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Using the Nortel Business Ethernet Switch 50 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.

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Preface

This guide provides information about administering and configuring the Nortel Business Ethernet Switch 50 (BES50) Series devices. This guide describes the features of the following Nortel switches:

- Nortel Business Ethernet Switch BES50GE-12T PWR Gigabit Ethernet Switch
- Nortel Business Ethernet Switch BES50GE-24T PWR Gigabit Ethernet Switch
- Nortel Business Ethernet Switch BES50FE-12T PWR Fast Ethernet Switch
- Nortel Business Ethernet Switch BES50FE-24T PWR Fast Ethernet Switch

Before you begin

This guide is intended for network administrators 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>`
	you enter
	`ping 192.168.1.128`

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.

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braces ({})	Indicate required elements in syntax descriptions where there is more than one option. You must choose only one of the options. Do not type the braces when you enter the command. Example:
	If the command syntax is
	`show ip {alerts|routes}`
	you must enter either
	`show ip alerts`
	or
	`show ip routes`
	but not both.

brackets ([ ])	Indicate optional elements in syntax descriptions. Do not type the brackets when you enter the command. Example: If the command syntax is
	`show ip interfaces [-alerts]`
	you can 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}`
	you enter either
	`show ip alerts`
	or
	`show  ip  routes`
	but not both.

Related publications

For more information about using the BES50 Series switch, see the *Quick Installation Guide for the Nortel Business Ethernet Switch 50 (NN47924-300)*.

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 purchased 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 purchased 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 here:

www.nortel.com

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New in this release

The following sections detail what’s new in *Using the Nortel Business Ethernet Switch 50 Series* (NN47924-301) for release 1.00.

Features

See the following sections for information about feature changes:

Release 1.0

This is the first release of *Using the Nortel Business Ethernet Switch 50 Series*.

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Introduction

The BES50FE-12/24T PWR and BES50GE-12/24T PWR are high performance Web-managed switches that deliver performance and control to your network. The BES50FE-12/24T PWR provides 12/24 full-duplex 10/100BASE-TX ports and the BES50GE-12/24T PWR provides 12/24 full-duplex 1000BASE-T ports that significantly improve network performance and boost throughput using switch features configured through the Web-based user interface. With 24/48FE and 24/48GE of throughput bandwidth, these switches provide the quickest solution to meeting the growing demands on your network.

Navigation

- To set up the Web-based user interface for use with the BES50, see "Using the Web-based user interface" (page 17).
- To set up the basic BES50 management features, see "BES50 basic configuration" (page 27).
- To set up advanced BES50 management features, see "BES50 advanced features configuration" (page 41).
- To reset the system, to change the IP address, to view system details, or to manage BES50 firmware, see "BES50 administration" (page 95).
- For installation options other than those covered by the *Quick Installation Guide for the Nortel Business Ethernet Switch 50 (NN47924-300)*, see "BES50 installation options" (page 123).
- To learn about the basic BES50 management features, see "BES50 fundamentals" (page 125).
- To learn about the advanced BES50 management features, see "BES50 advanced features fundamentals" (page 139).
- For system defaults, specifications, compliances, and other reference information related to the BES50, see "BES50 reference information" (page 155).

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Using the Web-based user interface

Use the information in this chapter to understand how to use the Web-based user interface to view and configure information about the Business Ethernet Switch (BES) 50 Series switch.

Prerequisites

- 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 Local Area Network (VLAN)
  - Microsoft Internet Explorer 5.5 or later installed on the administration computer
- Prior to accessing the switch from a Web browser, perform the following tasks:
  - "Setting up the Web-based user interface" (page 18).
  - If required, configure the switch with a valid IP address, subnet mask, and default gateway. (Default: 192.168.1.128/255.255.255.0/0.0.0.0) See "Initial configuration" (page 22).
  - Set a new password by using the Web-based user interface. Web-based user interface access is password controlled. (Default user name: nnadmin; default password : PlsChgMe!) See "Changing the administrator password" (page 23).

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

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

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Navigation

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 1.5.0_07-b03 or later is installed on your PC. Download the latest version from www.java.com if required.

> **ATTENTION**
> The menu on left 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. 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 left side of the Web-based user interface may not appear if Java script and Java applets are disabled.

3 Ensure the software programs on your PC enable 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**
> Some management features of your switch do not work properly if pop-up dialog boxes are disabled.

—End—

Logging on to the Web-based user interface

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

To access the Web-based user interface you must first enter a password. Users with Privileged access have Read/Write access to all configuration parameters and statistics.

> **ATTENTION**
> If user input does not occur within 5 minutes, the current session terminates.

Procedure steps

Step	Action
1	In the Web-based user interface address bar, type the IP address for your host switch. For example, type **http://192.168.1.128**, and press **Enter**.
2	Enter the user name and password, and click **OK**. (Default user name: nnadmin. Default password: PlsChgMe!)

—End—

Logging off from the Web-based user interface

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

Procedure steps

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

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2 Click **Logout**. A confirmation dialog box appears.

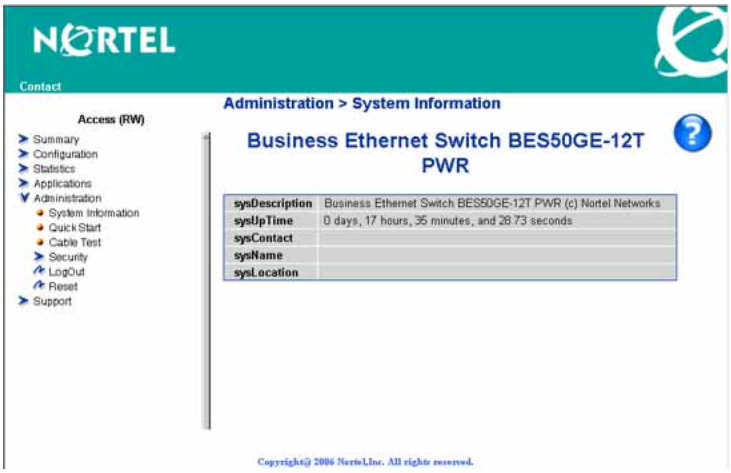
3 Click **Ok** to log off or click **Cancel** to cancel the request.

—End—

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 "Home page" (page 20). 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.

Home page



Administration > System Information

Business Ethernet Switch BES50GE-12T PWR

sysDescription	Business Ethernet Switch BES50GE-12T PWR (c) Nortel Networks
sysUpTime	0 days, 17 hours, 35 minutes, and 28.73 seconds
sysContact	
sysName	
sysLocation	

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The figure shows the home page for the BES50GE-12T-PWR 12-port switch. Other than the number of fixed ports, there are no major differences between the 12-port and 24-port switch user interface.

Menu and management pages

Using the onboard Web agent, you can define system parameters, manage and control the switch and all its ports, or monitor network conditions. 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. Tools are provided in the menu to assist you in navigating the Web-based user 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 is linked to an action, for example, logout, 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 selecting or clearing a check box. When a check mark appears in the box, that selection is enabled. You disable a selection by clearing the check 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.

Button	Action
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.

Initial configuration

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

To use the BES50 management features, you must first configure the BES50 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" (page 96).

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The default IP address is 192.168.1.128, 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 address **http://192.168.1.128**. If you do not see the logon page, check your IP address and repeat step 3.

If you are using DHCP service, use the Element Manager to launch the BES50 Web-based user interface.

8 Enter the default user name **nnadmin** and default password **PlsChgMe!**, and click **Login**.

> **ATTENTION**
> If you are using DHCP service, skip the remaining steps.

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

10 On the **IP Configuration** page, enter the new IP address, subnet mask and gateway IP address.

11 Click **Submit**.

—End—

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

Changing the administrator password

Use the User Accounts page to change the switch access passwords.

Procedure steps

Step	Action
1	From the main menu, choose **Administration > Security > User Accounts**.
2	In the **Change Password** table, enter the user name for the account whose password you want to change.
3	Type in the new password and retype the new password in the **Confirm Password** field.
4	Click **Change Password**.

—End—

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Adding system information

Use the System page to provide a descriptive name, location, and contact information for the system.

Procedure steps

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

—End—

Variable definitions

Variable	Value
System Description	Description of the switch.
System Object ID	This read-only parameter is the Management Information Base (MIB) II object ID for the switch network management subsystem.
System Up Time	Length of time the management agent has been operational.
System Contact	Administrator responsible for the system.
System Name	Name assigned to the switch system.
Location	The system location.

Setting the IP address

You can use an IP address to manage access to the switch over your network. By default, the switch uses Dynamic Host Configuration Protocol (DHCP) to assign IP settings to the management VLAN. (Default: VLAN 1.) If you want to manually configure IP settings, the IP address and subnet mask must be compatible with your network. You may also need to establish a default gateway between the switch and management stations that exist on another network segment.

You can manually configure a specific IP address or direct the device to obtain an address from a Bootstrap Protocol (BOOTP) or DHCP server. Valid IP addresses consist of four decimal numbers, 0 to 255, separated by periods. This is the only format that the Web-based user interface accepts.

Navigation

- "Setting the IP address manually" (page 25)
- "Setting the IP address automatically" (page 25)

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Setting the IP address manually

Use the IP Configuration page to set the IP address manually.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > IP**.
2	Select the VLAN through which the management station is attached.
3	In the IP Address Mode box, select **Static** .
4	Type the IP address, subnet mask, and gateway IP address.
5	Click **Submit**.
6	To save the changes, close the Web-based user interface and start a new session by using the new IP address.

—End—

Setting the IP address automatically

Use the IP Configuration page to set the IP address dynamically and to request an IP address from the DHCP server.

Prerequisites

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

Procedure steps to set the IP address automatically

Step	Action
1	From the main menu, choose **Configuration > IP**.
2	Select the VLAN through which the management station is attached.
3	In the IP Address Mode box, select **DHCP** or **BOOTP**.
4	Click **Submit** to save the setting and get the new IP address from the DHCP server. The switch broadcasts a request for IP configuration settings on each power reset.

—End—

Procedure steps to manually request an IP address from the DHCP server

Step	Action
1	From the main menu, choose **Configuration > IP**.
2	Click **Restart DHCP** to immediately request a new address. The switch broadcasts a request for IP configuration settings on each power reset.

—End—

Variable definitions

Variable	Value
Management VLAN	ID of the configured VLAN (Range: 1 to 4094). This is the only VLAN through which you can gain management access to the switch. By default, all ports on the switch are members of VLAN 1, so a management station can be connected to any port on the switch. However, if other VLANs are configured and you change the management VLAN, you can lose management access to the switch. In this case, reconnect the management station to a port that is a member of the management VLAN.
IP Address Mode	Select the configuration method. If you select DHCP or BOOTP, the IP address does not function until a reply is received from the server. The switch periodically broadcasts a request for an IP address.
IP Address	For Static IP Address Mode, enter the IP address of the management access VLAN interface. Valid IP addresses consist of four numbers, 0 to 255, separated by periods. (Default: 192.168.1.128)
Subnet Mask	For Static IP Address Mode, enter the host address bits used for routing to specific subnets. (Default: 255.255.255.0)
Gateway IP address	For Static IP Address Mode, enter the IP address of the gateway router between this device and management stations that exist on other network segments. (Default: 0.0.0.0)
MAC Address	The MAC address of this switch.
Restart DHCP	Requests a new IP address from the DHCP server.

BES50 basic configuration

Use the procedures in this chapter to manage the basic configuration of your Business Ethernet Switch (BES) 50 Series switch.

Navigation

Configuring initial settings by using the Quick Start feature

Use the Quick Start page to quickly set up BES50 features including IP configuration, Simple Network Management Protocol (SNMP) community, and trap managers.

Procedure steps

Step	Action
1	From the main menu, choose **Administration > Quick Start**.
2	Enter and select the data for IP configuration, SNMP community and trap managers as required by your site.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
IP Configuration	
Management VLAN	ID of the configured Virtual Local Area Network (VLAN) (Range: 1 to 4094). This is the only VLAN through which you can gain management access to the switch. By default, all ports on the switch are members of VLAN 1, so a management station can be connected to any port on the switch. However, if other VLANs are configured and you change the management VLAN, you can lose management access to the switch. In this case, reconnect the management station to a port that is a member of the management VLAN.
IP Address Mode	Select the configuration method. If you select Dynamic Host Configuration Protocol (DHCP) or Bootstrap Protocol (BOOTP), the IP address does not function until a reply is received from the server. The switch periodically broadcasts a request for an IP address.
IP Address	For Static IP Address Mode, enter the IP address of the management access VLAN interface. Valid IP addresses consist of four numbers, 0 to 255, separated by periods. (Default: 192.168.1.128)
Subnet Mask	For Static IP Address Mode, enter the host address bits used for routing to specific subnets. (Default: 255.255.255.0)
Gateway IP address	For Static IP Address Mode, enter the IP address of the gateway router between this device and management stations that exist on other network segments. (Default: 0.0.0.0)
MAC Address	The MAC address of this switch.
SNMP Community:	
SNMP Community Capability	The number of community strings supported by the BES50.
Current	List of currently configured community strings.
Community String	Type the name of the community string. The name acts like a password and permits access to the SNMP protocol. Default strings: PlsChgMe!RO (read-only access), PlsChgMe!RW (read/write access). Range: 1 to 32 characters, case-sensitive.
Access Mode	Select the access rights for the community string: • Read-Only—Authorized management stations can only retrieve Management Information Base (MIB) objects. • Read/Write—Authorized management stations can retrieve and modify MIB objects.
Trap Managers:	

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Variable	**Value**
Trap Manager Capability	The number of trap managers supported by the BES50.
Current	List of currently configured trap managers.
Trap Manager IP Address	Type the IP address of a new management station to receive notification messages.
Trap Manager Community String	Specify a valid community string for the new trap manager entry. (Range: 1 to 32 characters, case-sensitive) **ATTENTION** Nortel recommends that you define this string in the SNMP Configuratino page for version 1 or 2c clients, or define a corresponding user name in the SNMPv3 Users page for version 3 clients.
Trap UDP Port	The UDP port number used by the trap manager.
Trap Version	Select the SNMP version. (Default: 1)
Trap Security Level	For trap version 3, specify one of the following security levels. (Default: noAuthNoPriv) • noAuthNoPriv—SNMP communications do not use authentication or encryption. • AuthNoPriv—SNMP communications use authentication, but the data is not encrypted (only available for the SNMPv3 security model). • AuthPriv—SNMP communications use both authentication and encryption (only available for the SNMPv3 security model).
Trap Inform	For version 2c and 3 hosts, notifications are sent as inform messages. (Default: traps are used) • Timeout—The number of seconds to wait for an acknowledgment before resending an inform message. (Range: 0 to 2147483647 centiseconds) • Retry times—The maximum number of times to resend an inform message if the recipient does not acknowledge receipt. (Range: 0 to 255)

Configuring user authentication

Use the procedures in this section to restrict management access to the switch and to provide secure network access.

