the local subnet (the subnet with which the BES1000 Series switch is associated) that provides BootP Relay functionality as defined in RFC 1532.

BootP configuration Parameters

The BootP implementation on BES1000 Series switch enables BootP to operate in the following modes:

- "BootP or Default IP" (page 225)
- "BootP Always" (page 225)

- "BootP Disabled" (page 225)
- "BootP or Last Address" (page 226)

BootP or Default IP

When this mode is selected the switch requests an IP address if one has not already been set. When selected, this mode operates as follows:

- When the static IP data is manually entered, the data becomes the in-use address of the switch, and BootP requests are not broadcast. The switch is managed using this in-band IP address.
- When the in-band IP address is not manually set, the switch broadcasts BootP requests until it receives a BootP reply containing an IP address. If the switch does not receive a BootP reply that contains an IP address, the switch is managed using its default IP address.

If an IP address is not currently in use, these actions take effect immediately. If an IP address is currently in use, these actions take effect only after the switch is reset or power cycled.

BootP Always

When this mode is selected the switch obtains its IP address from the BootP server. If a static IP address is defined, it is ignored. When this option is selected, the switch operates as follows:

- The switch continues to broadcast BootP requests, regardless of whether an in-band IP address is set from the console terminal.
- If the switch receives a BootP reply that contains an in-band IP address, the switch uses this new in-band IP address.
- If the switch does not receive a BootP reply, the switch cannot be managed using the in-band IP address set from the console terminal.

If an IP address is not currently in use, these actions take effect immediately. If an IP address is currently in use, these actions take effect only after the switch is reset or power cycled.

BootP Disabled

When this mode is selected, the switch does not use BootP. The switch operates in the following manner:

- The switch does not broadcast BootP requests, regardless of whether a static IP address is set.
- The switch can be managed only by using the in-band switch static IP address.

These actions take effect after the switch is reset or power cycled, even if an IP address is not currently in use.

BootP or Last Address

When this mode is selected the switch uses the last IP address received from the BootP server if the BootP server becomes unreachable. When selected, this mode operates as follows:

- When the IP data is entered from the console terminal, the data becomes the in-band address of the switch and BootP requests are not broadcast. The switch is managed using this in-band IP address.
- When the in-band IP address is not set from the console terminal, the switch broadcasts BootP requests until it receives a BootP reply containing an in-band IP address. If the switch does not receive a BootP reply that contains an in-band IP address within 10 minutes (min), the switch uses the last in-band IP address it receives from a BootP server. This IP information is displayed in the Last BootP column.

If an IP address is not currently in use, these actions take effect immediately. If an IP address is currently in use, these actions take effect only after the switch is reset or power cycled.

Troubleshooting

Execute the following steps to diagnose your system if it has issues obtaining an IP address using the BootP protocol:

- Check if the BootP server is accessible to the switch through the management VLAN.
- Check if the BootP server is configured with the proper MAC address of the device.
- Review the last BootP settings on the Console Interface.
- Place a packet analyzer on the network to investigate the problem.

Flash memory storage

The BES1000 Series switch uses flash memory to store the switch software image.

Switch software image storage

You can use flash memory to update the software image with a newer version without changing the switch hardware. An in-band connection between the switch and the TFTP load host is required to download the software image.

Autosensing and autonegotiation

The BES1000 Series switch is an autosensing and autonegotiating device:

- The term *autosense* refers to the ability of a port to sense the speed of an attached device.
- The term *autonegotiation* refers to a standardized protocol (IEEE 802.3u) that exists between two IEEE 802.3u-capable devices. Autonegotiation lets the switch select the best of speed and duplex modes.

Autosensing is used when the attached device is not capable of autonegotiation or uses a form of autonegotiation that is not compatible with the IEEE 802.3u standard. In this case, because it is not possible to sense the duplex mode of the attached device, the BES1000 Series switch reverts to half-duplex mode.

When autonegotiation-capable devices are attached to the BES1000 Series switch, the ports negotiate down from 100 Mb/s speed and full-duplex mode until the attached device acknowledges a supported speed and duplex mode.

For more information about autosensing and autonegotiation modes, see "Autonegotiation modes" (page 198).

RFCs

For more information about networking concepts, protocols, and topologies, consult the following RFCs:

- RFC 1213 (MIB-II)
- RFC 1493 (Bridge MIB)
- RFC 1573 (Interface MIB)
- RFC 1643 (Ethernet MIB)
- RFC 2849 (RMON)
- RFC 1157 (SNMP)

Standards

The following IEEE Standards also contain information relevant to the BES1000 Series switch:

- IEEE 802.1D (Standard for Spanning Tree Protocol)
- IEEE 802.1ab (LLDP support)
- IEEE 802.3 (Ethernet)
- IEEE 802.1Q (VLAN Tagging)
- IEEE 802.3ad (Link Aggregation)

EAPOL and RADIUS security

The switch is an Extensible Authentication Protocol Over LAN (EAPOL) Authenticator as defined in 802.1x standards. As an authenticator, it communicates with the user and end-station connected to its port over EAPOL (EAP over LAN) and uses Remote Authentication Dial-In User Service (RADIUS) to communicate with the Authentication Server. The result of the authentication determines the user's access on the port.

RADIUS is a client / server-based authentication software system that provides secure Internet access, especially in a Virtual Private Network (VPN). When a RADIUS password is used for dial in access to an Internet Service Provider (ISP), the username and password are checked and if they are correct, the RADIUS server authorizes access to the ISP systems and network. Because the administration of user profiles within an authentication database is centralized in a RADIUS system, support for multiple VPN switches is simplified.

SNMP

Simple Network Management Protocol (SNMP) is the standard for network management that uses a common software agent to manage local and wide area network equipment from different vendors; SNMP is part of the Transmission Control Protocol/Internet Protocol (TCP/IP) suite and is defined in RFC115. SNMPv1 is version one, or the original standard protocol. SNMPv2c uses a standards-based GetBulk retrieval capability by using SNMPv1 communities.

MAC address-based security

You can use the MAC address-based security feature to set up network access control, based on source MAC addresses of authorized stations.

You can:

- create a list of up to 32 MAC addresses, and specify which addresses are authorized to connect to your switch.
- specify which of your switch ports each MAC address is allowed to access.

  The options for allowed port access include: NONE, ALL, and single or multiple ports that are specified in a list.

The MAC address-based security feature is based on Nortel BaySecure LAN Access for Ethernet, a real-time security system that safeguards Ethernet networks from unauthorized surveillance and intrusion.

SNTP

The Simple Network Time Protocol (SNTP) feature synchronizes the Universal Coordinated Time (UTC) to an accuracy within 1 s. This feature adheres to the IEEE RFC 2030. The MIB information is located under the s5agent. With this feature, the system can obtain the time from any RFC 2030-compliant NTP/SNTP server.

> **ATTENTION**
> If you have trouble using this feature, try various NTP servers. Some NTP servers can be overloaded or currently inoperative.

The system retries connecting with the NTP server a maximum of three times, with five min between each retry. If the connection fails after the three attempts, the system waits for the next synchronization time (the default is 24 hours [hr]) and begins the process again.

Using SNTP provides a real-time timestamp for the software, shown as Greenwich mean time (GMT).

If SNTP is enabled (the default value is disabled), the system synchronizes with the configured NTP server at boot-up and at user-configurable periods thereafter (the default sync interval is 24 hr). The first synchronization is not performed until network connectivity is established.

SNTP supports primary and secondary NTP servers. The system tries connecting to the secondary NTP server only if the primary NTP server is unresponsive.

Virtual local area networks

A virtual LAN (VLAN) is a collection of switch ports that make up a single broadcast domain. You can configure a VLAN for a single switch or for multiple switches. When you create a VLAN, you can control traffic flow and ease the administration of moves, adds, and changes on the network by eliminating the need to change physical cabling. Using the Web-based management interface, you can configure port-based VLANs.

Navigation

- "IEEE 802.1Q VLAN workgroups" (page 231)
- "VLAN workgroup example" (page 231)
- "VLANs spanning multiple switches" (page 236)
- "VLAN configuration rules" (page 239)

Port-based VLANs

A port-based VLAN is a VLAN in which the ports are explicitly configured to be in the VLAN. When you create a port-based VLAN on a switch, you assign a VLAN identification number (VLAN ID) and specify which ports belong to the VLAN. The VLAN ID is used to coordinate VLANs across multiple switches.

In a traditional shared-media network, traffic generated by a station is transmitted to all other stations on the local segment. Therefore, for any given station on the shared Ethernet, the local segment is the collision domain because traffic on the segment has the potential to cause an Ethernet collision. The local segment is also the broadcast domain because any broadcast is sent to all stations on the local segment. Although BES1000 Series switches divide a network into smaller collision domains, they do not affect the broadcast domain. In simple terms, a virtual local area network provides a mechanism to fine-tune broadcast domains.

You can use the BES1000 Series switch to create port-based VLANs. For example, an IEEE 802.1Q port-based VLAN is a VLAN in which the ports are explicitly configured to be in the VLAN. When you create a port-based VLAN, you assign a port VLAN identifier (PVID) and specify which ports belong to the VLAN. The PVID is used to coordinate VLANs across multiple switches.

VLAN support

The BES1000 Series switch supports 32 port-based VLANs, under the 802.1d bridging model. However, this version does not support protocol VLANs, MAC source-based VLANs, or subnet-based VLANs.