Navigation

- Use "Configuring user accounts" (page 30) to manually configure management access rights for users.

- Use "Configuring local and remote logon authentication" (page 31) to remotely configure users access rights.
- Use "Configuring port security" (page 32) to Configure secure addresses for individual ports.
- Use "Configuring 802.1X port authentication" (page 87) to control access to specific ports.

Configuring user accounts

Use the User Accounts page to manually configure management access rights for users.

The administrator has write access for all parameters governing the onboard agent. Assign a new administrator password as soon as possible, and store it in a safe place.

See "Changing the administrator password" (page 23).

Procedure steps

Step	Action
1	From the main menu, choose **Administration > Security > User Accounts**.
2	To configure a new user account, enter the user name, access level, and password. (The default administrator name is nnadmin with the password PlsChgMe!.)
3	Click **Add**.

ATTENTION

To change the password for a specific user, enter the user name and new password, and then confirm the password by entering it again.

—End—

Variable definitions

Variable	Value
Account List	The current list of user accounts and associated access levels. (Default user name: nnadmin; default password: PlsChgMe!)
New Account	
User Name	Enter the name of the user. (Maximum length: 8 characters; maximum number of users: 16)

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Variable	Value
Access Level	Select Privileged to configure read/write user access. Select Normal to configure read-only user access.
Password	Enter the user password. (Range: 0 to 8 characters plain text, case-sensitive)
Confirm Password	Enter a new password for the specified user.

Configuring local and remote logon authentication

Use the Authentication Settings page to restrict management access based on specified user names and passwords. You can manually configure access rights on the switch, or you can use a remote access authentication server based on Remote Authentication Dial-In User Server (RADIUS) protocols.

Procedure steps

Step	Action
1	From the main menu, choose **Administration > Security > Authentication Settings**.
2	To configure local or remote authentication preferences, select the authentication sequence from the **Authentication** list (one to two methods).
3	For RADIUS authentication, fill in the required parameters.
4	Click **Apply**.

—End—

Variable definitions

Variable	Value
Authentication	Select the authentication or authentication sequence: • Local—The switch performs user authentication locally. • RADIUS—The RADIUS performs user authentication. • [authentication sequence]—User authentication occurs in the indicated sequence. (Local/RADIUS or RADIUS/Local)
RADIUS Settings	Select the authentication or authentication sequence: • Global—Provides globally applicable RADIUS settings.

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Variable	Value
	• ServerIndex—Specifies one of five RADIUS servers that can be configured. The switch attempts authentication by using the listed sequence of servers. The process ends when a server either approves or denies access to a user. • Server Port Number—Network (UDP) port of authentication server used for authentication messages. (Range: 1 to 65535; Default: 1812) • Secret Text String—Encryption key used to authenticate logon access for the client. Do not use blank spaces in the string. (Maximum length: 20 characters) • Number of Server Transmits—Number of times the switch tries to authenticate logon access through the authentication server. (Range: 1 to 30; Default: 2) • Timeout for a reply—The number of seconds the switch waits for a reply from the RADIUS server before it resends the request. (Range: 1 to 65535; Default: 5)

Configuring port security

Use the Port Security page to configure secure addresses for individual ports.

Using the port security feature, you can configure a switch port with one or more device MAC addresses authorized to access the network through that port.

To use port security, specify a maximum number of addresses to allow on the port and then let the switch dynamically learn the source pair—MAC address, VLAN—for frames received on the port. See "Configuring 802.1X port settings" (page 88). You can also manually add secure addresses to the port by using the Static Address table. See "Setting static addresses" (page 85). When the port reaches the maximum number of MAC addresses, the selected port stops learning. The MAC addresses already in the address table are retained and do not age out. Any other device that attempts to use the port is prevented from accessing the switch.

A secure port:

- cannot use port monitoring
- cannot be a multi-VLAN port
- cannot be used as a member of a static or dynamic trunk
- should not be connected to a network interconnection device

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ATTENTION

If a port is disabled (shut down) due to a security violation, it must be manually reenabled from the Port/Port Configuration page.

Procedure steps

Step	Action
1	From the main menu, choose **Administration > Security > Port Security**.
2	Select the check box in the **Security Status** column to enable security for a port.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
Port	Port number.
Name	Descriptive text.
Security Status	Select to enable port security on the port. (Default: Disabled)
Trunk	Trunk number if port is a member.
LACP	Indicates whether Link Aggregation Control Protocol (LACP) is enabled or disabled.

Configuring event logging

Use these procedures to control the logging of error messages, including the type of events recorded in switch memory, and logging to a remote System Log (syslog) server.

Navigation

- "Configuring the system logs" (page 33)
- "Configuring the remote logs" (page 35)

Configuring the system logs

Use the System Logs page to configure system messages logged to flash or RAM memory.

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Severe error messages logged to flash memory are permanently stored in the switch to assist in troubleshooting network problems. The flash memory can store up to 4096 log entries with the oldest entries being overwritten first when the available log memory exceeds 256 kilobytes.

Procedure steps

Step	Action
1	From the main menu choose **Configuration > Log > System Logs**.
2	Select the System Log Status **Enabled** check box.
3	Type the event level for flash and RAM. See the "Event level messages table" (page 34).

ATTENTION
The flash level must not exceed the RAM level.

Step	Action
4	Click **Submit**.

—End—

Variable definitions

Variable	Value
System Log Status	Select to enable the logging of debug or error messages to the logging process.
Flash Level	Enter the highest level of log message to save to the switch permanent flash memory. For example, specify level 3 to log all messages from level 0 to level 3 to flash. (Range: 0 to 7. Default: 3)
RAM Level	Enter the highest level of log message to save to the switch temporary RAM memory. For example, specify level 7 to log all messages from level 0 to level 7 to RAM. (Range: 0 to 7. Default: 7)

Event level messages table

Level	Severity Name	Description
7	Debug	Debugging messages
6	Informational	Informational messages only
5	Notice	Normal but significant condition, such as cold start
4	Warning	Warning conditions (such as return false, or unexpected return)

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Level	Severity Name	Description
3	Error	Error conditions (such as invalid input, or default used)
2	Critical	Critical conditions (such as memory allocation, or free memory error—resource exhausted)
1	Alert	Immediate action needed
0	Emergency	System unusable

Configuring the remote logs

Use the Remote Logs page to configure message logging to remote servers. You can also limit the error messages sent to only those messages below a specified level.

Procedure steps

Step Action

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

2 For **Remote Log Status**, select the Enabled check box.

3 In the Logging Facility and the Logging Trap fields, type the event level.

4 To add an IP address to the Host IP List, type the new IP address in the Host IP Address box, and then click **Add**.

5 To delete an IP address, click the entry in the Host IP List, and then click **Remove**.

6 Click **Submit**.

—End—

Variable definitions

Variable	Value
Remote Logs	
Remote Log Status	Select to enable the logging of debug or error messages to the remote logging process. (Default: Disabled)
Logging Facility	Type the facility type tag to send in syslog messages. The facility type is used by the syslog server to dispatch log messages to an appropriate service, and to sort or store messages in the corresponding database. (Range: 16 to 23. Default: 23)

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Variable	Value
Logging Trap	Enter the highest level of log message to send to the remote syslog server. For example, specify level 3 to send all messages from level 0 to level 3 to the remote server. (Range: 0 to 7. Default: 7)
Host IP Address	
Host IP List	List of remote server IP addresses that receive the syslog messages. The maximum number of host IP addresses allowed is five.
Host IP Address	Enter the server IP address to add to the Host IP List.

Setting application filtering

Use this procedure to set access control on the switch. The BES50 provides security control features and controls the access modes, consequently preventing illegal users from logging on to and accessing switches.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > Application Filtering**.
2	For each port, select the appropriate check boxes to enable the required access.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
FTP	Select to enable filtering.
SSH	Select to enable filtering.
TELNET	Select to enable filtering.
TFTP	Select to enable filtering.
HTTP	Select to enable filtering.
HTTPs	Select to enable filtering.

Configuring the system clock

Use the Applications Simple Network Time Protocol (SNTP) page to configure the system clock manually or automatically, and to configure daylight saving time on the BES50.

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Navigation

- "Setting the system clock" (page 37)
- "Setting daylight saving time" (page 37)

Setting the system clock

Use this procedure to set the system clock manually or automatically.

> **ATTENTION**
> Manually set system time is not maintained upon reset of the BES50 hardware or software.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > SNTP**.
2	To set time manually: a. Select **Set the system time manually**. b. In the Manual table, type the value for each of the **Hours**, **Minutes**, **Seconds**, **Month**, **Day**, and **Year** fields.

> **ATTENTION**
> The Year field must be at least 2001.

Step	Action
3	To set time automatically: a. Select **Set the system time using Simple Network Time Protocol (SNTP) automatically**. b. From the **Time Zone** list, select the appropriate time zone. c. Complete the settings in the **Automatic** and **SNTP Server** tables as required. See "Setting daylight saving time" (page 37) for details.
4	Click **Submit**.

—End—

Setting daylight saving time

Use this procedure to configure daylight saving time on the BES50.

Prerequisites

- Select the automatic system time configuration option.

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Procedure steps

Step	Action
1	From the main menu, choose **Applications > SNTP**.
2	In the **Automatic** table, select the **Daylight Saving** check box, and then select the daylight saving configuration type. (USA, Europe, Custom)
3	In the **Time Set Offset** field, type the number of minutes to offset the original time to achieve daylight saving time. (This value is typically set to 60 minutes.)
4	If you select Custom as the daylight saving configuration type, type the start and end date and time in the **FROM** and **TO** fields, or select the **Recurring** check box to configure a custom recurring daylight saving time.
5	Click **Submit**.

—End—

Variable definitions

Variable	Value
Set Time	Select the method for setting the system time. (Options: set the system time manually or set the system time automatically using SNTP.)
Manual	For manual time setting, enter the time and date. If the time is set manually, the system clock resets each time the switch is rebooted.
Automatic	For automatic time setting, configure the switch so the SNTP automatically sets the time and date. Enter the values for the parameters as required. • Time Zone—Select your time zone. • Daylight Saving—Select the daylight saving configuration type. (Options: USA, Europe, or Custom) • Time Set Offset—For custom settings, enter the time offset from the time zone. • Recurring—Select to use the daylight saving feature for a specific time period. • From/To—Enter the applicable dates and times for daylight saving use.

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Variable	Value
Server 1/Server 2	For automatic time setting, type the IP address for up to two SNTP servers. The switch attempts to update the time from the first server; if this fails, it attempts an update from the second server.
Polling Interval	For automatic time setting, select the interval between sending requests for a time update from a time server. (Range: 16 to 16384 seconds. Default: 16 seconds)

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BES50 advanced features configuration

Use these procedures to set up the Business Ethernet Switch (BES) 50 advanced management features.

Navigation

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Configuring Simple Network Management Protocol

Use these procedures to set up Simple Network Management Protocol (SNMP) and security on your BES50.

Navigation

- "Sending an inform message to an SNMP version 2 host" (page 42)
- "Sending an inform message to an SNMP version 3 host" (page 42)
- "Setting community access strings" (page 43)
- "Specifying trap managers and trap types" (page 43)
- "Enabling SNMP service" (page 46)
- "Configuring SNMP version 3 management access" (page 46)

Sending an inform message to an SNMP version 2 host

You can send an inform message to an SNMP version 2 host by completing the following procedures.

1. Enable the SNMP agent. See "Enabling SNMP service" (page 46).
2. Enable trap inform messages. See "Specifying trap managers and trap types" (page 43).
3. Create a view with the required notification messages. See "Setting SNMP version 3 views" (page 48).
4. Create a group that includes the required notify view. See "Creating SNMP version 3 groups" (page 52).

Sending an inform message to an SNMP version 3 host

You can send an inform message to an SNMP version 3 host by completing the following procedures.

1. Enable the SNMP agent. See "Enabling SNMP service" (page 46).
2. Enable trap inform messages. See "Specifying trap managers and trap types" (page 43).
3. Create a view with the required notification messages. See "Setting SNMP version 3 views" (page 48).
4. Create a group that includes the required notify view. See "Creating SNMP version 3 groups" (page 52).
5. Specify a remote engine ID where the user resides. See "Setting a remote engine ID" (page 47).
6. Configure a remote user. See "Configuring remote SNMP version 3 users" (page 51).

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Setting community access strings

Use this procedure to configure community strings and related trap functions for clients by using SNMP version 1 and v2c. List all community strings used for IP trap managers in this table, to a maximum of five.

For security reasons, Nortel recommends that you remove the default community strings.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > SNMP > SNMP Configuration**.
2	In the SNMP Community table, type a community string and select an access mode.
3	Click **Add** to save your configuration settings.