When the BES1000 Series switch is installed for the first time, all ports are assigned to the default VLAN (PVID = 1). The default management VLAN is VLAN 1.

You can configure VLANs on each port through the user interface or the configuration file.

IEEE 802.1Q Tagging

The BES1000 Series switch allows tagging on all ports, and tagging can be configured on a per-port basis. Tagging status applies on all ports of a link aggregation group (LAG) (a port member in an LAG cannot be configured independently of the other members in the same LAG). You can configure untagged frame dropping on a per-port basis.

BES1000 Series switch supports the independent VLAN learning (IVL) model. IVL allows duplicate MAC addresses to be present in different VLANs, but not in the same VLAN.

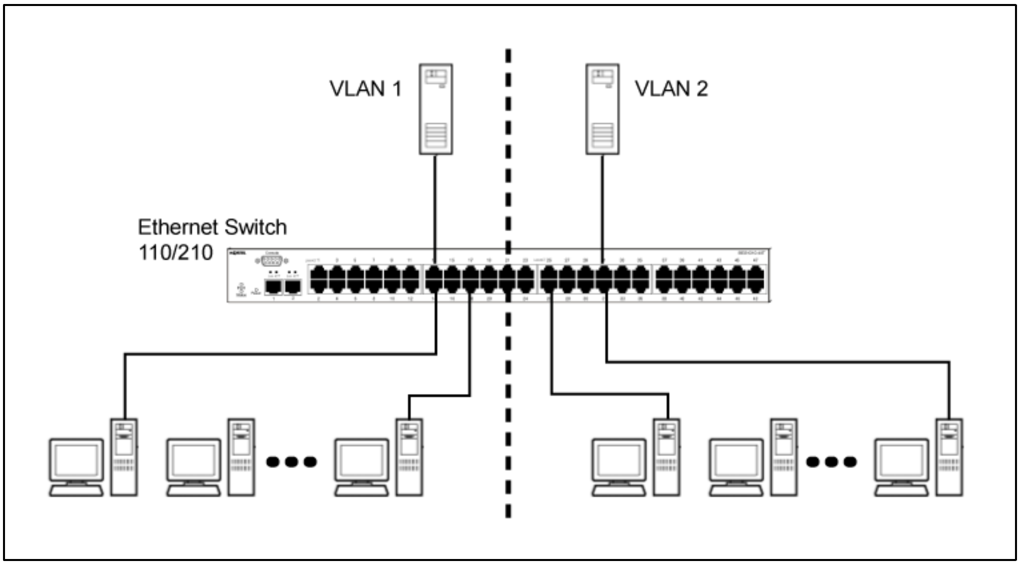
IEEE 802.1Q VLAN workgroups

The BES1000 Series switch supports up to 32 VLANs and IEEE 802.1Q tagging on a per-port basis. Ports are grouped into broadcast domains by assigning them to the same VLAN. Frames received in one VLAN can only be forwarded within that VLAN. Multicast frames and unknown unicast frames are flooded only to ports in the same VLAN.

Setting up virtual LANs (VLAN) is a way to segment networks to increase network capacity and performance without changing the physical network topology (see the Port-based VLAN examplegraphic). With network segmentation, each switch port connects to a segment that is a single collision domain. Adding to VLANs defines broadcast domains, and having a switch instead of a hub segments the network into individual collision domains.

With the BES1000 Series switch, you can assign ports to VLANs using the Web-based management or the Element Manager. By assigning ports (and therefore the devices attached to these ports) to different VLANs, you create individual broadcast domains per VLAN. This feature provides network flexibility because you can reassign VLANs to accommodate network moves, additions, and changes, and thus eliminate the need to change physical cabling.

Port-based VLAN example



VLAN workgroup example

As shown in VLAN configuration spanning multiple switches, Switch S1 (BES1000 Series switch) is configured with multiple VLANs:

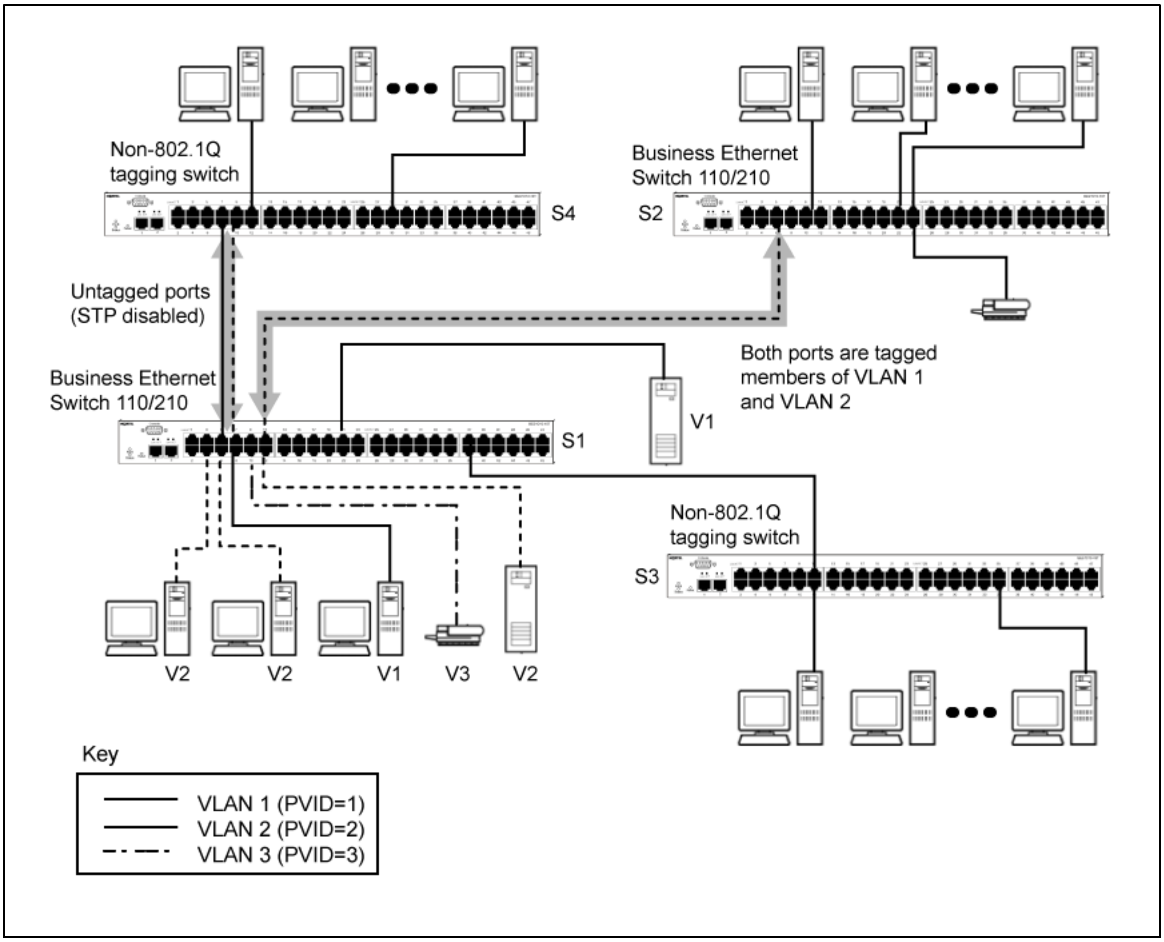
- Ports 17, 20, 25, and 26 are in VLAN 1.
- Ports 16, 18, 19, 21, and 23 are in VLAN 2.

- Port 22 is in VLAN 3.

Because S4 does not support 802.1Q tagging, a single switch port on each switch must be used for each VLAN (see "VLANS spanning multiple untagged switches" (page 237)).

The connection to S2 requires only one link between the switches because S1 and S2 are both BES1000 Series switches that support 802.1Q tagging (see "VLANs spanning multiple 802.1Q tagged switches" (page 236)).

VLAN configuration spanning multiple switches


Non-802.1Q tagging switch
S4
Business Ethernet Switch 110/210
S2
Untagged ports (STP disabled)
Business Ethernet Switch 110/210
S1
Both ports are tagged members of VLAN 1 and VLAN 2
V1
Non-802.1Q tagging switch
S3
V2
V2
V1
V3
V2
Key
VLAN 1 (PVID=1)
VLAN 2 (PVID=2)
VLAN 3 (PVID=3)

IEEE 802.1Q tagging

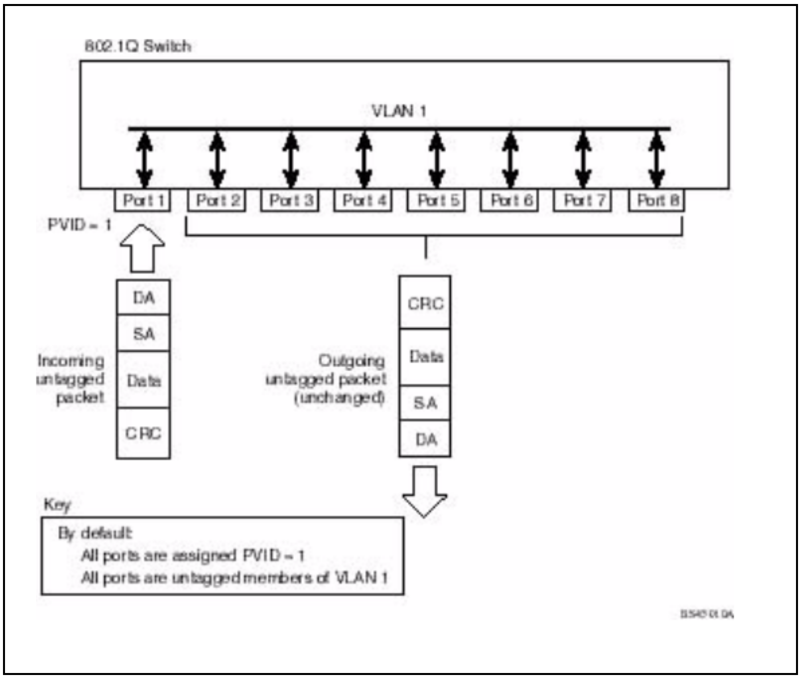
The BES1000 Series switch operates in accordance with the IEEE 802.1Q tagging rules. Important terms used with the 802.1Q tagging feature are:

- VLAN identifier (VID)—the 12-bit portion of the VLAN tag in the frame header that identifies an explicit VLAN. When other types of VLANs are enabled, this default value can be overridden by the values enabled in the Web-based management interface.