—End—

SNMP Configuration page items

Item	Description
SNMP Community Capability	The maximum number of community strings that the BES50 supports. (Maximum number supported: 5)
Current	List of currently configured community strings.
Community String	Type the name of the community string. The name acts like a password and permits access to the SNMP protocol. (Default strings: PlsChgMe!RO [read-only access], PlsChgMe!RW [read/write access]. Range: 1 to 32 characters, case-sensitive.)
Access Mode	Specify the access rights for the community string: • Read-Only—Authorized management stations can only retrieve Management Information Base (MIB) objects. • Read/Write—Authorized management stations can retrieve and modify MIB objects.

Specifying trap managers and trap types

Use the SNMP Configuration page to specify trap managers.

The switch issues traps indicating status changes to specified trap managers. You must specify trap managers so the switch reports key events to your management station by using network management platforms such

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as the Element Manager. You can specify up to five management stations to receive authentication failure messages and other notification messages from the switch.

By default, the switch issues notifications as trap messages. The recipient of a trap message does not send a response to the switch. Therefore, traps are not reliable as inform messages, which include a request for acknowledgement of receipt. Informs can be used to ensure that the host receives critical information. However, inform messages consume more system resources because they must be kept in memory until a response is received. Inform messages also add to network traffic.

If you specify an SNMP version 3 host, then the Trap Manager Community String is interpreted as an SNMP user name. If you use SNMP version 3 authentication or encryption options (authNoPriv or authPriv), you must first define the user name in the SNMP version 3 Users page to enable password authentication and SNMP access to the switch. However, if you specify a SNMP version 3 host with the no authentication (noAuth) option, an SNMP user account is automatically generated, and the switch authorizes SNMP access for the host.

Prerequisites

- For SNMP version 3 authentication or encryption options (authNoPriv or authPriv), you must first define the user name in the SNMP version 3 Users page. See "Configuring SNMP version 3 users" (page 49).

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > SNMP > SNMP Configuration**.
2	In the **Trap Managers** table, enter a trap manager IP address and trap manager community string for each management station that receives trap messages.
3	For SNMP version 2 and version 3 clients, specify the trap inform message settings.
4	For SNMP version 3 clients, specify the UDP port, trap version, and trap security level.
5	Click **Add**.
6	Select the check boxes for **Enable Authentication** and **Enable Link-up and Link-down Traps** to indicate the trap types.
7	Click **Submit**.

—End—

Variable definitions

Variable	Value
Trap Manager Capability	The number of trap managers that the BES50 supports.
Current	List of currently configured trap managers.
Trap Manager IP Address	Type the IP address of a new management station to receive notification messages.
Trap Manager Community String	Specify a valid community string for the new trap manager entry. (Range: 1 to 32 characters, case-sensitive.) **ATTENTION** Nortel recommends that you define this string in the SNMP Configuration page for Version 1 or 2c clients, or define a corresponding user name in the SNMP version 3 Users page for Version 3 clients.
Trap UDP Port	The UDP port number used by the trap manager.
Trap Version	Select the SNMP version. (Default: 1)
Trap Security Level	For trap version 3, specify one of the following security levels. (Default: noAuthNoPriv) • noAuthNoPriv—SNMP communications do not use authentication or encryption. • AuthNoPriv—SNMP communications use authentication, but the data is not encrypted. • AuthPriv—SNMP communications use both authentication and encryption.
Trap Inform	For version 2c and 3 hosts, notifications are sent as inform messages. (Default: traps are used) • Timeout—The number of seconds to wait for an acknowledgment before resending an inform message. (Range: 0 to 2 147 483 647 centiseconds) • Retry times—The maximum number of times to resend an inform message if the recipient does not acknowledge receipt. (Range: 0 to 255)
Enable Authentication Traps	Select to issue a notification message to specified IP trap managers whenever authentication of an SNMP request fails. (Default: Enabled)
Enable Link-up and Link-down Traps	Select to issue a notification message whenever a port link is established or broken. (Default: Enabled)

Enabling SNMP service

Use the SNMP Agent page to enable SNMP service for all management clients (versions 1, 2c, 3).

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > SNMP > Agent Status**.
2	Select the **Enable** check box.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
SNMP Agent Status	Select to enable SNMP on the switch.

Configuring SNMP version 3 management access

Use these procedures to configure SNMP version 3 management access to the BES50.

Navigation

- "Setting the local engine ID" (page 46)
- "Setting a remote engine ID" (page 47)
- "Setting SNMP version 3 views" (page 48)
- "Configuring SNMP version 3 users" (page 49)
- "Changing the assigned group for an SNMP version 3 user" (page 50)
- "Configuring remote SNMP version 3 users" (page 51)
- "Creating SNMP version 3 groups" (page 52)

Setting the local engine ID

Use this procedure to set the SNMP version 3 engine ID on the BES50 if it is different from the default value or if it has been deleted.

ATTENTION

If this local default engine ID is deleted or changed, all SNMP users are cleared and all existing users must be reconfigured.

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Prerequisites

- Change the default engine ID before you configure other parameters.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > SNMPv3 > Engine ID**.
2	Type an engine ID, to a maximum of 26 hexadecimal characters. If you specify fewer than 26 characters, trailing zeroes are added to the value. For example, the value 1234 is equivalent to 1234 followed by 22 zeroes.
3	Click **Save**.

—End—

Setting a remote engine ID

Use the Remove Engine ID page to set the SNMP version 3 engine ID for a remote device.

To send inform messages to an SNMP version 3 user on a remote device, you must first specify the engine identifier for the SNMP agent on the remote device where the user resides. The remote engine ID is used to compute the security digest for authenticating and encrypting packets sent to a user on the remote host.

SNMP passwords are localized by using the engine ID of the authoritative agent. For inform messages, the authoritative SNMP agent is the remote agent. You therefore need to configure the remote agent SNMP engine ID before you can send proxy requests or inform messages to it.

Prerequisites

- Change the default engine ID before you configure other parameters.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > SNMPv3 > Remote Engine ID**.
2	Type an engine ID, to a maximum of 26 hexadecimal characters.

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If you specify fewer than 26 characters, trailing zeroes are added to the value. For example, the value 1234 is equivalent to 1234 followed by 22 zeroes.

3 Type an IP address for the remote host.

4 Click **Add**.

—End—

Setting SNMP version 3 views

Use this procedure to restrict user access to specified portions of the Management Information Base (MIB) tree. The predefined view defaultview includes access to the entire MIB tree.

Procedure steps

Step Action

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

2 Click **New**.

3 In the **SNMPv3 View—Edit** page, for each Object Identifier (OID) subtree, type a view name and select the type to specify which OID subtrees to include or exclude.

4 Click **Add** to save the new view.

5 Click **Back** to return to the SNMPv3 Views list.

—End—

Variable definitions—SNMPv3 View—Edit page

Variable	Value
View Name	Type the name of the SNMP view. (Range: 1 to 64 characters)
Current	The listing of OID subtrees configured for the selected SNMP version 3 view.

Variable	Value
OID Subtrees	Type the object identifier of the MIB tree branch that defines the SNMP view.
Type	Select to indicate whether the object identifier of the MIB tree branch is included in or excluded from the SNMP view.

Variable definitions—SNMPv3 Views page

Variable	Value
[check box column]	Select the check box for each SNMP version 3 view that you want to view or delete.
Name	The name of the SNMP view. (Range: 1 to 64 characters)
OID Subtrees	Click the hyperlink to view details of the currently configured object identifiers of the MIB tree branch that defines the SNMP view.

Configuring SNMP version 3 users

Use this procedure to assign SNMP version 3 users to groups.

A unique name defines each SNMP version 3 user. Each user must be configured with a specific security level and assigned to a group (community access string). The SNMP version 3 group restricts users to a specific read, write, and notify view.

Procedure steps

Step Action

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

2 Click **New**.

3 In the **SNMPv3 Users—New** page, type a name for the user and assign the user to a group.

4 If required, select the **Security Model** and **Level**, **User Authentication**, and **Data Privacy** settings for the user.

5 Click **Submit** to save the configuration and return to the User Name list.

—End—

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Variable definitions

Variable	Value
User Name	Type the name of the user connecting to the SNMP agent. (Range: 1 to 32 characters)
Group Name	Type the name of the SNMP group to which the user is assigned or select a preexisting group name from the list. (Range: 1 to 32 characters)
Security Model	Select the user security model. (SNMP v1, v2c, or v3.)
Security Level	For security model 3, select the security level used: • noAuthNoPriv—SNMP communications do not use authentication or encryption. (Default) • AuthNoPriv—SNMP communications use authentication, but the data is not encrypted. • AuthPriv—SNMP communications use both authentication and encryption.
Authentication	For AuthNoPriv or AuthPriv security level, select the user authentication method. (Options: MD5, SHA. Default: MD5)
Authentication Password	For AuthNoPriv or AuthPriv security level, type an authorization password with a minimum of eight plain text characters.
Privacy	The encryption algorithm used for data privacy; only 56-bit DES is currently available.

Changing the assigned group for an SNMP version 3 user

Use the SNMPv3 Users page to change the assigned group of an SNMP version 3 user.

Procedure steps

Step **Action**

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

2 In the **Actions** column for the user that you wish to update, click **Change Group**.

3 On the **SNMPv3 Users-Edit** table, click the option button and enter the name of a new group, or click the option button and select an existing group from the list.

4 Click **Submit**.

—End—

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Configuring remote SNMP version 3 users

Use this procedure to assign remote SNMP version 3 users to groups. The remote engine ID is used to compute the security digest for authenticating and encrypting packets sent to a user on the remote host.

Prerequisites

- Specify the engine identifier for the SNMP agent on the remote device where the user resides. See "Setting a remote engine ID" (page 47).

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > SNMPv3 > Remote Users**.
2	Click **New**.
3	If the remote engine ID is not configured, the Remote Engine ID dialog box appears. Click **OK** to access the **Remote Engine ID** configuration page. See "Setting a remote engine ID" (page 47) to configure the remote engine ID before proceeding to the next step.
4	In the **Remote Users—New** page, type a name for the user and assign the user to a group.
5	Select the **Security Model** and **Level**, **User Authentication**, and **Data Privacy** settings for the user.
6	Click **Submit**.

—End—

Variable definitions

Variable	Value
User Name	Type the name of the user connecting to the SNMP agent. (Range: 1 to 32 characters)
Group Name	Type the name of the SNMP group to which the user is assigned or select a preexisting group name from the list. (Range: 1 to 32 characters)

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Variable	Value
Engine IP	Select the engine identifier for the SNMP agent on the remote device where the remote user resides. You must specify the remote engine identifier before you configure a remote user. (See "Setting a remote engine ID" (page 47))
Security Model	The user security model.
Security Level	The security level used for the user: • noAuthNoPriv—SNMP communications use no authentication or encryption. • AuthNoPriv—SNMP communications use authentication, but the data is not encrypted. • AuthPriv—SNMP communications use both authentication and encryption.
Authentication Protocol	Select the user authentication method. (Options: MD5, SHA; Default: MD5)
Authentication Password	Type an authorization password with a minimum of eight plain text characters.
Privacy Protocol	The encryption algorithm use for data privacy; only 56-bit DES is currently available.
Privacy Password	Type a privacy password with a minimum of eight plain text characters.

Creating SNMP version 3 groups

An SNMP version 3 group sets the access policy for its assigned users, restricting them to specific read, write, and notify views. You can use the predefined default groups or create new groups to map a set of SNMP users to SNMP views.

Procedure steps

Step Action

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

2 Click **New**.

3 In the **New Group** page, type a group name, and select a security model and level and the SNMP version 3 views.

4 Click **Submit**.

—End—

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Variable definitions

Variable	Value
Group Name	Type the name of the SNMP group. (Range: 1 to 32 characters)
Security Model	Select the group security model. (SNMP v1, v2c, or v3.)
Security Level	For security model 3, select the security level used: • noAuthNoPriv—SNMP communications do not use authentication or encryption. (Default) • AuthNoPriv—SNMP communications use authentication, but the data is not encrypted. • AuthPriv—SNMP communications use both authentication and encryption.
Read View	Click the upper option button and type a name for the read access view, or click the lower option button and select the configured view from the list. (Range: 1 to 64 characters)
Write View	Click the upper option button and type a name for the write access view, or click the lower option button and select the configured view from the list. (Range: 1 to 64 characters)
Notify View	Click the upper option button and type a name for notifications, or click the lower option button and select the configured view from the list. (Range: 1 to 64 characters)

Supported notification messages

Object label	Object ID	Description
RFC 1493 Traps		
newRoot	1.3.6.1.2.1.17.0.1	This trap indicates that the sending agent is the new Spanning Tree root. A bridge sends the trap soon after its election as the new root, such as upon expiration of the Topology Change Timer immediately subsequent to its election.
topologyChange	1.3.6.1.2.1.17.0.2	This trap indicates that a configured port transitioned from the Learning state to the Forwarding state, or from the Forwarding state to the Discarding state. This trap is not sent if a newRoot trap is sent for the same transition.
SNMP version 2 Traps		
coldStart	1.3.6.1.6.3.1.1.5.1	This trap indicates that the SNMP version 2 entity, acting in an agent role, is reinitializing itself and that its configuration may be altered.