- Port VLAN identifier (PVID)—a classification mechanism that associates a port with a specific VLAN. For example, a port with a PVID of 3 (PVID =3) assigns all untagged frames received on this port to VLAN 3.
- Tagged frame—the 32-bit field (VLAN tag) in the frame header that identifies the frame as belonging to a specific VLAN. Untagged frames are marked (tagged) with this classification as they leave the switch through a port that is configured as a tagged port.
- Untagged frame—a frame that does not carry any VLAN tagging information in the frame header.
- VLAN port members—a set of ports that form a broadcast domain for a specific VLAN. A port can be a member of one or more VLANs.
- Untagged member—a port that is configured as an untagged member of a specific VLAN. When an untagged frame exits the switch through an untagged member port, the frame header remains unchanged. When a tagged frame exits the switch through an untagged member port, the tag is stripped, and the tagged frame is changed to an untagged frame.
- Tagged member—a port that is configured as a member of a specific VLAN. When an untagged frame exits the switch through a tagged member port, the frame header is modified to include the 32-bit tag associated with the PVID. When a tagged frame exits the switch through a tagged member port, the frame header remains unchanged (original VID remains).
- User priority—a three-bit field in the header of a tagged frame. The field is interpreted as a binary number, therefore, it has a value of zero to seven. With this field, you can use the tagged frame to carry the user-priority across bridged LANs.
- Port priority—the priority level assigned to untagged frames received on a port. This value becomes the user priority for the frame. Tagged packets get their user priority from the value contained in the 802.1Q frame header.
- Unregistered packet—a tagged frame that contains a VID where the receiving port is not a member of that VLAN.

The default configuration settings for the BES1000 Series switch has all ports set as untagged members of VLAN 1 with all ports configured as PVID = 1. Every VLAN is assigned a unique VLAN identifier (VID) that distinguishes it from all other VLANs. In the default configuration example shown in "Default VLAN settings" (page 234), all incoming packets are assigned to VLAN 1 by the default port VLAN identifier (PVID =1). Untagged packets enter and leave the switch unchanged.

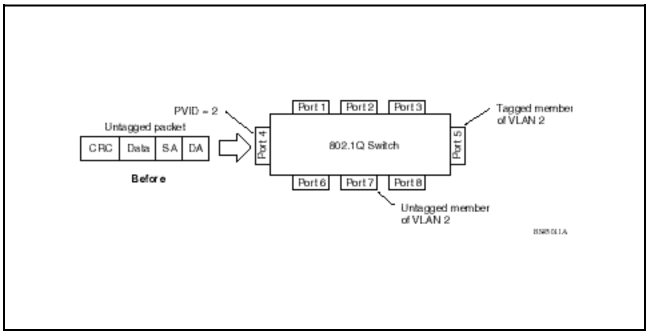
Default VLAN settings



When you configure VLANs, you configure the switch ports as tagged or untagged members of specific VLANs (see "Port-based VLAN assignment" (page 234) through "802.1Q tagging - after 802.1Q tag assignment" (page 236)).

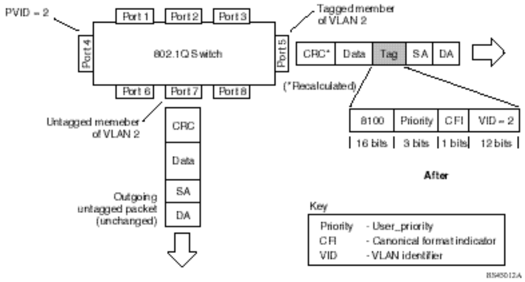
In "Port-based VLAN assignment" (page 234), untagged incoming packets are assigned directly to VLAN 2 (PVID = 2). Port 5 is configured as a tagged member of VLAN 2, and port 7 is configured as an untagged member of VLAN 2.

Port-based VLAN assignment



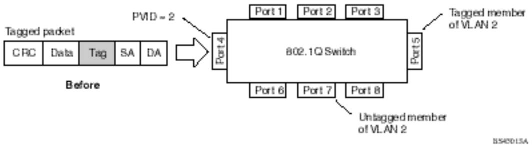
As shown in "802.1Q tagging (after port-based VLAN assignment)" (page 235), the untagged packet is marked (tagged) as it leaves the switch through port 5, which is configured as a tagged member of VLAN 2. The untagged packet remains unchanged as it leaves the switch through port 7, which is configured as an untagged member of VLAN 2.

802.1Q tagging (after port-based VLAN assignment)



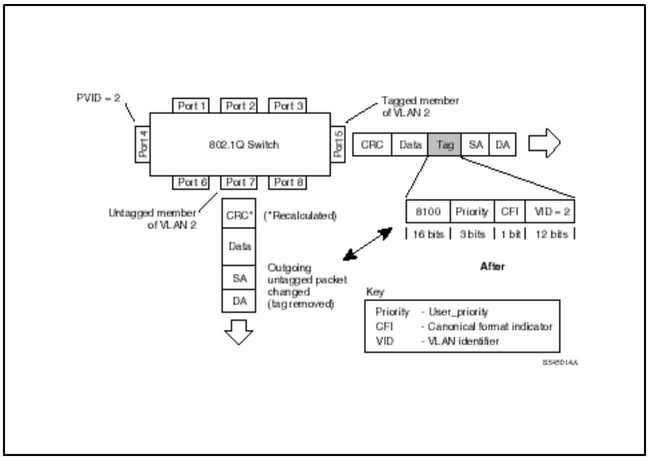
In "802.1Q tag assignment" (page 235), tagged incoming packets are assigned directly to VLAN 2 because of the tag assignment in the packet. Port 5 is configured as a tagged member of VLAN 2, and port 7 is configured as an untagged member of VLAN 2.

802.1Q tag assignment



As shown in "802.1Q tagging - after 802.1Q tag assignment" (page 236), the tagged packet remains unchanged as it leaves the switch through port 5, which is configured as a tagged member of VLAN 2. However, the tagged packet is stripped (untagged) as it leaves the switch through port 7, which is configured as an untagged member of VLAN 2.

802.1Q tagging - after 802.1Q tag assignment



VLANs spanning multiple switches

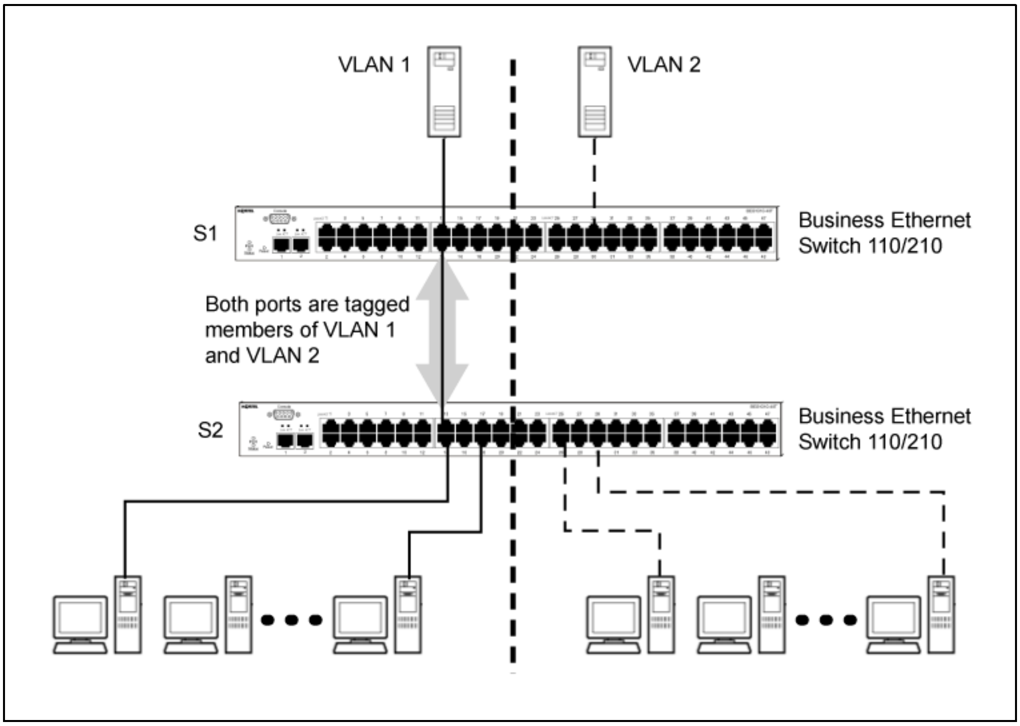
You can use VLANs to segment a network within a switch. When you connect multiple switches, it is possible to connect users of one VLAN with users of the same VLAN in another switch. However, the configuration guidelines depend on whether both switches support 802.1Q tagging.

With 802.1Q tagging enabled on a port for a VLAN, all frames leaving the port for that VLAN are marked as belonging to that specific VLAN. You can assign specific switch ports as members of one or more VLANs that span multiple switches, without interfering with the Spanning Tree Protocol.

VLANs spanning multiple 802.1Q tagged switches

The"VLANs spanning multiple 802.1Q tagged switches " (page 236) diagram shows VLANs spanning two BES1000 Series switches. The 802.1Q tagging is enabled on S1, port 2, and on S2, port 1 for VLAN 1 and VLAN 2. Both ports are tagged members of VLAN 1 and VLAN 2.

VLANs spanning multiple 802.1Q tagged switches

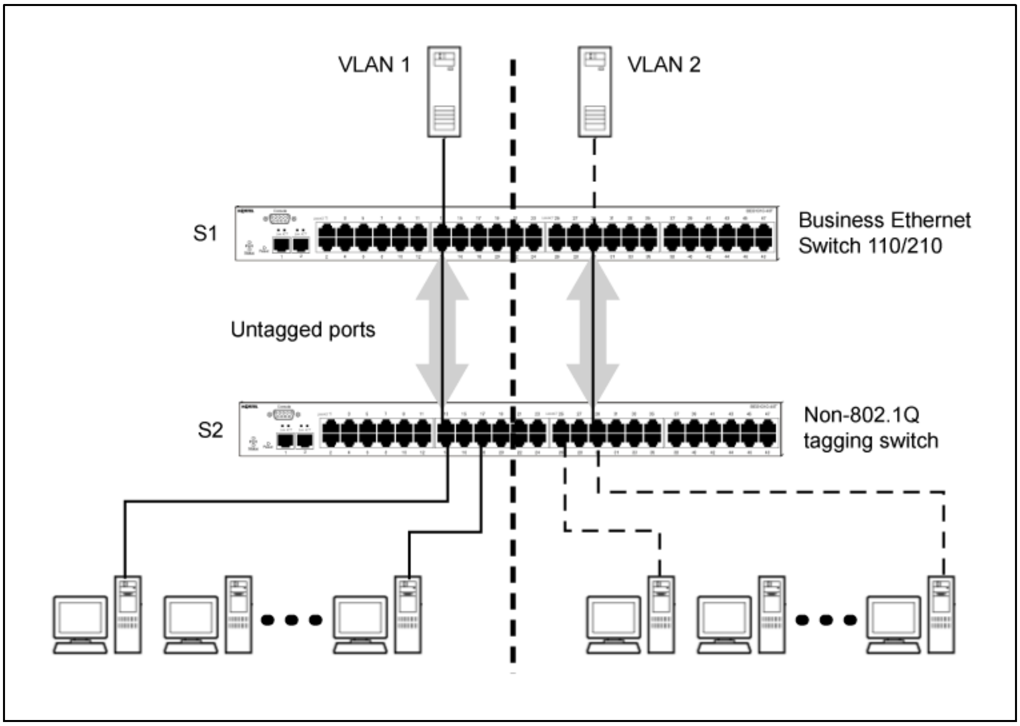

VLAN 1
VLAN 2
S1
Business Ethernet Switch 110/210
Both ports are tagged members of VLAN 1 and VLAN 2
S2
Business Ethernet Switch 110/210

Because there is only one link between the two switches, the Spanning Tree Protocol (STP) treats this configuration as any other switch-to-switch connection. For this configuration to work properly, both switches must support the 802.1Q tagging protocol.

VLANS spanning multiple untagged switches

The"VLANS spanning multiple untagged switches " (page 237) diagram shows VLANs spanning multiple untagged switches. In this configuration, Switch S2 does not support 802.1Q tagging, and you must use a single switch port on each switch for each VLAN.

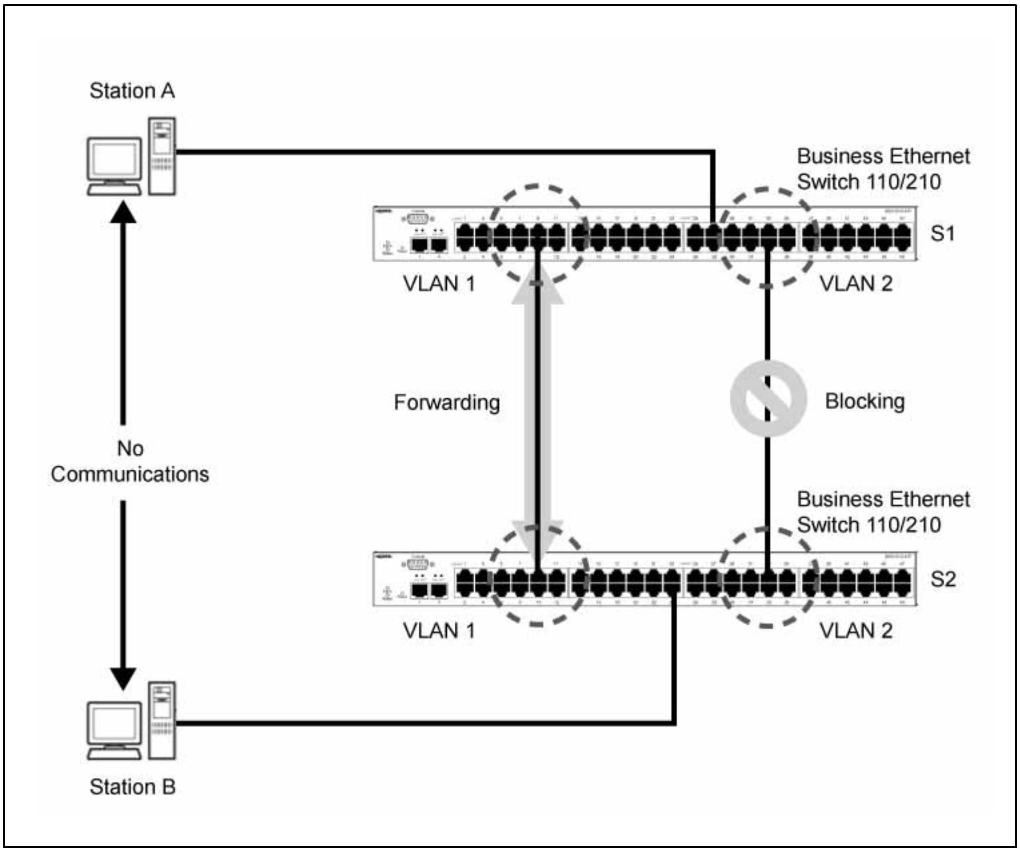
VLANs spanning multiple untagged switches



When the STP is enabled on these switches, only one link between each pair of switches forwards traffic. Because each port belongs to only one VLAN at a time, connectivity on the other VLAN is lost. Exercise care when configuring the switches to ensure that the VLAN configuration does not conflict with the spanning tree configuration.

To connect multiple VLANs across switches with redundant links, you must disable the STP on all participating switch ports. ThePossible problems with VLANs and Spanning Tree Protocol diagram shows possible consequences of enabling the STP when using VLANs between untagged (802.1Q that are not tagged) switches.

Possible problems with VLANs and Spanning Tree Protocol



As shown in Possible problems with VLANs and Spanning Tree Protocol, with STP enabled, only one connection between Switch S1 and Switch S2 is forwarding at any time. Communications failure occurs between VLAN 2 of S1 and VLAN 2 of S2, blocking communications between Stations A and B.

The STP selects the link connecting VLAN 1 on Switches S1 and S2 as the forwarding link based on port speed, duplex-mode, and port priority. Because the other link connecting VLAN 2 is in Blocking mode, stations on VLAN 2 in Switch S1 cannot communicate with stations in VLAN 2 on Switch S2. With multiple links, only one link forwards.

VLAN configuration rules

VLAN configuration steps have specific configuration rules. When creating VLANs, consider if a port is a trunk group member. If a port is a trunk group member, adding or removing that port from a VLAN results in all other port members of that trunk group being added or removed from the VLAN.

Spanning Tree Protocol

The BES1000 Series switch supports the Spanning Tree Protocol (STP) as defined in IEEE 802.1D and the Rapid Spanning Tree Protocol (RSTP) as defined in IEEE 802.1w. However, RSTP is only run with backward compatibility to STP. The Spanning Tree Protocol detects and eliminates logical loops in a bridged or switched network. When multiple paths exist, the spanning tree algorithm configures the network so that a bridge or switch uses only the most efficient path. If that path fails, the protocol automatically configures the network to make another path become active, thus sustaining network operations.

The following sections describe in detail how STP and RSTP function. However, all spanning tree configuration on the BES1000 Series switch is performed automatically by the switch. You do not need to perform any switch configuration for STP and RSTP.