Object label	Object ID	Description
warmStart	1.3.6.1.6.3.1.1.5.2	This trap indicates that the SNMP version 2 entity, acting in an agent role, is reinitializing itself such that its configuration is unaltered.
linkDown	1.3.6.1.6.3.1.1.5.3	This trap indicates that the SNMP entity, acting in an agent role, detects that the ifOperStatus object for one of its communication links is about to enter the down state from some other state (but not from the notPresent state). This other state is indicated by the included value of ifOperStatus.
linkUp	1.3.6.1.6.3.1.1.5.4	This trap indicates that the SNMP entity, acting in an agent role, detects that the ifOperStatus object for one of its communication links left the down state and transitioned into some other state (but not into the notPresent state). This other state is indicated by the included value of ifOperStatus. These are legacy notifications and therefore must be enabled in conjunction with the corresponding traps on the SNMP Configuration menu.
authenticationFailure	1.3.6.1.6.3.1.1.5.5	This trap signifies that the SNMP version 2 entity, acting in an agent role, has received a protocol message that is not properly authenticated. While all implementations of the SNMP version 2 must be capable of generating this trap, the snmpEnableAuthenTraps object indicates whether this trap is generated. These are legacy notifications and therefore must be enabled in conjunction with the corresponding traps on the SNMP Configuration menu.
RMON Events (V2)		
risingAlarm	1.3.6.1.2.1.16.0.1	This trap generates when an alarm entry crosses its rising threshold and generates an event configured for sending SNMP traps.
fallingAlarm	1.3.6.1.2.1.16.0.2	This trap generates when an alarm entry crosses its falling threshold and generates an event configured for sending SNMP traps.
Private Traps		
swPowerStatus ChangeTrap	1.3.6.1.4.1.202.20.28 .63.2.1.0.11.3.6.1.4.1 .202.20.41.63.2.1.0.1	This trap is sent when the power state changes.

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Object label	Object ID	Description
swIpFilterRejectTrap	1.3.6.1.4.1.202.20.28 .63.2.1.0.40 1.3.6.1.4.1.202.20.41 .63.2.1.0.40	This trap is sent when an incorrect IP address is rejected by the IP filter.
swSmtpConnFailure Trap	1.3.6.1.4.1.202.20.28 .63.2.1.0.411.3.6.1.4 .1.202.20.41.63.2.1.0 .41	This trap is triggered if the SMTP system cannot open a connection to the mail server successfully.
pethPsePortOnOff Notification	1.3.6.1.4.1.202.20.41 .63.2.1.0.43	This notification indicates if a Power Sourcing Equipment (PSE) port is delivering power to the Powered Device (PD). This notification is sent on every status change except in search mode.
pethPsePortPower MaintenanceStatus Notification	1.3.6.1.4.1.202.20.41 .63.2.1.0.44	This notification indicates a port change status and is sent on every status change.
pethMainPower UsageOnNotification	1.3.6.1.4.1.202.20.41 .63.2.1.0.45	This notification indicates that the PSE Threshold usage indication is on. The power usage is above the threshold.
pethMainPower UsageOffNotification	1.3.6.1.4.1.202.20.41 .63.2.1.0.46	This notification indicates that the PSE Threshold usage indication is off. The power usage is below the threshold.

Configuring ports and trunks

Use these procedures to configure ports and trunks. In this section, the term *interface* describes ports and trunks.

Navigation

- "Configuring interface connections" (page 55)
- "Creating trunk groups" (page 56)

Configuring interface connections

Use the Port Configuration or Trunk Configuration page to enable or disable an interface, to set autonegotiation and the interface capabilities to advertise, or to manually fix the speed, duplex mode, and flow control.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > Port > Port Configuration** or choose **Configuration > Port > Trunk Configuration**.
2	Modify the required interface settings.

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3 Click **Submit**.

—End—

Variable definitions

Variable	Value
Name	Type a label for the interface. (Range: 1 to 64 characters)
Admin	Clear the check box to manually disable an interface. You can disable an interface due to abnormal behavior, such as excessive collisions, and then reenable it after the problem is resolved. You can also disable an interface for security reasons.
Speed/Duplex	If autonegotiation is disabled (cleared), select port speed and duplex mode manually.
Flow Control	If autonegotiation is disabled (cleared), clear to configure flow control manually.
Autonegotiation (Port Capabilities)	Select to enable autonegotiation and to specify the capabilities to be advertised as follows: • 10half—Supports 10 Mb/s half-duplex operation • 10full—Supports 10 Mb/s full-duplex operation • 100half—Supports 100 Mb/s half-duplex operation • 100full—Supports 100 Mb/s full-duplex operation • 1000full—Supports 1000 Mb/s full-duplex operation Clear to disable autonegotiation and to configure speed duplex and flow control manually. (Default: Autonegotiation enabled; Advertised capabilities for 100BASE-TX—10half, 10full, 100half, 100full; 1000BASE-T—10half, 10full, 100half, 100full, 1000full)
Trunk	Indicates if a port is a member of a trunk.

Creating trunk groups

Use these procedures to configure static and dynamic Link Aggregation Control Protocol (LACP) trunks. You can create up to six trunks at a time.

Navigation

- "Configuring a static trunk" (page 57)
- "Enabling LACP on selected ports" (page 58)
- "Configuring LACP parameters" (page 59)

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Prerequisites

- Before you make any physical connections between devices, use the Web-based user interface to specify the trunk on the devices at both ends.
- To avoid creating loops, configure the port trunks completely before you connect the corresponding network cables between switches.
- Configure the ports at both ends of a connection as trunk ports.
- Ensure that static trunks on switches of different types are compatible with the IEEE802.3ad link aggregation standard.
- Configure the ports at both ends of a trunk in an identical manner, including communication mode (speed, duplex mode, and flow control), Virtual Local Area Network (VLAN) assignments, and Class Of Service (CoS) settings.
- Ensure that all trunk ports have the same media type (for example, all 100BASE-T or all 1000BASE-TX).
- Treat all the ports in a trunk as a whole when moving, adding, or deleting them to or from a VLAN.

Configuring a static trunk

Use this procedure to configure static trunks. You can create up to six trunks on the switch, with up to four ports for each trunk.

When you configure static trunks, keep in mind the following:

- You may not be able to link switches of different types, depending on the manufacturer’s implementation.
- Spanning Tree Algorithm (STA), VLAN, and IGMP settings can only be configured for the entire trunk.
- Static trunks on the BES50 are IEEE802.3ad link aggregation-compatible.

Prerequisites

- To avoid creating a loop in the network:
  - — Add a static trunk through the configuration interface before you connect the ports.
  - — Disconnect the ports before you remove a static trunk through the configuration interface.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > Port > Trunk Membership**.
2	In the **Trunk** field, type a trunk ID of 1 to 6.
3	Select a port.
4	Click **Add**.

—End—

Variable definitions

Variable	Value
Current	Lists configured trunks (Trunk ID, Unit, Port).
New	Includes entry fields for creating new trunks. (For trunk membership: Trunk identifier. Range: 1 to 6.) (For port membership: Port identifier. Range: 1 to 24.)

Enabling LACP on selected ports

Use the LACP Configuration page to select ports for dynamic LACP. Keep the following points in mind when you select ports for LACP configuration:

- To avoid creating a loop in the network, enable LACP before you connect the ports, and disconnect the ports before you disable LACP.
- After LACP is enabled on the connected ports, the trunk is activated automatically.
- A trunk formed with another switch by using LACP is automatically assigned to the next available trunk ID.
- If more than four ports attached to the same target switch are LACP-enabled, the additional ports are placed in standby mode and are enabled only if one of the active links fails.
- All ports on both ends of an LACP trunk must be configured for full duplex, either by forced mode or autonegotiation.
- Trunks dynamically established through LACP are shown in the Member List on the Trunk Membership listing.

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Procedure steps

Step	Action
1	From the main menu, choose **Configuration > Port > LACP > Configuration**.
2	Select a port.
3	Click **Add**.

—End—

Variable definitions

Variable	Value
Member List (Current)	List of configured trunks (Port).
New	Includes entry fields for creating new trunks. (Ranges: 1 to 12 for 12-port switches, and 1-24 for 24-port switches.)

Configuring LACP parameters

Use the LACP Aggregation Port page to dynamically create port channels. Ports assigned to a common port channel must meet the following criteria:

- Ports must have the same LACP system priority.
- Ports must have the same LACP port administration key.

  However, if the port channel administration key is set, then the port administration key must be set to the same value for a port to be allowed to join a channel group.

  If the port channel LACP administration key is not set when a channel group is formed (if it has a null value of 0), this key is set to the same value as the port administration key used by the interfaces that joined the group.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > Port > LACP > Aggregation Port**.
2	Type the System Priority, Admin Key, and Port Priority for each Port Actor.

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ATTENTION
You can optionally configure these settings for the port partner. Be aware that these settings only affect the administrative state of the partner and do not take effect until the next time an aggregate link is formed with this device.

3 Click **Submit**.

—End—

Variable definitions

Variable	Value
Set Port Actor	This menu sets the local side of an aggregate link; that is, the ports on this switch.
Port	Port number. (Range: 1 to 12 for 12-port switches, and 1 to 24 for 24-port switches.)
System Priority	Enter the LACP system priority used to determine Link Aggregation Group (LAG) membership and to identify this device to other switches during LAG negotiations. Ports must be configured with the same system priority to join the same LAG. System priority is combined with the MAC address to form the LAG identifier. This identifier is used to indicate a specific LAG during LACP negotiations with other systems. (Range: 0 to 65 535. Default: 32 768)
Admin Key	Enter the same value for ports that belong to the same LAG. (Range: 0 to 65535. Default: 1)
Port Priority	Enter the value to determine the LACP port priority backup link, if a link goes down. (Range: 0 to 65 535. Default: 32 768)
Set Port Partner	This menu sets the remote side of an aggregate link; that is, the ports on the attached device. The command attributes are the same as those used for the port actor. However, configuring LACP settings for the partner only applies to its administrative state, not its operational state, and only takes effect the next time an aggregate link is established with the partner.

Setting broadcast storm thresholds

Use this procedure to set the level of broadcast traffic on all ports and trunks on the BES50.

Broadcast control does not affect IP multicast traffic.

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Procedure steps

Step	Action
1	From the main menu, choose **Configuration > Port > Port Broadcast Control** or choose **Configuration > Port > Trunk Broadcast Control**.

ATTENTION
BES50GE-12/24T does not support trunk broadcast control.

Step	Action
2	Select the **Enabled** check box and type a threshold for each port and trunk.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
Port	Indicates the port number.
Protect Status	Select to enable broadcast storm control. (Default: Enabled)
Threshold	Enter threshold as acpercentage of port or trunk bandwidth. For BES50GE-12/24T, the threshold setting is a global setting for all ports. (Default: 64 packets per second)
Trunk	Indicates the trunk number if the port is a member.

Configuring port mirroring

Use this procedure to configure traffic to mirror from any source port to a target port for real-time analysis.

Prerequisites

- All mirror sessions must share the same destination port.
- The VLAN must include the target port and the source port.
- Monitor port speed must match or exceed source port speed; otherwise, traffic can drop from the monitor port.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > Port > Mirror Port Configuration**.

2 Select the source port, type, and target port to mirror.

3 Click **Add**.

—End—

Variable definitions

Variable	Value
Mirror Sessions	Lists current mirror sessions.
Source Port	Select the port for traffic monitoring. (Range: 1 to 12 for 12-port switches, and 1 to 24 for 24-port switches.)
Type	Select the traffic to mirror to the target port. (Options: Rx [receive], Tx [transmit], or Both [receive and transmit]. Default: Rx)
Target Port	Select the port that will mirror the traffic from the source port. (Range: 1 to 12 for 12-port switches, and 1 to 24 for 24-port switches.)

Configuring rate limits

Use this procedure to configure the input and output rate limits for ports and trunks.

Procedure steps

Step **Action**

1 From the main menu, choose **Rate Limit** then choose one of the following options:

a. Input Port Configuration

For BES50FE-12/24T only:

b. Input Trunk Configuration

c. Output Port Configuration

d. Output Trunk Configuration

2 For each port and trunk, select the **Rate Limit Status** check box. (Default: Disabled)

3 For each port and trunk, type the input rate limit:

- Fast Ethernet default rate: 100 Mb/s
- Gigabit Ethernet default rate: 1000 Mb/s
- Fast Ethernet range: 1 to 100 Mb/s
- Gigabit Ethernet range: 1 to 1000 Mb/s

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4 Click **Submit**.

—End—

Setting Power over Ethernet

Use these procedures to configure the DC power settings for the switch.

Navigation

- "Setting the switch power budget" (page 63)
- "Configuring port PoE power priorities" (page 64)

Setting the switch power budget

Use this procedure to define the Power over Ethernet (PoE) power budget for the switch.

You can define a maximum PoE power budget for the switch (power available to all switch ports) so that power can be centrally managed, preventing overload conditions at the power source. If the power demand from devices connected to the switch exceeds the power budget setting, the switch uses port power priority settings to limit the supplied power.

Procedure steps

Step Action

1 From the main menu, choose **Configuration > PoE > Power Configuration**.

2 Type the desired power allocation.

> **ATTENTION**
> Nortel recommends that you leave this value at the default setting of 84 watts.

3 Click **Submit**.

—End—

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Variable definitions

Variable	Value
Power Allocation	Enter the power budget for the switch. If devices connected to the switch require more power than the switch budget, the port power priority settings control the supplied power. (Range: 37 to 84 watts. Default: 84 watts)

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 > PoE > Power Port Configuration**.
2	Select the **Enabled** check box on the required ports.
3	Select the Priority and type the required Power Allocation value.
4	Click **Submit**.

—End—

Variable definitions

Variable	Value
Port	The port number on the switch.
Admin Status	Select to enable PoE power on the port. Power is automatically supplied when a device is detected on the port, providing that the power demanded does not exceed the switch or port power budget. (Default: Enabled) **ATTENTION** If the power required by a device exceeds the power budget of the port, the power is not supplied.
Priority	Select the power priority for the port. (Default: low)
Power Allocation	Type the power budget amount for the port. (Default: 15400 milliwatts)

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Configuring Spanning Tree Algorithm

You can configure the switch to interact with other bridging devices in your network to ensure that only one route exists between any two stations on the network and to provide backup links, that automatically take over when a primary link goes down.

Use these procedures to configure your Spanning Tree Algorithm (STA).

Navigation

- "Configuring STA switch settings (global settings)" (page 65)
- "Configuring STA settings for interfaces" (page 67)

Configuring STA switch settings (global settings)

Use this procedure to apply STA settings to the entire switch.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > Spanning Tree > STA > Configuration**.
2	In the **Switch**, **When the Switch Becomes Root**, and **Advanced** tables, modify the required attributes.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
Switch	
Spanning Tree State	Select to enable STA on this switch. (Default: Enabled)
Spanning Tree Type	Select the spanning tree type. (Default: STP) • STP: Spanning Tree Protocol (IEEE 802.1D). Select this option to configure the switch to use RSTP set to STP forced compatibility mode. • RSTP: Rapid Spanning Tree Protocol (IEEE 802.1w)

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Variable	Value
Priority	Type the bridge priority used in selecting the root device, root port, and designated port. The device with the highest priority becomes the STA root device. However, if all devices have the same priority, the device with the lowest MAC address becomes the root device. Lower numeric values indicate higher priority. (Default: 32 768. Range: 0 to 61 440 in increments of 1 for 802.1D format, or increments of 4 096 for 802.1t format. Options for 802.1t format: 0, 4 096, 8 192, 12 288, 16 384, 20 480, 24 576, 28 672, 32 768, 36 864, 40 960, 45 056, 49 152, 53 248, 57 344, 61 440)
When the Switch Becomes Root	
Hello Time	Type the interval (in seconds) at which this device transmits a configuration message. (Default: 2. Minimum: 1. Maximum: The lower of 10 or [{Max. Message Age / 2} -1])
Maximum Age	Type the maximum time (in seconds) a device can wait without receiving a configuration message before attempting to reconfigure. All device ports (except for designated ports) should receive configuration messages at regular intervals. Any port that ages out STA information (provided in the last configuration message) becomes the designated port for the attached Local Area Network (LAN). If it is a root port, a new root port is selected from among the device ports attached to the network. (In this instance, the term *ports* refers to both ports and trunks.) (Default: 20. Minimum: The higher of 6 or [2 x {Hello Time + 1}]. Maximum: The lower of 40 or [2 x {Forward Delay—1}])
Forward Delay	Type the maximum time (in seconds) the device waits before changing states. (For example, changing from discarding to learning to forwarding). Every device must receive information about topology changes before it starts to forward frames. In addition, each port needs time to listen for conflicting information that can cause it to return to a discarding state resulting in temporary data loops. (Default: 15. Minimum: The higher of 4 or [{Max. Message Age / 2} + 1]. Maximum: 30)
Advanced	
Path Cost Method	Select the best path between devices. (Default: Long) This option determines the range of values that can be assigned to each interface: • Long: Specifies 32-bit based values ranging from 1 to 200 000 000. • Short: Specifies 16-bit based values ranging from 1 to 65 535.
Transmission Limit	Type the minimum interval between the transmission of consecutive protocol messages. This is the maximum transmission rate for Bridge Protocol Data Units (BPDUs). (Range: 1 to 10. Default: 3.)

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Configuring STA settings for interfaces

Use this procedure to configure Spanning Tree Protocol (STP) attributes for specific interfaces. In this procedure, the term *interfaces* refers to both ports and trunks.

You can use a different priority or path cost for ports of the same media type to indicate the preferred path, a link type to indicate a point-to-point connection or shared-media connection, and an edge port to indicate if the attached device can support fast-forwarding.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > Spanning Tree > STA > Port Configuration** or choose **Applications > Spanning Tree > STA > Trunk Configuration**.
2	Modify the required attributes.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
Port	The port number.
Spanning Tree	Select to enable STA on this interface. (Default: Enabled)
STA State	Indicates the current state of this port within the Spanning Tree Protocol: • Discarding—Port receives STA configuration messages, but does not forward packets. • Learning—Port has transmitted configuration messages for an interval set by the Forward Delay parameter without receiving contradictory information. Port address table is cleared and the port begins learning addresses. • Forwarding—Port forwards packets and continues learning addresses.

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Variable	Value
Priority	Type the priority to use for this port in the Spanning Tree Protocol. If the path cost for all ports on a switch is the same, the port with the highest priority (lowest value) is configured as an active link in the Spanning Tree Protocol. This makes a port with higher priority less likely to be blocked if the Spanning Tree Protocol detects network loops. Where more than one port is assigned the highest priority, the port with lowest numeric identifier is enabled. (Default: 128. Range: 0 to 240, in increments of 16.)
Admin Path Cost	Type the value to establish the best path between devices. Assign lower values to ports attached to faster media, and assign higher values to ports with slower media. Path cost takes precedence over port priority. When the Path Cost Method is set to short, the maximum path cost is 65 535. Ranges: • Ethernet—200 000 to 20 000 000 • Fast Ethernet—20 000 to 2 000 000 • Gigabit Ethernet—2 000 to 200 000 Default values: • Ethernet—Half duplex: 2 000 000. Full duplex: 1 000 000. Trunk: 500 000 • Fast Ethernet—Half duplex: 200 000. Full duplex: 100 000. Trunk: 50 000 • Gigabit Ethernet—Full duplex: 10 000. Trunk: 5 000
Admin Link Type	Select the link type attached to this interface as follows: • Point-to-Point—To connect to exactly one other bridge. • Shared—To connect to two or more bridges. • Auto—To configure the switch to automatically determine the link type. (Default: Auto)
Admin Edge Port (Fast Forwarding)	If the interface is connected to an end-node device, or to a LAN segment that is at the end of a bridged LAN, select to enable. Because end nodes cannot cause forwarding loops, they can pass directly through to the spanning tree forwarding state. Specifying edge ports provides quicker convergence for devices such as workstations or servers, retains the current forwarding database to reduce the amount of frame flooding required to rebuild address tables during reconfiguration events, does not cause the spanning tree to initiate reconfiguration when the interface changes state, and also overcomes other STA-related timeout problems. (Default: Disabled)

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Variable	Value
Migration	Select to enable manual rechecking of the appropriate BPDU format (RSTP or STP-compatible) to send on the selected interfaces. If Migration is disabled, the switch detects STA BPDUs including configuration or topology change notification BPDUs; it automatically sets the selected interface to forced STP-compatible mode. (Default: Disabled)
Trunk	Indicates if a port is a member of a trunk.

Configuring IEEE 802.1Q VLANs

Use these procedures to configure IEEE 802.1Q on the VLANs.

Navigation

- "Assigning ports to VLANs" (page 69)
- "Enabling or disabling GVRP (global setting)" (page 70)
- "Setting up VLANs" (page 70)
- "Adding static members to VLANs (VLAN index) " (page 71)
- "Adding static members to VLANs (port index)" (page 72)
- "Configuring VLAN behavior for interfaces " (page 73)

Assigning ports to VLANs

Before you enable VLANs for the switch, you must first assign each port to the VLAN groups in which it will participate. By default, all ports are assigned to VLAN 1 as untagged ports.

Add a port as a tagged port if you want the port to carry traffic for one or more VLANs, and for any intermediate network devices, or for the host at the other end of the connection support VLANs. Assign ports on the other VLAN-aware network devices along the path to carry this traffic to the same VLANs, either manually or dynamically by using Generic VLAN Registration Protocol (GVRP).

Add a port as an untagged port if you want the port to participate in one or more VLANs, but not on the intermediate network devices nor on the host at the other end of the connection support VLANs.

You can assign ports to:

- multiple tagged VLANs on the BES50FE-12/24T and the BES50GE12/24T
- multiple untagged VLANs on the BES50FE-12/24T
- only one untagged VLAN on the BES50GE12/24T

For BES50GE-12/24T, if a port is an untagged member of VLAN 1, making it an untagged member of VLAN 2 disassociates it from VLAN 1. The same result occurs from VLAN 2 to VLAN 1.

> **ATTENTION**
>
> VLAN-tagged frames can pass through VLAN-aware or VLAN-unaware network interconnection devices, but the VLAN tags should be stripped off before passing the VLAN-tagged frames on to any end-node host that does not support VLAN tagging.

Enabling or disabling GVRP (global setting)

Use this procedure to define the method of information exchange between VLAN members on ports across the network.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > VLAN > 802.1Q VLAN > GVRP Status**.
2	Select the **GVRP** check box to enable the global setting.
3	Click **Submit**.

—End—

Setting up VLANs

Use this procedure to create or remove VLAN groups. To propagate information about VLAN groups used on this switch to external network devices, you must specify a VLAN ID for each group.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > VLAN > 802.1Q VLAN > Static List**.
2	Enter the VLAN ID and VLAN name.
3	To activate the VLAN, select the **Enable** check box.
4	Click **Add** to add the new VLAN to the list of current VLAN groups.

—End—

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Variable definitions

Variable	Value
Current	Lists all the current VLAN groups created for this system. You can define up to 32 VLAN groups. (Default untagged VLAN: VLAN 1.)
New	Use this area to specify the name and numeric identifier for new VLAN groups. The VLAN name is only used for management on this system; it is not added to the VLAN tag.
VLAN ID	Type the numeric identifier of the configured VLAN. (Range: 1 to 4094, no leading zeroes.)
VLAN Name	Type the VLAN name. (Range: 1 to 32 characters.)
Status	Select to enable the specified VLAN. If the VLAN is not enabled, it is suspended and therefore does not pass packets.

Adding static members to VLANs (VLAN index)

Use this procedure to configure port members for the selected VLAN index. Assign ports as tagged if they are connected to 802.1Q VLAN compliant devices, or untagged if they are not connected to any VLAN-aware devices. Or, configure a port as forbidden to prevent the switch from automatically adding it to a VLAN through the GVRP.

You can also use the VLAN Static Membership by Port page to configure VLAN groups based on the port index. However, this configuration page can add ports to VLANs only as tagged members.

> **ATTENTION**
>
> The default untagged VLAN (VLAN 1) contains all ports on the switch and can only be modified by first reassigning the default port VLAN ID.

Procedure steps

Step **Action**

1 From the main menu, choose **Application > VLAN > 802.1Q VLAN > Static Table**.

2 Select a VLAN from the list.

3 Modify the VLAN name and status if required.

4 Select the membership type for each port and trunk (Tagged, Untagged, Forbidden, None).

5 Click **Submit**.

—End—

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Variable definitions

Variable	Value
VLAN	Select the ID of the configured VLAN. (Range: 1 to 4094)
Name	Type the VLAN name. (Range 1 to 32 characters)
Status	Select to enable the specified VLAN. If the VLAN is not enabled, it is suspended and therefore does not pass packets.
Port	Port identifier.
Trunk	Trunk identifier.
Tagged	Select if the interface is a member of the VLAN. All packets transmitted by the port are tagged. Packets carry a tag and therefore they carry VLAN or CoS information.
Untagged	Select if the interface is a member of the VLAN. All packets transmitted by the port are untagged. Packets do not carry a tag and therefore they do not carry VLAN or CoS information. An interface must be assigned to at least one group as an untagged port.
Forbidden	Select if the interface is forbidden from automatically joining the VLAN through GVRP.
None	Select if the interface is not a member of the VLAN. Packets associated with this VLAN are not transmitted by the interface.
Trunk Member	Indicates if a port is a member of a trunk. To add a trunk to the selected VLAN, use the last table on the VLAN Static Table page.

Adding static members to VLANs (port index)

Use this procedure to assign VLAN groups to the selected interface as a tagged member.

Procedure steps

Step	Action
1	From the main menu, choose **Application > VLAN > 802.1Q VLAN > Static Membership by Port**.
2	Select the appropriate port or trunk interface.
3	Click **Query** to display membership information for the interface.
4	From the **Non-Member**, select a VLAN ID list.
5	Click **Add** to add the interface as a tagged member.
6	Click **Submit**.

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—End—

Variable definitions

Variable	Value
Interface	Port or trunk identifier.
Member	VLANs for which the selected interface is a tagged member.
Non-Member	VLANs for which the selected interface is not a tagged member.

Configuring VLAN behavior for interfaces

Use this procedure to configure VLAN behavior for specific interfaces, including the default Port VLAN Identifier (PVID), accepted frame types, ingress filtering, GVRP status, and Generic Attribute Resolution Protocol (GARP) timers.

GARP VLAN Registration Protocol defines a way for switches to exchange VLAN information to automatically register VLAN members on interfaces across the network.

GVRP and GARP Multicast Registration Protocol (GMRP) use GARP to register or deregister client attributes for client services within a bridged LAN. The default values for the GARP timers are independent of the media access method or data rate. Do not change these values unless you are experiencing difficulties with GMRP or GVRP registration or deregistration.

Prerequisites

- At least one port on the switch must be a member of the VLAN.
- At least one member port of the VLAN must be in the Spanning Tree Protocol Forwarding state.

Procedure steps

Step	Action
1	From the main menu, choose **Application > VLAN > 802.1Q VLAN > Port Configuration** or choose **Application > VLAN > 802.1Q VLAN > Trunk Configuration**.
2	Select the required settings for each Port and Trunk Interface.
3	Click **Submit**.