For detailed information about STP and RSTP, refer to the following sections:

- "Spanning Tree Protocol - IEEE 802.1D" (page 240)
- "Rapid Spanning Tree Protocol - IEEE 802.1w" (page 242)

Spanning Tree Protocol - IEEE 802.1D

The BES1000 Series switch supports transparent bridging by implementing the IEEE 802.1D standard. This is also known as the Spanning Tree Protocol (STP) and Algorithm (STA) standards. STP runs on all ports to provide an automatic network configuration of a loop-free topology, which you can use to configure redundant links to provide network fault tolerance.

Port states

A port is always in one of the following five spanning tree states:

- Disabled - A network administrator can manually disable a port.
- Blocking - A port that causes a switching loop; no user data is sent or received but it may go into forwarding mode if the trunk line in use fails. BPDU data is still sent and received in blocking mode.
- Listening - The switch processes BPDUs and determines the network topology.
- Learning - The switch builds a switching table that maps MAC addresses to port numbers.
- Forwarding - A port that receives and sends data. A normal operation.

After a switch is powered up or reset and the initialization process is completed, all the ports are transformed from the Disabled state to the Blocking state.

If a port is not connected, it remains in the Forwarding state until it is connected.

If you connect a station to a port, the port does not start forwarding packets immediately. You need to wait for the port to transit through the Listening and Learning states to gain access to any resources located on another segment.

If you connect a hub or another bridging device to a port, they could potentially create a loop in the network topology, and a broadcast storm can occur. This is because one of the ports causing the loop can be in the Forwarding state instead of the Blocking state. The loop should be eliminated after this port receives a BPDU frame from a higher priority port.

You can use the MIB variable dot1dStpPortEnable to disable or enable a port. A port is enabled by default. In this mode of operation, the port is in one of the following STP states:

- Blocking
- Listening
- Learning
- Forwarding

If you disable Spanning Tree on a port, it does not forward any frames and doesl not participate in the Spanning Tree Algorithm and Protocol.

Aging of Dynamic Entries in Forwarding Database

Dynamic MAC address entries are automatically removed from the Forwarding Database after a specified time.

If the network topology has not changed, the aging time-out value is specified by the dot1dTpAgingTime MIB variable. This can be configured through the user interface console. The range of applicable values specified in the IEEE standard is 10-1000000 (seconds), whereas the default value recommended is 300.

If the root bridge notifies topology changes to other bridging devices, a short aging time-out value is used. The time-out value is set equal to the Forward Delay parameter contained in BPDUs originating from the root. The range of values for the Forward Delay parameter specified in the IEEE standard is 4 to 30 (seconds). The recommended default value is 15.

Port path cost

With the BES1000 Series switch, the path cost associated with a port is automatically calculated by the switch. The cost of a given link is specified to be inversely proportional to the data rate of the link: thus, a 10 Mb/s Ethernet has a link cost of 100.

"Path cost values" (page 242) describes the default values that have a nonlinear relationship between link cost and data rate for high-speed LANs.

Path cost values

Data rate	Default link cost value
10 Mbps	100
100 Mbps	19
1 Gbps	4
10 Gbps	2

Rapid Spanning Tree Protocol - IEEE 802.1w

The IEEE 802.1d Spanning Tree Protocol is slow to respond to a topology change in the network (such as a problematic link). The Rapid Spanning Tree Protocol (RSTP or IEEE 802.1w) reduces the recovery time after a network breakdown. In certain configurations, the recovery time of RSTP can be reduced to less than one s. RSTP also maintains a backward compatibility with the IEEE 802.1d, which was the Spanning Tree implementation prior to RSTP. The backward compatibility can be maintained by configuring a port to be in STP compatible mode. A port operating in the STP compatible mode transmits and receives only STP BPDUs and drops any RSTP BPDUs.

RSTP also reduces the amount of flooding in the network by enhancing the way Topology Change Notification (TCN) packet is generated. With the Rapid Spanning Tree Protocol (RSTP or IEEE 802.1w), only one instance of RSTP exists on the switch.

The RSTP instance can include one or more VLANs. RSTP enables the BES1000 Series switch to achieve the following:

- reduce converging time from 30 seconds to less than 1 or 2 seconds when there is topology change in the network (that is, port going up or down)
- eliminate unnecessary flushing of the MAC database and flooding of traffic to the network, with new Topology Change mechanism
- backward compatibility with other switches that run legacy 802.1d STP

Interoperability with legacy STP

RSTP provides for backward compatibility with legacy STP. An RSTP port transmits and receives only RSTP BPDU. If an RSTP port receives an STP BPDU, it becomes an STP port. If the STP port receives an RSTP BPDU, it reverts back to RSTP operation. This process is called Port Protocol Migration.

Differences in port roles

RSTP is an enhanced version of STP. These two protocols have almost the same set of parameters.

The "Differences in port roles for STP and RSTP " (page 243)table lists the differences in port roles for STP and RSTP. STP supports two port roles while RSTP supports four port roles.

Differences in port roles for STP and RSTP

Port Role	STP	RSTP	Description
Root	Yes	Yes	This port is receiving a lower cost BPDU than its own and it has the best path to reach the Root. Root port is in Forwarding state.
Designated	Yes	Yes	This port has the lower cost BPDU on the segment. Designated port is in Forwarding state.
Alternate	No	Yes	This port is receiving a lower cost BPDU than its own BPDU and there is a Root port within the same switch. Alternate port is in Discarding state.
Backup	No	Yes	This port is receiving a lower cost BPDU than its own BPDU and this BPDU is from another port within the same switch. Backup port is in Discarding state.

Edge Port

Edge Port is a new parameter that is supported by RSTP. When a port is connected to a nonswitch device such as a PC or a workstation, configure it as an Edge port. An active Edge port goes directly to Forwarding state without any delay. An Edge port becomes a non-Edge port if it receives a BPDU.

Path cost values

RSTP recommends new path cost values that support a wide range of link speeds. The "Recommended path cost values " (page 244) table lists the recommended path cost values.

Recommended path cost values

Link speed	Default value

Less than or equal 100 Kb/s
1 Mb/s
10 Mb/s
100 Mb/s
	200 000 000
	20 000 000
	2 000 000
	200 000

1 Gb/s
10 Gb/s
100 Gb/s
	20 000
	2 000
	200

1 Tb/s 10 Tb/s	20 2

Rapid convergent

In RSTP, the root port or the designated port can ask its peer for permission to move to the Forwarding State. If the peer agrees, the root port can move to the Forwarding State without any delay. This procedure is called Negotiation Process.

With RSTP, if the port becomes inoperative, information that is received on a port is sent immediately, instead of waiting for the Maximum Age time. The following example illustrates how an RSTP port moves rapidly to Forwarding state without the risk of creating a loop in the network.

Port 2 on switches A, B, and C are configured as edge ports because they connect to PC end-stations.

Switch A is the Root.

Negotiation process

After power up, all ports assume the role as Designated ports. All ports are in the Discarding state except the Edge ports. Edge ports go directly to Forwarding state without delay.

In the example below, Switch A port 1 and switch B port 1 exchange BPDUs and switch A knows that it is the Root and switch A port 1 is the Designated port. Switch B learns that switch A has better priority. Switch B port 1 becomes Root port. Both switch A port 1 and switch B port 1 are still in Discarding state.

Switch A starts the negotiation process by sending a BPDU with the proposal bit set.

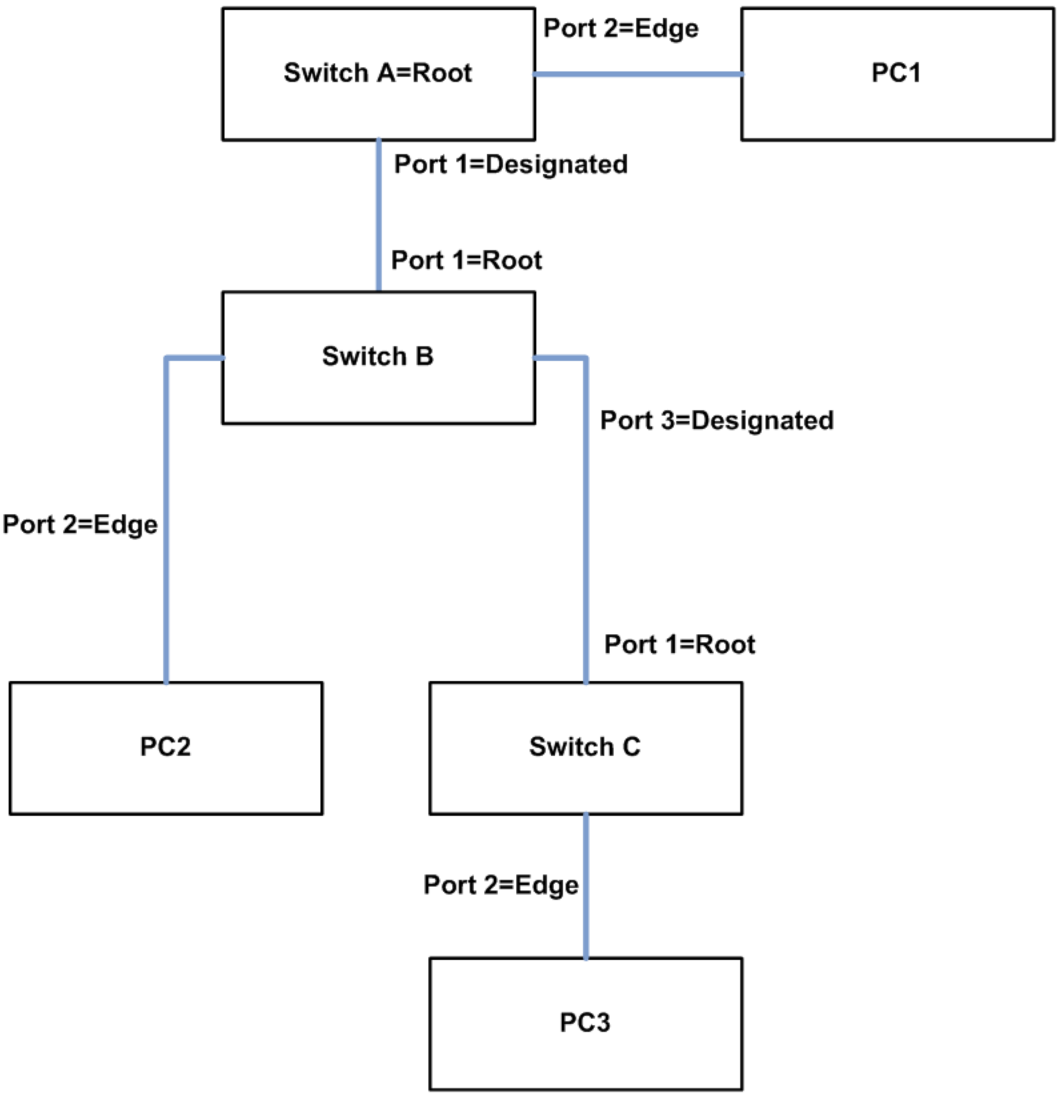
Switch B receives a proposal BPDU and it sets its non Edge ports to Discarding state. This operation is the sync process.