—End—

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Variable definitions

Variable	Value
PVID	Type the VLAN ID assigned to untagged frames received on the interface. If an interface is not a member of VLAN 1 and you assign its PVID to this VLAN, the interface is automatically added to VLAN 1 as an untagged member. For all other VLANs, an interface must first be configured as an untagged member before you can assign its PVID to that group. (Default: 1)
Acceptable Frame Type	Select frame types accepted by the interface. When set to receive all frame types, any untagged frames are assigned to the default VLAN. (Option: All, Tagged; Default: All)
Ingress Filtering	Determines how to process frames tagged for VLANs for which the ingress port is not a member: • Ingress filtering only affects tagged frames. • Ingress filtering does not affect VLAN independent BPDU frames, such as GVRP or STA. However, ingress filtering does affect VLAN dependent BPDU frames, such as GMRP. Select to enable ingress filtering and to direct ports to discard frames tagged for VLANs for which they are not a member. If ingress filtering is disabled, frames tagged for VLANs for which they are not a member are flooded to all other ports, except for those VLANs explicitly forbidden on this port. (Default: Disabled)
GVRP Status	Select to enable GVRP for the interface. GVRP must be globally enabled for the switch before this setting can take effect. When disabled, any GVRP packets received on this port are discarded and no GVRP registrations are propagated from other ports. (Default: Disabled)
GARP Join Timer	Type the interval between transmitting requests and queries to participate in a VLAN group. (Range: 20 to 1 000 centiseconds. Default: 20)
GARP Leave Timer	Type the interval a port waits before leaving a VLAN group. Set this time to more than twice the join time, to ensure that the applicants can rejoin before the port actually leaves the group after a Leave or LeaveAll message is issued. (Range: 60 to 3 000 centiseconds. Default: 60)
GARP LeaveAll Timer	Type the interval between sending out a LeaveAll query message for VLAN group participants and the port leaving the group. Set this interval to be considerably larger than the Leave Timer to minimize the amount of traffic generated by nodes rejoining the group. (Range: 500 to 18 000 centiseconds. Default: 1 000)

Variable	Value
Mode	Select a VLAN membership mode for an interface: • 1Q Trunk—Specifies a port as an endpoint for a VLAN trunk. A trunk is a direct link between two switches, so the port transmits tagged frames that identify the source VLAN. Frames belonging to the default port VLAN (associated with the PVID) are also transmitted as tagged frames. • Hybrid—Specifies a hybrid VLAN interface. The port can transmit tagged or untagged frames. (Default: Hybrid)
Trunk Member	Indicates if a port is a member of a trunk. To add a trunk to the selected VLAN, use the last table on the VLAN Static Table page.

Link Layer Discovery Protocol (LLDP) configuration

Use these procedures to configure devices to share information.

Navigation

- "Configuring the LLDP" (page 75)
- "Configuring the LLDP interfaces" (page 76)

Configuring the LLDP

Use the LLDP Configuration page to configure the LLDP for the switch.

Procedure steps

Step	Action
1	From the main menu, choose **Application > LLDP > Configuration**.
2	Select the **Enabled** check box and type the required setting values.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
LLDP	Select to enable LLDP. This setting allows each port to receive and transmit Type Length Values (TLVs).

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Variable	Value
Transmission Interval (5-32768)	Type the number (in seconds) between TLV transmissions. **ATTENTION** The Transmission Interval must be greater than or equal to four times the Delay Interval.
Hold Time Multiplier (2-10)	Type the time multiplier to hold on to the TLV.
Delay Interval (0-8192)	Type the delay time to transmit and receive.
Reinitialization Delay (0-10)	Type the delay time to reinitialize LLDP.
Notification Interval (0-3600)	Type the interval time to send a notification.

Configuring the LLDP interfaces

Use this procedure to configure the LLDP and Type Length Value (TLV) settings for each interface.

Procedure steps

Step **Action**

1 From the main menu, choose **Application > LLDP > Port Configuration** or choose **Application > LLDP > Trunk Configuration**.

2 Select the required setting values for each port and trunk.

3 Click **Submit**.

—End—

Variable definitions

Variable	Value
Admin Status	Select the required status. (Transmit [Tx], Receive [Rx], Transmit and Receive [TxRx], or Disabled.)
SNMP Notification	Select to enable SNMP notification.
TLV Type	Select the types of information to use in the TLV.
Trunk	The trunk number.

Configuring Class of Service

Use these procedures to set the default priority for each interface and to configure the mapping of frame priority tags to the switch priority queues.

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Navigation

- "Setting the default priority for interfaces" (page 77)
- "Mapping CoS values to egress queues" (page 77)
- "Selecting the queue mode rules" (page 78)
- "Setting the service weight for traffic classes " (page 79)
- "Enabling IP DSCP priority" (page 80)
- "Mapping DSCP priority" (page 80)

Setting the default priority for interfaces

Use this procedure to specify the default priority for each interface on the switch.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > Priority > Default Port Priority** or choose **Applications > Priority > Default Trunk Priority**.
2	Type the default priority level for each port and trunk.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
Default Priority	Type priority level assigned to untagged frames received on the specified interface. (Range: 0 to 7. Default: 0)
Number of Egress Traffic Classes	The number of queue buffers provided for each port.

Mapping CoS values to egress queues

Use this procedure and the "Mapping CoS values to egress queues table" (page 78) and "CoS priority levels table" (page 78) to map priority levels to the switch output queues.

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Procedure steps

Step	Action
1	From the main menu, choose **Applications > Priority > Traffic Classes**.
2	Type a traffic class for each priority level.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
Priority	Indicates the CoS value. (Range: 0 to 7, where 7 is the highest priority)
Traffic Class	Type the value for the output queue buffer. Refer to the following table to determine the appropriate value. (Range: 0 to 3, where 3 is the highest CoS priority queue)

Mapping CoS values to egress queues table

Queue	0	1	2	3
Priority	1,2	0,3	4,5	6,7

CoS priority levels table

Priority level	Traffic type
0 (default)	Best Effort
1	Background
2	(Spare)
3	Excellent Effort
4	Controlled Load
5	Video, less than 100 milliseconds latency and jitter
6	Voice, less than 10 milliseconds latency and jitter
7	Network Control

Selecting the queue mode rules

Use this procedure to set the rules for processing queue priorities.

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Procedure steps

Step	Action
1	From the main menu, choose **Applications > Priority > Queue Mode**.
2	Select the queue mode.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
Queue Mode	Select the mode for processing queue priorities. (Default: WRR) • Weighted Round-Robin (WRR) shares bandwidth at the egress ports by using scheduling weights. For BES50FE: 1, 2, 4, 8 for queues 0 through 3 respectively. For BES50GE: 1, 2, 4, 6, 8, 10, 12, 14 for queues 0 through 7 respectively. • Strict services the egress queues in sequential order, transmitting all traffic in the higher priority queues before servicing lower priority queues.

Setting the service weight for traffic classes

Use this procedure to set the frequency at which each queue is polled for service, and subsequently affect the response time for software applications assigned a specific priority value.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > Priority > Queue Scheduling**.
2	Select the port or trunk interface.
3	Click **Query**.
4	Select a traffic class.
5	Click **Submit**.

—End—

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Variable definitions

Variable	Value
WRR Setting Table	Lists the weights for each traffic class or queue.

Enabling IP DSCP priority

You can select Differentiated Services Code Point (DSCP) service as the method for prioritizing Layer 3/4 traffic. The subsequent mapping is to a Class of Service value on the switch.

Procedure steps

Step Action

1 From the main menu, choose **Applications > Priority > IP DSCP Status**.

2 Select the **Enabled** check box.

3 Click **Submit**.

—End—

Variable definitions

Variable	Value
IP DSCP Priority Status	Select to enable mapping of Layer 3/4 priorities by using Differentiated Services Code Point mapping.

Mapping DSCP priority

Use this procedure and the "Mapping DSCP priority table" (page 81) to map Layer 3/4 traffic priorities to CoS values. IP DSCP settings apply to all interfaces.

Procedure steps

Step Action

1 From the main menu, choose **Applications > Priority > IP DSCP Priority**.

2 In the **DSCP Priority Table**, select a mapping entry.

3 Type a Class of Service value.

4 Click **Submit**.

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—End—

Variable definitions

Variable	Value
DSCP Priority Table	Select the DSCP priority to CoS value to map. All the DSCP values that are not specified are mapped to CoS value 0.
Class of Service Value	Type a CoS value to map to the selected DSCP priority value. Zero (0) represents low priority and 7 represents high priority.

Mapping DSCP priority table

IP DSCP value	CoS value
0	0
8	1
10, 12, 14, 16	2
18, 20, 22, 24	3
26, 28, 30, 32, 34, 36	4
38, 40, 42	5
48	6
46, 56	7

Configuring Quality Of Service (QoS)

Use these procedures to set the QoS values.

Navigation

- "Configuring class maps" (page 81)
- "Configuring policy maps" (page 82)
- "Configuring service policy settings" (page 83)

Configuring class maps

Use the Class Map page to remove a class, update the name and description, or edit the rules for a class map.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > QoS > DiffServ > Class Map**.

2 Click **Add Class** to add a new class map.

3 In the **Class Map—Add** page, define a class name, type, and description.

4 Click **Submit**.

5 In the **Class Map—Match Class Settings** page, define the IP DSCP, IP precedence, and VLAN.

—End—

Variable definitions

Variable	Value
Action	Specifies which class map to work with.
Class Name	Name given to the class map.
Type	Type for the class map is match-any.
Description	Description for the class map.
For BES50FE-12/24T only	
ACL List	Select an ACL list.
For BES50GE-12/24T only	
IP DSCP (0-63)	Define an IP DSCP priority. Maps Layer 3/4 priorities by using Differentiated Services Code Point Mapping.
Source IP	Filters packets matching a specified source IP address.
Destination IP	Filters packets matching a specified destination IP address.
Priority	The priority that is assigned to untagged frames received on the specified interface.
Source MAC	Filters packets matching a specified source MAC address.
Destination MAC	Filters packets matching a specified destination MAC address.

Configuring policy maps

Use the Policy Map page to remove a class, update the name and description, or edit the rules for a policy map.

Procedure steps

Step Action

1 From the main menu, choose **Applications > QoS > DiffServ > Policy Map**.

2 Click **Add Policy** to add a new policy map.

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3 In the **Policy Map—Add** page, define a policy name and description.

4 Click **Submit**.

5 In the **Policy Rule Settings** page, choose a class name, set the priority, and define the meter and exceed settings.

—End—

Variable definitions

Variable	Value
Action	Select to specify which class map to work with.
Policy Name	Enter a name for the policy map.
Description	Enter a description for the policy map.
Class Name	Select a class map.
Action (in Policy Rules Setting)	Set and define either CoS, IP DSCP, or IP Precedence.
Meter	Set the meter rate and burst.
Exceed	Set or drop IP DSCP.

Configuring service policy settings

Use this procedure to configure ingress for policies.

Prerequisites

- A policy map must be configured. See "Configuring policy maps" (page 82).

Procedure steps

Step Action

1 From the main menu, choose **Applications > QoS > DiffServ > Service Policy Settings**.

2 Select the port.

3 Select the **Enable** check box and select a policy map.

4 Click **Submit**.

—End—

Variable definitions

Variable	Value
Port	The port number.
Ingress	Select to enable policy settings and select a policy map.

Configuring address tables

Switches store the addresses for all known devices. This information passes traffic directly between the inbound and outbound ports. The dynamic address table stores all addresses learned by monitoring traffic. You can also manually configure static addresses bound to a specific port.

Navigation

- "Changing the aging time" (page 84)
- "Setting static addresses" (page 85)

Changing the aging time

You can change the aging time for entries in the dynamic address table.

Procedure steps

Step **Action**

1 From the main menu, choose **Applications > Address Table > Address Aging**.

2 Specify the new aging time.

3 Click **Submit**.

—End—

Variable definitions

Variable	Value
Aging Status	Select to enable the aging time.
Aging Time	Type the time after which a learned entry is discarded. (Range: BES50FE-12/24T 10 to 630 seconds; BES50GE-12/24T 10 to 1 000 000 seconds; Default: 300 seconds)

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Setting static addresses

Use this procedure to assign MAC addresses to a specific interface on the switch. You can assign multiple MAC addresses to one port.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > Address Table > Static Addresses**.
2	Specify the interface, the MAC address, and the VLAN.
3	Click **Add**.

—End—

Variable definitions

Variable	Value
Static Address Counts	The number of manually configured addresses.
Current Static Address Table	List of current static addresses.
Interface	Select to indicate the port or trunk associated with the device assigned a static address.
VLAN	Select the ID of the configured VLAN. (Range: 1 to 4 094)
MAC Address	Type the physical address of a device mapped to this interface.

Voice VLAN configuration

Use these procedures to manually configure voice VLAN.

Navigation

- "Configuring voice VLAN on the BES50 (global setting)" (page 85)
- "Configuring voice VLAN on ports" (page 86)

Configuring voice VLAN on the BES50 (global setting)

Use the Voice VLAN Global Configuration page to manually configure voice VLAN for the switch.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > Auto Device Detection > Voice VLAN > Global Settings**.

2 Select the **Auto Detection Status Enabled** check box.

3 Type the Voice VLAN ID and Aging Time values.

4 For BES50FE-12/24T, enter the information for the telephone OUI, mask, and description, and click **Add**.

5 Click **Submit**.

—End—

Variable definitions

Variable	Value
Auto Detection Status	Select to enable the voice VLAN.
Voice VLAN ID	Type the ID for voice VLAN used for autodetection.
Voice VLAN Aging Time	Type the aging time. After the OUI address, the MAC address of the IP Phone is aged on the port, and then the port enters the aging phase of voice VLAN. If the OUI address is not learned by a port within the aging time, the port is automatically deleted from voice VLAN. (Default: 1 440 minutes)
For BES50FE-12/24T only	
Telephony OUI	To create the OUI address, type the first 3-byte values of the MAC address and set the remaining 3-bytes values to zero.
Mask	Select the MAC address.
Description	Type a description for the telephony OUI.

Configuring voice VLAN on ports

Use this procedure to manually configure voice VLAN for the ports.

Procedure steps

Step **Action**

1 From the main menu, choose **Applications > Auto Device Detection > Voice VLAN > Port Configuration**.

2 For each port, select the mode, security and discovery protocol.

3 Type the priority level.

4 Click **Submit**.

—End—

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Variable definitions

Variable	Value
Voice VLAN Mode	Select the mode. (Options: Auto or Manual.)
Voice VLAN Security	Select to enable security filtering. In security mode, the system filters out the traffic whose source MAC address is not OUI within the voice VLAN, while the other VLANs are not influenced. If security mode is disabled, the system cannot filter traffic.
Priority	Enter the priority for the voice VLAN. (Range: 0 to 7. Default: 6.)
Trunk	Trunk number if the port is a member.
For BES50FE-12/24T only	
Discovery Protocol	Select the discovery protocol type to filter out traffic. (Options: OUI or 802.1AB.)

Configuring jumbo frames (BES50GE-12/24T PWR only)

On the BES50GE-12/24T PWR version, use the Jumbo Frames page to enable jumbo frames to support data packets 9000 bytes in size.

Procedure steps

Step	Action
1	From the main menu, choose **Configuration > Jumbo Frames**.
2	Select the **Enable** check box to enable jumbo packet status.

—End—

Configuring 802.1X port authentication

Use these procedures to configure 802.1X port authentication on the switch.

Navigation

- "Configuring 802.1X global settings" (page 88)
- "Configuring 802.1X port settings" (page 88)

Prerequisites

- The switch must have an IP address assigned.

- Remote Authentication Dial-In User Server (RADIUS) authentication must be enabled on the switch and the IP address of the RADIUS server must be specified.
- 802.1X must be enabled globally for the switch.
- Each switch port that will be used must be set to 802.1x Auto mode.
- Each client to be authenticated must have 802.1x client software installed and properly configured.
- The RADIUS server and 802.1X client must support Extensible Authentication Protocol (EAP). (The switch supports EAP over LAN [EAPOL] to pass the EAP packets from the server to the client.)
- The RADIUS server and client must support the same EAP authentication type—MD5. (Some clients have native support in Windows; otherwise, the 802.1x client must support MD5.)

Configuring 802.1X global settings

Use this procedure to set up client authentication.

Procedure steps

Step	Action
1	From the main menu, choose **Administration > Security > 802.1X > 802.1X Configuration**.
2	Enable 802.1X globally for the switch.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
802.1X System Authentication Control	Select to enable the global setting for 802.1X. (Default: Disabled)

Configuring 802.1X port settings

When 802.1X is enabled, use this procedure to configure the parameters for the authentication process that runs between the client and the switch (for example, authenticator), as well as the client identity lookup process that runs between the switch and authentication server.

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Procedure steps

Step	Action
1	From the main menu, choose **Administration > Security > 802.1X > Port Configuration**.
2	Modify the parameters as required.
3	Click **Submit**.

—End—

Variable definitions

Variable	Value
Status	Indicates if authentication is enabled or disabled on the port.
Operation Mode	Select single or multiple hosts (clients) to connect to an 802.1X-authorized port. (Default: Single-Host)
Max Count	For Multi-Host operation mode, type the maximum number of hosts that can connect to a port. (Range: 1 to 1 024. Default: 5)
Mode	Select the authentication mode. (Default: Force-Authorized) • Auto—Requires the authentication server to authorize all 802.1x-aware clients. Clients that are not 802.1x-aware are denied access. • Force-Authorized—Forces the port to grant access to all clients, either 802.1x-aware or otherwise. • Force-Unauthorized—Forces the port to deny access to all clients, either 802.1x-aware or otherwise.
Re-authen	Select to reauthenticate the client after the interval specified by the reauthentication period. When enabled, reauthentication can detect if a new device is plugged into a switch port. (Default: Disabled)
Max Request	Type the maximum number of times the switch port retransmits an EAP request packet to the client before it times out the authentication session. (Range: 1 to 10. Default 2)
Quiet/Period	Type the time that a switch port waits after the Max Request count is exceeded before attempting to acquire a new client. (Range: 1 to 65535 seconds. Default: 60 seconds.)
Re-authen/Period	Type the time period after which a connected client must be reauthenticated. (Range: 1 to 65 535 seconds. Default: 3600 seconds.)

Variable	Value
TX Period	Type the time period during an authentication session that the switch waits before retransmitting an EAP packet. (Range: 1 to 65 535. Default: 30 seconds.)
Authorized	Indicates client authorization mode: • Yes—Connected client is authorized. • No—Connected client is not authorized. • Blank—Displays nothing when 802.1x is disabled on a port.
Supplicant	Indicates the MAC address of a connected client.
Trunk	Indicates if the port is configured as a trunk port.

Configuring Access Control Lists

Use these procedures to configure Access Control Lists (ACL) to provide packet filtering for IP frames (based on address, protocol, Layer 4 protocol port number, or TCP control code). To filter incoming packets, first create an access list, add the required rules, specify a mask to modify the precedence in which the rules are checked, and then bind the list to a specific port.

Navigation

- "Configuring an Access Control List" (page 90)
- "Binding a port to an Access Control List" (page 93)

Configuring an Access Control List

Use this procedure to designate the name and type of an ACL, and to configure ACLs.

Procedure steps

Step Action

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

2 Type a name for the ACL.

3 Select an ACL type.

4 Click **Submit**.

The configuration page for the selected ACL type appears.

5 To configure a Standard ACL:

a. Select the action.

b. Select the address type.

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i. If you select **Host**, type an IP address.

ii. If you select **IP**, type an IP address and a subnet mask address.

6 To configure an Extended ACL:

a. Select the action.

b. Select the source address type.

i. If you select **Host**, type an IP address.

ii. If you select **IP**, type an IP address and a subnet mask address.

c. Repeat the previous step for the **Destination Address Type**.

d. Set any other required criteria, such as protocol type, source port, source port bit mask, destination port, or destination port bit mask.

7 Click **Submit**.

8 Click **Back** to return to the ACL Configuration page to set up additional ACLs.

—End—

Variable definitions for the ACL configuration page

Variable	Value
Name	Type the name of the ACL. (Maximum length: 15 characters)
Type	Select the ACL filter type. • Standard filters packets based on the source IP address. • Extended filters packets based on the source or destination IP address, as well as the protocol type and protocol port number.

Variable definitions for the Standard IP ACL configuration page

Variable	Value
Action	Select the permit or deny rules.
Address Type	Select the source IP address. (Default: Any) • Any includes all possible addresses. • Host specifies a specific host address. • IP specifies a range of addresses.

Variable	Value
IP Address	For Host and IP address types, type a source IP address. The address is automatically generated if Any is the selected address type. (Format: xxx.xxx.xxx.xxx)
Subnet Mask	For IP address type, type a subnet mask. The mask is automatically generated if Any is the selected address type. The subnet mask contains four integers from 0 to 255, each separated by a period. The mask uses 1 bits to indicate match and 0 bits to indicate ignore. The mask is bitwise ANDed with the specified source IP address and compared with the address for each IP packet entering the ports to which this ACL is assigned. (Format: xxx.xxx.xxx.xxx)

Variable definitions for the Extended IP ACL configuration page

Variable	Value
Action	Select the permit or deny rules.
Source/ Destination Address Type	Select the source IP address. (Default: Any) • Any includes all possible addresses • Host specifies a specific host address. • IP specifies a range of addresses.
Source/ Destination IP Address	For Host and IP address types, type a source IP or destination address. The address is automatically generated if Any is the selected address type. (Format: xxx.xxx.xxx.xxx)
Source/ Destination Subnet Mask	For IP address type, type a subnet mask. The mask is automatically generated if Any is the selected address type. (Format: xxx.xxx.xxx.xxx)
Protocol	Select the protocol type to match. If you select Others, enter the specific protocol number (Range: 0 to 255. Default: TCP.)
Source/ Destination Port	Type the source or destination port number for the specified protocol type. (Range: 0 to 65 535)
Source/ Destination Port Bitmask	Type the decimal number representing the port bits to match. (Range: 0 to 65 535) **ATTENTION** Address bits from the source/destination port are ANDed with the corresponding bit positions in the source/destination port bitmask. This produces a correct value that has bits set in all positions where a bit is set in the supplied address.

Binding a port to an Access Control List

After you configure the Access Control Lists (ACL), you can bind the ports that need to filter traffic to the appropriate ACLs. The switch supports ACLs for only ingress filtering. However, you can only bind one IP ACL to any port for ingress filtering. This means that only one ACL can be bound to an interface—Ingress IP ACL.

Prerequisites

- ACL must be configured before you can bind it to a port.
- A mask must be configured for an ACL.

  If the IP address type is Any, the mask is automatically generated.

Procedure steps

Step	Action
1	From the main menu, choose **Administration > Security > ACL > Port Binding**.
2	Select the **Enable** check box for the port you want to bind to an ACL for ingress traffic.
3	Select the required ACL.
4	Click **Submit**.

—End—

Variable definitions

Variable	Value
Port	Fixed port or optional module, or SFP port. (Range: 1 to 26)
IP (Ingress)	Select the Enabled check box and select the IP ACL to bind to a port.

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BES50 administration

Navigation

Resetting the system

Use this procedure to reset the factory defaults on the Business Ethernet Switch (BES) 50.

Procedure steps

Step	Action
1	From the BES50 switch, to reboot the switch press the reset button for at least 5 seconds.

ATTENTION

The reset button is located inside the housing approximately 2.54 cm (1 inch) from the faceplate. Use a nonmetallic object to press the reset button at the location indicated on the front panel. See "BES50FE/GE-12T PWR front panel" (page 127) or "BES50FE/GE-24T PWR front panel" (page 127).

Step	Action
2	From the main menu, choose **Administration > Reset**.
3	To reboot the switch and maintain current settings, click **Reset**.
4	To reset the switch to factory default settings, click **Factory Default**.
5	From the Web-based user interface, confirm that you want to reset the switch.

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The system takes 4 to 5 minutes to reboot.

—End—

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.

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

—End—

Displaying system and switch information

Use these procedures to display switch information or system information that is produced by the switch.

Navigation

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Displaying switch hardware and software versions

Use the Switch Information page to display hardware/software version numbers for the main board and management software, as well as the power status of the system. To open this page from the main menu, choose **Summary > Switch Information**.

Switch information page items

Item	Description
Main Board	
Serial Number	The serial number of the switch.
Number of Ports	Number of built-in ports.
Hardware Version	Hardware version of the main board.
Internal Power Status	The status of the internal power supply.
Management Software	
EPLD Version	Version number of EPLD code.
Loader Version	Version number of loader code.
Boot-ROM Version	Version of Power-On Self-Test (POST) and boot code.
Operation Code Version	Version number of runtime code.

Displaying bridge extension capabilities

The bridge Management Information Base (MIB) includes extensions for managed devices that support multicast filtering, traffic classes, and VLANs. You can access these extensions to display default settings for the key variables. To open this page from the main menu, choose **Configuration > Bridge Extension Configuration**.

Bridge Capability page items

Item	Description
Extended Multicast Filtering Services	This switch does not support the filtering of individual multicast addresses based on GMRP (GARP Multicast Registration Protocol).
Traffic Classes	This switch provides mapping of user priorities to multiple traffic classes.
Static Entry Individual Port	This switch allows static filtering for unicast and multicast addresses.
VLAN Learning	This switch uses Independent VLAN Learning (IVL), where each port maintains its own filtering database.

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Item	Description
Configurable PVID Tagging	This switch allows you to override the default Port VLAN ID (PVID) used in frame tags and egress status (VLAN-Tagged or Untagged) on each port.
Local VLAN Capable	This switch does not support multiple local bridges outside the scope of 802.1Q defined Virtual Local Area Networks (VLANs).

Displaying log messages

Use the Logs page to display logged system and event messages. The switch can store up to 2048 log entries in temporary random access memory (RAM) and up to 4096 entries in permanent flash memory. The RAM is flushed on power reset. To open this page from the main menu, choose **Configuration > Log > Logs**.

Displaying connection status

Use the Port Information or Trunk Information pages to display the current connection status, including link state, speed/duplex mode, flow control, and autonegotiation. To open these pages from the main menu, choose **Configuration > Port > Port Information** or choose **Configuration > Port > Trunk Information**.

Port Information and Trunk Information page items

Item	Description
Port	The port number.
Name	The interface label.
Type	The port type. (100BASE-TX, 1000BASE-GBIC, 100BASE-FX-S, 100BASE-FX-M, 1000BASE-T, or SFP)
Admin Status	Indicates whether the interface is enabled or disabled.
Oper Status	Indicates if the link is up or down.
Speed Duplex Status	Indicates the current speed and duplex mode. (Auto or fixed choice)
Flow Control Status	Indicates the type of flow control currently in use. (IEEE 802.3x, Back-Pressure, or None)
Autonegotiation	Indicates whether autonegotiation is enabled or disabled.
Trunk Member	Indicates if the port is a trunk member.
Creation (Trunk Information page only)	Indicates whether a trunk is manually configured or dynamically set through LACP.

Displaying LACP statistics

Use the LACP Port Counters Information page to display statistics for LACP protocol messages. To open this page from the main menu, choose **Configuration > Port > LACP > Port Counters Information** and select the number for the port that you want to view.

LACP Port Counters page items

Item	Description
LACPDUs Sent	Number of valid Link Aggregation Control Protocol Data Units (LACPDU) transmitted from this channel group.
LACPDUs Received	Number of valid LACPDUs received on this channel group.
Marker Sent	Number of valid marker PDUs transmitted from this channel group.
Marker Received	Number of valid marker PDUs received by this channel group.
Marker Unknown Pkts	Number of frames received for one of the following listed scenarios: • frames that carry the Slow Protocols Ethernet type value, but contain an unknown PDU • frames that are addressed to the Slow Protocols group MAC address, but do not carry the Slow Protocols Ethernet type
Marker Illegal Pkts	Number of frames that carry the Slow Protocols Ethernet type value, but contain a badly formed PDU or an illegal value of the protocol subtype.

Displaying local LACP settings and status

Use the Link Aggregation Control Protocol (LACP) Port Internal Information page to display the configuration settings and operational state for the local side of a link aggregation. To open this page from the main menu, choose **Configuration > Port > LACP > Port Internal Information** and select the number for the port that you want to view.

LACP Internal Configuration Information page items

Item	Description
Oper Key	Current operational value of the key for the aggregation port.
Admin Key	Current administrative value of the key for the aggregation port.
LACPDUs Interval (secs)	Number of seconds before invalidating received LACPDU information.
LACP System Priority	LACP system priority assigned to this port channel.
LACP Port Priority	LACP port priority assigned to this interface within the channel group.