Switch B sends a BPDU with the agreement bit set to switch A.

Switch A sets port 1 to Forwarding and switch B sets port 1 to Forwarding state. PC1 and PC2 can talk to each other.

- The negotiation process now moves down to switch B port 3 and its partner port.
- PC3 cannot talk to either PC1 or PC2 until the negotiation process between switch B and switch C is complete.

Negotiation process



802.1p Class of Service support

The BES1000 Series switch enables 802.1p Traffic Class by mapping the eight priority levels into four internal Class of Service (CoS) queues. The priorities can range from Low to Highest. You can specify this mapping through the Web-based management interface.

CoS queues are scheduled based on the Weighted Round-Robin Scheduling policy.

You can change the policy at runtime.

802.1p COS Remarking

The BES1000 Series switch also implements the 802.1p remarking option. This forces all incoming Ethernet packets to the 802.1p priority instead of the ingress port priority for tagged packets within the TAG field.

IEEE 802.3ad Link Aggregation

With IEEE 802.3ad-based link aggregation you can aggregate one or more links together to form Link Aggregation Groups (LAG), such that a MAC client can treat the Link Aggregation Group as if it were a single link. Link aggregation increases the aggregate throughput of the interconnection between the devices while providing link redundancy.

Link Aggregation Control Protocol (LACP), defined by the IEEE 802.3ad standard, lets a switch learn the presence and capabilities of a remote switch by exchanging information with the remote switch before a trunk group is formed. Either switch can accept or reject the aggregation request with the far end on a per port basis. A link that cannot join a trunk group operates as an individual link.

The main purpose of LACP is to manage switch ports and their port memberships to link LAGs. LACP can dynamically add or remove LAG ports, depending on their availability and states. By default, only uplink ports (Gigabit ports) are set to enabled on all ports.

Link aggregation employs the following principles and concepts:

- A MAC client communicates with a set of ports through an Aggregator, which presents a standard IEEE 802.3 service interface to the MAC client. The Aggregator binds to one or more ports within a system.
- The responsibility of the Aggregator is to distribute frame transmissions from the MAC client to the various ports, and to collect received frames from the ports and pass them to the MAC client transparently.
- A system can contain multiple aggregators serving multiple MAC clients. A given port binds to (at most) a single Aggregator at any time. A MAC client is served by a single Aggregator at a time.
- The binding of ports to aggregators within a system is managed by the Link Aggregation Control function for that system, which is responsible for determining which links can be aggregated, aggregating them, binding the ports within the system to an appropriate Aggregator, and monitoring conditions to determine when a change in aggregation is needed.

  The network manager can control the determination and binding directly through the manipulation of the state variables of Link Aggregation (for example, Keys). In addition, automatic determination, configuration, binding, and monitoring can occur through the use of a Link Aggregation Control Protocol (LACP).

The LACP uses peer exchanges across the links to determine, on an ongoing basis, the aggregation capability of the various links, and continuously provides the maximum level of aggregation capability achievable between a given pair of systems.

- Each port is assigned a unique, globally administered MAC address.

  The MAC address is used as the source address for frame exchanges that are initiated by entities within the Link Aggregation sublayer itself (for example, LACP and Marker protocol exchanges).

- Each Aggregator is assigned a unique, globally administered MAC address, which is used as the MAC address of the aggregation from the perspective of the MAC Client, both as a source address for transmitted frames and as the destination address for received frames.

  The MAC address of the Aggregator may be one of the MAC addresses of a port in the associated Link Aggregation Group.

Link aggregation rules

The BES1000 Series switch link aggregation groups operate under the following rules:

- Link aggregation groups are formed using LACP.
- All ports in a link aggregation group must be connected to the same far-end system.
- All ports in a link aggregation group must operate in full-duplex mode.
- All ports in a link aggregation group must be configured to the same port speed.
- All ports in a link aggregation group must be in the same VLANs.
- LACPDUs are transmitted and received on all ports in the link aggregation group.
- Link aggregation is compatible with the Spanning Tree Protocol (STP).
- STP BPDUs are transmitted and received only on the first link in the group.
- A maximum of six link aggregation groups are supported.
- A maximum of four active links are supported per LAG.
- A maximum of one standby link is supported per LAG.

The maximum number of LAGs is 32, and the maximum number of active links per group is 8. With Link Aggregation more than eight links are configurable in one LAG. The first eight high-priority links are active links, and together they form a trunk group. The ninth low-priority link remains in standby mode. When one of the active links goes down, the standby link becomes active and is added to the trunk group.

LACP supports only one standby link.

The failover process is as follows:

- The down link is removed from the trunk group.
- The standby link is added to the trunk group.

There may be a temporary delay in traffic flow due to the switching of links. If the active link goes down and there is no standby link, the traffic is rerouted to the remaining active links with a minimal time delay.

IGMP Snooping

IP multicast is directly mapped to broadcast transmissions in a bridged Ethernet environment. In a layer 2 device such as the BES1000 Series switch, every IP multicast packet is forwarded on all the links. These IP multicast packets are delivered to all the segments of an extended LAN. As the network carries more broadcast traffic, the network performance degrades. End stations are indiscriminately offered the same load as the rest of the network, even though they are not interested in particular IP multicast streams.

IGMP is a protocol used by the IP hosts. IGMP is used to report the multicast group memberships of the IP hosts to any of their immediately neighboring multicast routers.

When multicasting is used on more than one physical network and multicast datagrams have to pass through routers, the IGMP protocol is useful.

IGMP snooping is supported by the BES1000 Series switch for both version one and two of the IGMP protocol. The IGMP snooping technique enables the switch to selectively forward multicast traffic only on those ports where particular IP multicast streams are expected.

By snooping for IGMP communication between routers and hosts, a switch can identify those ports.

Configuring IP and gateway settings

Configure the IP and gateway settings to modify the switch IP address and subnet mask parameters, and then configure the IP address of your default gateway.

ATTENTION

Settings take effect immediately when you click Submit.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > IP**. The IP page appears.
2	Type information in the text boxes or select from a list.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
BootP Request Mode	Choose from BootP or Default IP, BootP Always, BootP Disabled, or BootP or Last Address.
	BootP or Default IP: choose this mode to inform the switch to send a BootP request when the switch IP address stored in non-volatile memory is the factory default value. If the stored IP address differs from the factory default value, the switch uses the stored network parameters. If the switch cannot find a BootP server, it tries five more times to find one and then defaults to the factory settings.
	BootP Always: choose this mode to inform the switch, each time the switch boots, to ignore any stored network parameters and send a BootP request. If the BootP request fails, the switch boots with the factory default IP configuration. This setting disables remote management if no BootP server is set up for the switch, and lets the switch boot normally.
	BootP Disabled: choose this mode to inform the switch, each time the switch boots, to use the IP configuration parameters stored in nonvolatile memory. If a BootP configuration is in progress when you issue this command, the BootP configuration stops.
	BootP or Last Address: choose this mode to inform the switch, at each start-up, to obtain its IP configuration using BootP. If the BootP request fails, the switch uses the network parameters stored in its nonvolatile memory.

Variable	Value
	Note: Valid parameters obtained when using BootP always replace the current information stored in the nonvolatile memory.
	Note: Whenever the switch broadcasts BootP requests, the BootP process times out if a reply is not received within (approximately) 10 minutes (min). When the process times out, the BootP request mode automatically changes to BootP Disabled mode. To restart the BootP process, change the BootP request mode to any of the two following modes: BootP Always, or to BootP or Last Address.
Switch IP Address	Type a new switch IP address in the appropriate format. The default switch IP address is 192.168.1.132. ***Note:*** When the IP address is entered in the In-Band IP Address field, and the In-Band Subnet Mask field value is not present, the software provides an in-use default value for the In-Band Subnet Mask field that is based on the class of the IP address entered in the In-Band IP Address field. The format is: XXX.XXX.XXX.XXX
Subnet Mask	Type a new subnet mask in the appropriate format. The default subnet mask value is 255.255.55.0. The format is: XXX.XXX.XXX.XXX
Default Gateway	Type an IP address for the default gateway in the appropriate format. The default gateway value is 192.168.1.1. The format is: XXX.XXX.XXX.XXX

BES reference information

This chapter provides technical specifications and reference information for the BES1000 Series switch.

Navigation

System defaults

The following table lists some of the BES1000 basic system defaults.

Feature	Parameter	Default
Administration	User Name	nnadmin
	Password	PlsChgMe!
Console Switch	Password Type	ON
Switch	User ID (Read Only)	nnadminRO
	Password (Read Only)	PlsChgMe!RO
	User ID (Read/Write)	nnadmin
	Password (Read/Write)	PlsChgMe!
Web Switch	Password Type	ON
TCP/IP	IP Address	192.168.1.132
SNMP	Community (Read Only)	PlsChgMe!RO
	Community (Read/Write)	PlsChgMe!RW

QoS defaults

For information about QoS defaults weights, see the following table.

QoS default weights	Value
Low	32
Medium	64
High	96
Highest	128

Technical specifications

This section provides technical specifications for the Small Form Factor Pluggable (SFP) models.

Navigation

- "SFP physical specifications" (page 254)
- "Specifications for LC type 1000BASE-SX connectivity" (page 254)
- "Specifications for LC type 1000BASE-LX connectivity" (page 255)
- "Specifications for MT-RJ Type 1000BASE-SX connectivity" (page 256)

SFP physical specifications

This section provides technical specifications for the following SFP models.

Technical specifications for 1000BASE-SX SFPs and 1000BASE-LX SFPs

Specification	Description
Dimensions (H x W x D)	0.53 x 0.33 x 2.22 in. (13.4 x 8.5 x 56.4 mm)
Connectors	Multimode fiber optic: LC or MT-RJ Single-mode fiber optic: LC or MT-RJ Single-fiber LC fiber optic connector

Specifications for LC type 1000BASE-SX connectivity

The model 1000BASE-SX SFP provides 1000BASE-SX (850 nm, short wavelength, Gigabit Ethernet) connectivity using LC duplex multimode fiber connectors. The Model 1000BASE-SX SFP supports full-duplex operation only. The following table describes standards, connectors, cabling, and distance for the model 1000BASE-SX SFP.

1000BASE-SX SFP specifications

Type	Specification
Standards	Conforms to the following standards: 802.3z, 1000BASE-SX

Type	Specification
Connectors	Duplex LC fiber optic connector
Cabling	62.5 m MMF optic cable 50 m MMF optic cable
Distance	902 ft (275 m) using 62.5 m MMF optic cable 1804 ft. (550 m) using 50 m MMF optic cable
Wavelength	850 nm
Optical budget	7 dB
Laser Transmitter characteristics	
Minimum launch power	-10 dBm
Maximum launch power	-4 dBm
Receiver characteristics	
Minimum receiver sensitivity	-17 dBm
Maximum power input	0 dBm

Specifications for LC type 1000BASE-LX connectivity

The model 1000BASE-LX SFP provides 1000BASE-LX (1310 nm, long wavelength, gigabit Ethernet) connectivity by using LC duplex fiber connectors. The long wavelength optical transceivers used in the LX model provide variable distance ranges by using both multimode and singlemode fiber optic cabling. The model 1000BASE-LX supports full-duplex operation only. The following table describes standards, connectors, cabling, and distance for the model 1000BASE-LX SFPs.

1000BASE-LX SFP specifications

Type	Specification
Standards	Conforms to the following standards: 802.3z, 1000BASE-LX
Connectors	Duplex LC fiber optic connector
Cabling	62.5 m MMF optic cable 50 m MMF optic cable 10 m SMF optic cable
Distance	1804 ft (550 m) using 62.5 m MMF optic cable 1804 ft (550 m) using 50 m MMF optic cable 16405 ft (5 km) using 10 m SMF optic cable
Wavelength	1310 nm
Optical budget	10.5 dB

Type	Specification
Laser Transmitter characteristics	
Minimum launch power	-9.5 dB
Maximum launch power	-3.0 dB
Receiver characteristics	
Minimum receiver sensitivity	-20.0 dBm
Maximum power input	-3.0 dBm

Specifications for MT-RJ Type 1000BASE-SX connectivity

The model 1000BASE-SX (MT-RJ type) SFP GBIC provides gigabit Ethernet connectivity by using MT-RJ multimode fiber connectors. The following table describes standards, connectors, cabling, and distance for the model 1000BASE-SX (MT-RJ type) SFP GBIC..

1000BASE-SX SFP specifications

Type	Specification
Standards	Conforms to the following standards: 802.3z, Ethernet full duplex
Connectors	Duplex MT-RJ fiber optic connector
Cabling	62.5 m MMF optic cable 50 m MMF optic cable
Distance	902 ft. (275 m) using 62.5 m MMF optic cable 1804 ft. (550 m) using 50 m MMF optic cable
Laser Transmitter characteristics	
Wavelength	850 nm
Maximum spectral width	0.85 nm
Minimum launch power	-9.5 dB
Maximum launch power	-4.0 dB
Receiver characteristics	
Minimum receiver sensitivity	-17.0 dBm
Maximum power input	0 dBm

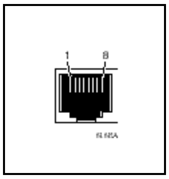
Connector and pin assignments

This section describes port connectors and pin assignment for the BES1000 Series switch.

RJ-45 (10BASE-T/100BASE-TX) port connectors

The RJ-45 port connectors (see "RJ-45 (8-pin modular) port connector" (page 257)) are wired as MDI-X ports to connect end stations without using crossover cables. For more information, see "MDI and MDI-X devices" (page 257). For 10BASE-T connections, use Category 3 (or higher) UTP cable. For 100BASE-TX connections, use only Category 5 UTP cable.

RJ-45 (8-pin modular) port connector



Pin descriptions for RJ-45 pinouts

Pin	Signal	Description
1	RX+	Receive Data +
2	RX-	Receive Data -
3	TX+	Transmit Data +
4	Not applicable	Not applicable
5	Not applicable	Not applicable
6	TX-	Transmit Data -
7	Not applicable	Not applicable
8	Not applicable	Not applicable

MDI and MDI-X devices

Media dependent interface (MDI) is the Institute of Electrical and Electronics Engineers (IEEE) standard for the interface to unshielded twisted pair (UTP) cable.

For two devices to communicate, the transmitter of one device must connect to the receiver of the other device. The connection is established through a crossover function, which can be a crossover cable or a port that implements the crossover function internally.

Ports that implement the crossover function internally are known as MDI-X ports, where X refers to the crossover function

ATTENTION

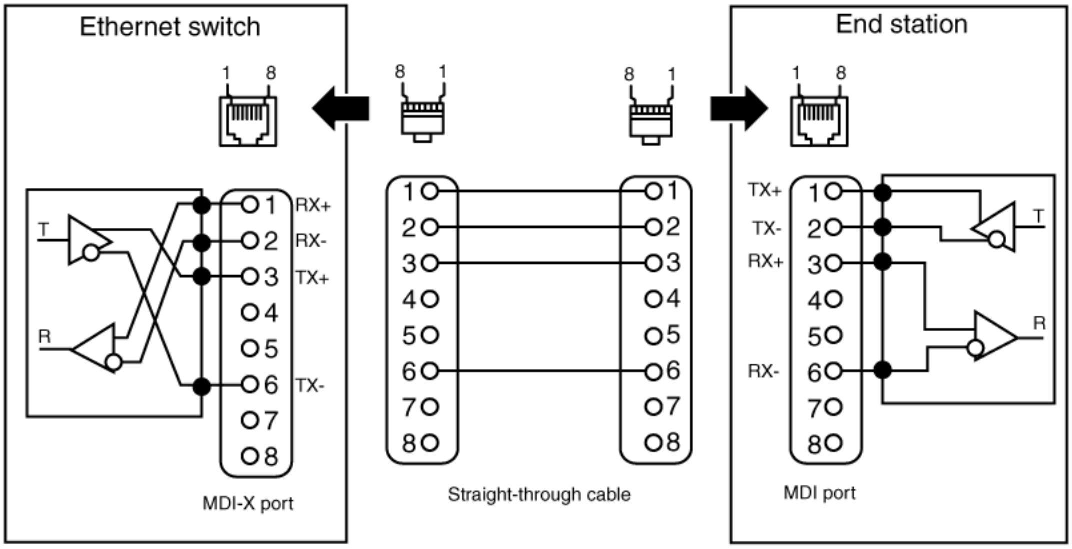
For the transmitter of one device to connect to the receiver of another device, the total number of crossovers must always be an odd number.

The following sections describe the use of straight-through and crossover cables for connecting MDI and MDI-X devices.

MDI-X to MDI cable connections

BES1000 Series switches use MDI-X ports that you can use to connect directly to end stations without using crossover cables (See "MDI-X to MDI cable connections" (page 258)).

MDI-X to MDI cable connections

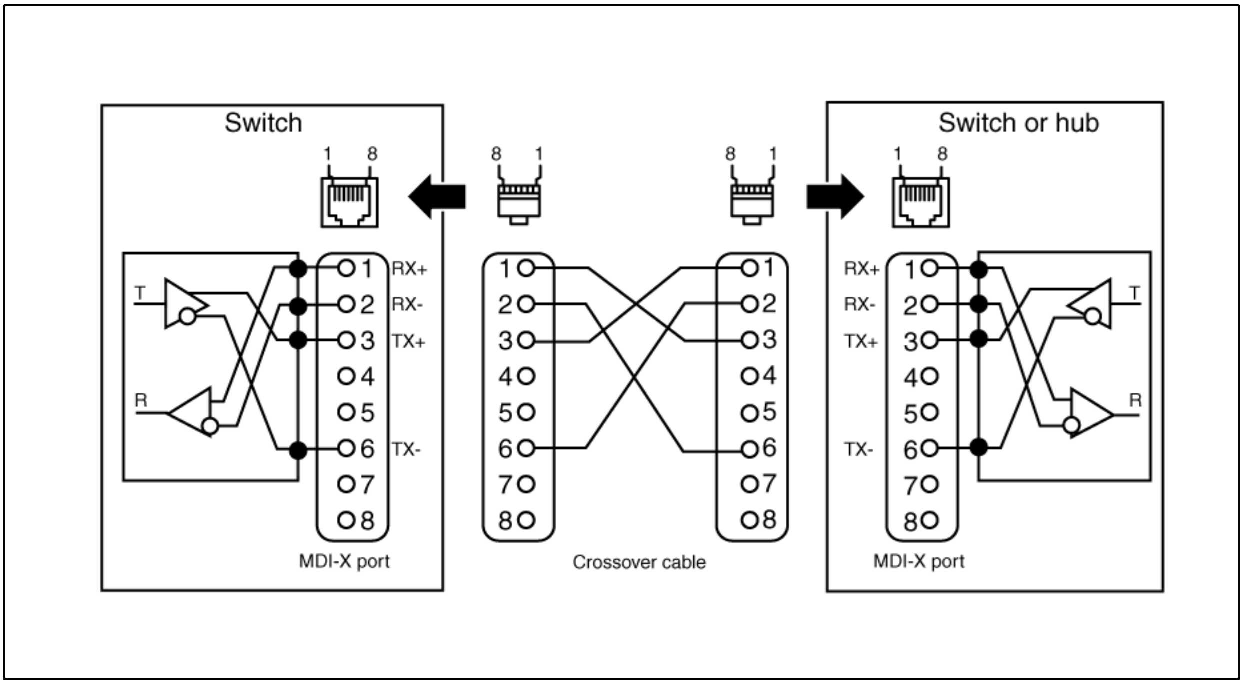


MDI-X to MDI-X cable connections

If you want to connect the BES1000 Series switch to a device that also implements MDI-X ports, use a crossover cable (See "DB-9 console/comm port connector" (page 259)).

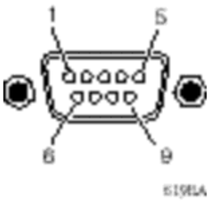
DB-9 (RS-232-D) console/comm port connector

DB-9 console/comm port connector with crossover cable



The DB-9 console/comm port connector (see "DB-9-console port connector" (page 260)) is configured as a data communications equipment (DCE) connector. The DSR and CTS signal outputs are always asserted; the CD, DTR, RTS, and RI signal inputs are not used. This configuration enables a management station (a PC or console terminal) to connect directly to the switch by using a straight-through cable.

DB-9-console port connector



"DB-9 console port connector pin assignments " (page 260) lists the DB-9 console port connector pin assignments.

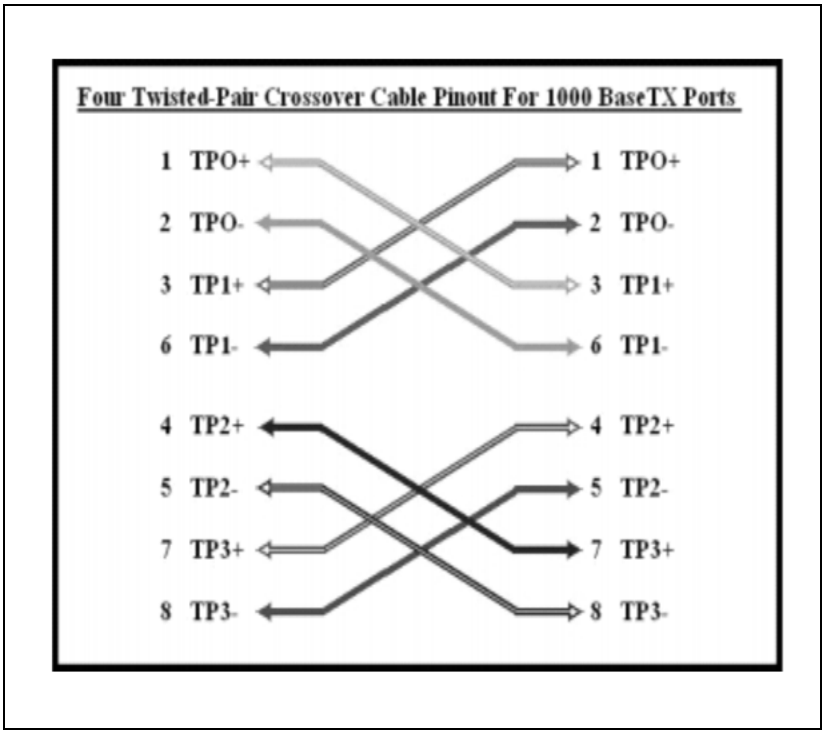
DB-9 console port connector pin assignments

Pin	Signal	Description
1	CD	Carrier detect (not used)
2	TXD	Transmit data (output)
3	RXD	Receive data (input)
4	DTR	Data terminal ready (not used)
5	GND	Signal ground
6	DSR	Not used
7	RTS	Request to send (not used)
8	CTS	Not used
9	RI	Ring indicator (not used)
Shell	—	Chassis ground

1000Base-T pinouts for the BES1000 Series switch

The 1000Base-T pinouts are illustrated and described in the following section.

1000Base-T pinouts



Pin descriptions for 1000Base-T pinouts

Pin	MDI	MDI-X
1	BI_DA+	BI_DB+
2	BI_DA-	BI_DB-
3	BI_DB+	BI_DA+
4	BI_DC+	BI_DD+
5	BI_DC-	BI_DD-
6	BI_DB-	BI_DA-
7	BI_DD+	BI_DC+
8	BI_DD-	BI_DC-

System information page

Use the System information page to view an image of the BES1000 Series switch configuration, to get information about the host device, and, if provided, the contact person or manager for the switch.

The System Information page is also the home page for the Web-based user interface. You can create or modify existing system information parameters by using the System page. For more information about configuring system information, see "Configuring console port communication speed" (page 64).

Procedure steps

Step	Action
1	From the main menu, choose **Administration**.
2	Choose **System Information**. The System Information page appears.

—End—

System Information page items

Item	Description
Description	The default description of the BES1000 Series switch
System Up-Time	The elapsed time since the system is last reinitialized
System Contact	The name, e-mail, address, and telephone number of the person to contact about switch operation
System Name	The name that the network administrator creates to identify the switch, for example, Finance Group
Location	The location name that the network administrator creates to identify the switch location, for example, first floor

Summary Switch Information page

On the Summary Switch Information page, view summary information about the switch. For example, from this page, you can obtain the physical description and serial number of the switch.

Procedure steps

Step	Action
1	From the main menu, choose **Summary**.
2	Choose **Switch Information**. The Switch Information page appears.

—End—

Summary Switch Information page items

Item	Description
Module Description	The factory default description of the switch
SFP Installed 1	Indicates if SFP is installed on port 1

Item	Description
SFP Installed 2	Indicates if SFP is installed on port 2
Firmware Version	The firmware version of the policy switch
Software Version	The version of the running software
Manufacturing Date Code	The date of manufacture of the board in ASCII format
Hardware Version	The hardware version of the policy switch
Serial #	The serial number of the policy switch
Mac Address	The MAC address of the switch
IP Address	The IP address of the switch
Fans Status	The fan status of the switch

Nortel Business Ethernet Switch 1000 Series

Using The Nortel Business Ethernet Switch 1000 Series

Publication: NN47927-300
Document status: Standard
Document version: 01.01
Document date: 10 January 2007

Sourced in Canada and the United States of America.

To order documentation from Nortel Networks Global Wireless Knowledge Services, call
(1) (877) 662-5669

To report a problem in this document, call
(1) (877) 662-5669
or send e-mail from the Nortel Networks Customer Training & Documentation World Wide Web site at
www.nortel.com.

Sourced in Canada and the United States of America.

The information in this document is subject to change without notice. The statements, configurations, technical data, and recommendations in this document are believed to be accurate and reliable, but are presented without express or implied warranty. Users must take full responsibility for their applications of any products specified in this document. The information in this document is proprietary to Nortel Networks.

The software described in this document is furnished under a license agreement and may be used only in accordance with the terms of that license. The software license agreement is included in this document.

Trademarks

*Nortel, Nortel Networks, the Nortel logo, and the Globemark are trademarks of Nortel Networks.
The asterisk after a name denotes a trademarked item.