Item	Description
Admin State, Oper State	Administrative or operational values of the actor state parameters: Expired—The actor receive machine is in the expired state. Defaulted—The actor receive machine is using defaulted operational partner information, administratively configured for the partner. Distributing—If false, distribution of outgoing frames on this link is disabled. That is, distribution is currently disabled and is not expected to be enabled in the absence of administrative changes or changes in received protocol information. Collecting—Collection of incoming frames on this link is enabled. That is, the collection is currently enabled and is not expected to be disabled in the absence of administrative changes or changes in received protocol information. Synchronization—The system considers this link to be IN_SYNC. That is, it is allocated to the correct Link Aggregation Group, the group is associated with a compatible aggregator, and the identity of the Link Aggregation Group is consistent with the system ID and operational key information transmitted. Aggregation—The system considers this link to be aggregatable. That is, the link is a potential candidate for aggregation. Timeout—Periodic transmission of LACPDUs uses a slow transmission rate. LACP-Activity—The activity control value with regard to this link. (0: Passive; 1: Active)

Displaying remote LACP settings and status

Use the LACP Port Neighbors Information page to display the configuration settings and operational state for the remote side of a link aggregation.

To open this page from the main menu, choose **Configuration > Port > LACP > Port Neighbors Information** and select the number for the port that you want to view.

LACP Neighbor Configuration Information page items

Item	Description
Partner Admin System ID	Link Aggregation Group (LAG) partner system ID assigned by the user.
Partner Oper System ID	LAG partner system ID assigned by the LACP protocol.
Partner Admin Port Number	Current administrative value of the port number for the protocol partner.
Partner Oper Port Number	Operational port number assigned to this aggregation port by the port protocol partner.
Port Admin Priority	Current administrative value of the port priority for the protocol partner.
Port Oper Priority	Priority value assigned to this aggregation port by the partner.

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Item	Description
Admin Key	Current administrative value of the key for the protocol partner.
Oper Key	Current operational value of the key for the protocol partner.
Admin State, Oper State	Administrative or operational values of the partner state parameters: Expired—The partner receive machine is in the expired state. Defaulted—The partner receive machine is using defaulted operational partner information, administratively configured for the partner. Distributing—If false, distribution of outgoing frames on this link is disabled. That is, distribution is currently disabled and is not expected to be enabled in the absence of administrative changes or changes in received protocol information. Collecting—Collection of incoming frames on this link is enabled. That is, the collection is currently enabled and is not expected to be disabled in the absence of administrative changes or changes in received protocol information. Synchronization—The system considers this link to be IN_SYNC. That is, it is allocated to the correct Link Aggregation Group, the group is associated with a compatible aggregator, and the identity of the Link Aggregation Group is consistent with the system ID and operational key information transmitted. Aggregation—The system considers this link to be aggregatable. That is, the link is a potential candidate for aggregation. Timeout—Periodic transmission of LACPDUs uses a slow transmission rate. LACP-Activity—The activity control value with regard to this link. (0: Passive; 1: Active)

Displaying switch power status

Use the Power Status page to display the Power over Ethernet (PoE) parameters for the switch. To open this page from the main menu, choose **Configuration > PoE > Power Status**.

Power Status page items

Item	Description
Maximum Available Power	The configured power budget for the switch.
System Operation Status	The PoE power service provided to the switch ports.
Mainpower Consumption	The amount of power being consumed by PoE devices connected to the switch.
Thermal Temperature	The internal temperature of the switch.
Software Version	The version of software running on the PoE controller subsystem in the switch.

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Displaying port power status

Use the Power Port Status page to display the current PoE power status for all ports. To open this page from the main menu, choose **Configuration > PoE > Power Port Status**.

Power port status page items

Item	Description
Port	The port number.
Admin Status	The administrative status of PoE power on the port
Mode	The current operating status of PoE power on the port.
Power Allocation	The configured power budget for the port.
Power Consumption	The current power consumption on the port.
Priority	The configured power priority setting for the port.

Displaying port statistics

You can display standard statistics on network traffic from the Interfaces Group and Ethernet-like MIBs, as well as a detailed breakdown of traffic based on the RMON MIB. Interfaces and Ethernet-like statistics display errors on the traffic passing through each port. You can use this information to identify potential problems with the switch (such as a faulty port or unusually heavy loading). RMON statistics provide access to a broad range of statistics, including a total count of different frame types and sizes passing through each port. All displayed values are accumulated since the last system reboot and are shown as counts per second. Statistics are refreshed every 60 seconds by default. For available statistics, see "Port Statistics table" (page 104).

Procedure steps

Step	Action
1	From the main menu, choose **Statistics > Port Statistics**.
2	Select the required port or trunk interface and number.
3	Click **Query**, or click **Reload**.

—End—

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ATTENTION
RMON groups 2, 3, and 9 can only be accessed by using Simple Network Management Protocol (SNMP) management software.

Port Statistics table

Parameter	Description
Interface Statistics	
Received Octets	The total number of octets received on the interface, including framing characters.
Received Unicast Packets	The number of subnetwork-unicast packets delivered to a higher layer protocol.
Received Multicast Packets	The number of packets delivered by this sublayer to a higher (sub)layer, addressed to a multicast address at this sublayer.
Received Broadcast Packets	The number of packets delivered by this sublayer to a higher (sub)layer, addressed to a broadcast address at this sublayer.
Received Discarded Packets	The number of inbound packets chosen to be discarded even though no errors were detected to prevent their being deliverable to a higher layer protocol. A packet can be discarded to free up buffer space.
Received Unknown Packets	The number of packets received by the interface that were discarded because of an unknown or unsupported protocol.
Received Errors	The number of inbound packets that contained errors preventing them from being deliverable to a higher layer protocol.
Transmit Octets	The total number of octets transmitted out of the interface, including framing characters.
Transmit Unicast Packets	The total number of packets that higher level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.
Transmit Multicast Packets	The total number of packets that higher level protocols requested be transmitted, and which were addressed to a multicast address at this sublayer, including those that were discarded or not sent.
Transmit Broadcast Packets	The total number of packets that higher level protocols requested be transmitted, and which were addressed to a broadcast address at this sublayer, including those that were discarded or not sent.
Transmit Discarded Packets	The number of outbound packets that were chosen to be discarded even though no errors are detected to prevent their being transmitted. A packet can be discarded to free up buffer space.
Transmit Errors	The number of outbound packets that could not be transmitted because of errors.
Etherlike Statistics	
Alignment Errors	The number of alignment errors (missynchronized data packets).

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Parameter	Description
Late Collisions	The number of times that a collision is detected later than 512 bit-times into the transmission of a packet.
FCS Errors	A count of frames received on a particular interface that are an integral number of octets in length but do not pass the Frame Check Sequence (FCS). This count does not include frames received with a frame-too-long or frame-too-short error.
Excessive Collisions	A count of frames for which transmission on a particular interface fails due to excessive collisions. This counter does not increment when the interface is operating in full-duplex mode.
Single Collision Frames	The number of successfully transmitted frames for which transmission is inhibited by exactly one collision.
Internal MAC Transmit Errors	A count of frames for which transmission on a particular interface fails due to an internal MAC sublayer transmit error.
Multiple Collision Frames	A count of successfully transmitted frames for which transmission is inhibited by more than one collision.
Carrier Sense Errors	The number of times that the carrier sense condition was lost or never asserted when attempting to transmit a frame.
SQE Test Errors	A count of times that the SQE TEST ERROR message is generated by the PLS sublayer for a particular interface.
Frames Too Long	A count of frames received on a particular interface that exceed the maximum permitted frame size.
Deferred Transmissions	A count of frames for which the first transmission attempt on a particular interface is delayed because the medium is busy.
Internal MAC Receive Errors	A count of frames for which reception on a particular interface fails due to an internal MAC sublayer receive error.
RMON Statistics	
Drop Events	The total number of events in which packets were dropped due to lack of resources.
Jabbers	The total number of frames received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and had either an FCS or alignment error.
Received Bytes	Total number of bytes of data received on the network. This statistic can be used as a reasonable indication of Ethernet utilization.
Collisions	The best estimate of the total number of collisions on this Ethernet segment.
Received Frames	The total number of frames (bad, broadcast, and multicast) received.
Broadcast Frames	The total number of good frames received that were directed to the broadcast address. This does not include multicast packets.

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Parameter	Description
Multicast Frames	The total number of good frames received that were directed to this multicast address.
CRC/Alignment Errors	The number of CRC/alignment errors (FCS or alignment errors).
Undersize Frames	The total number of frames received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.
Oversize Frames	The total number of frames received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.
Fragments	The total number of frames received that were less than 64 octets in length (excluding framing bits, but including FCS octets) and had either an FCS or alignment error.
64 Bytes Frames	The total number of frames (including bad packets) received and transmitted that were 64 octets in length (excluding framing bits but including FCS octets).
65-127 Byte Frames 128-255 Byte Frames 256-511 Byte Frames 512-1023 Byte Frames 1024-1518 Byte Frames 1519-1536 Byte Frames	The total number of frames (including bad packets) received and transmitted where the number of octets fall within the specified range (excluding framing bits but including FCS octets).

Displaying STA switch settings (global settings)

Use the STA Information page to display a summary of the current bridge Spanning Tree Algorithm (STA) information that applies to the entire switch. To open this page from the main menu, choose **Applications > Spanning Tree > STA > Information**.

STA Information page items

Item	Description
Spanning Tree State	Displays if the switch is enabled to participate in an STA-compliant network.
Bridge ID	A unique identifier for this bridge, consisting of the bridge priority, the MST Instance ID 0, and the MAC address, where the address is taken from the switch system.
Max Age	The maximum time (in seconds) a device can wait without receiving a configuration message before attempting to reconfigure. All device ports (except for designated ports) should receive configuration messages at regular intervals. Any port that ages out STA information (provided in the last configuration message) becomes the designated port for the attached LAN. If it is a root port, a new root port is selected from among the device ports attached to the network.

Item	Description
Hello Time	Interval (in seconds) at which the root device transmits a configuration message.
Forward Delay	The maximum time (in seconds) the root device waits before changing states (such as discarding to learning to forwarding). This delay is required because every device must receive information about topology changes before it starts to forward frames. In addition, each port needs time to listen for conflicting information that would make it return to a discarding state; otherwise, temporary data loops might result.
Designated Root	The priority and MAC address of the device in the Spanning Tree that this switch has accepted as the root device.
Root Port	The number of the port on this switch that is closest to the root. This switch communicates with the root device through this port. If there is no root port, then this switch has been accepted as the root device of the Spanning Tree network.
Root Path Cost	The path cost from the root port on this switch to the root device.
Configuration Changes	The number of times the Spanning Tree has been reconfigured.
Last Topology Change	Time since the Spanning Tree was last reconfigured.

Displaying STA settings for interfaces

Use the STA Port Information and STA Trunk Information pages to display the current status of ports and trunks in the Spanning Tree. To open these pages from the main menu, choose **Applications > Spanning Tree > STA > Port Information** or **Applications > Spanning Tree > STA > Trunk Information**.

Port Information and Trunk Information page items

Item	Description
Port	The port number.
Spanning Tree	Shows if STA is enabled on this interface.
STA Status	Displays the current state of this port within the Spanning Tree: • Discarding—Port receives STA configuration messages, but does not forward packets. • Learning—Port transmits configuration messages for an interval set by the Forward Delay parameter without receiving contradictory information. Port address table is cleared, and the port begins learning addresses. • Forwarding—Port forwards packets and continues learning addresses. The rules defining port status are as follows: A port on a network segment with no other STA compliant bridging device is always forwarding. If two ports of a switch are connected to the same segment and no other STA device

Item	Description
	is attached to this segment, the port with the smaller ID forwards packets and the other port is discarding. All ports are discarding when the switch is booted, and then some of them change state to learning, and then to forwarding.
Forward Transitions	The number of times this port has changed from the Learning state to the Forwarding state.
Designated Cost	The cost for a packet to travel from this port to the root in the current Spanning Tree configuration. The slower the media, the higher the cost.
Designated Bridge	The bridge priority and MAC address of the device through which this port must communicate to reach the root of the Spanning Tree.
Designated Port	The port priority and number of the port on the designated bridging device through which this switch must communicate with the root of the Spanning Tree.
Oper Path Cost	The operational path cost of the LAN segment attached to this interface. This parameter is determined by manual configuration or by autodetection, as described for Admin Path Cost in "Configuring STA settings for interfaces" (page 67).
Oper Link Type	The operational point-to-point status of the LAN segment attached to this interface. This parameter is determined by manual configuration or by autodetection, as described for Admin Link Type in "Configuring STA settings for interfaces" (page 67).
Oper Edge Port	This parameter is initialized to the setting for Admin Edge Port in "Configuring STA settings for interfaces" (page 67) (true or false), but it is set to false if a Bridge Protocol Data Unit (BPDU) is received, indicating that another bridge is attached to this port.
Port Role	Roles are assigned as follows: • The port is part of the active topology connecting the bridge to the root bridge (root port). • The port is connecting a LAN through the bridge to the root bridge (designated port). • The port is the MSTI regional root (master port). • The port is an alternate or backup port that may provide connectivity if other bridges, bridge ports, or LANs fail or are removed. The role is set to disabled (disabled port) if a port has no role within the spanning tree.
Trunk	Indicates if a port is a member of a trunk.

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Displaying basic VLAN information

Use the VLAN Basic Information page to display basic information about the VLAN type supported by the switch. To open this page from the main menu, choose **Applications > VLAN > 802.1Q VLAN > Basic Information**.

VLAN Basic Information page items

Item	Description
VLAN Version Number	The VLAN version used by this switch as specified in the IEEE 802.1Q standard.
Maximum VLAN ID	Maximum VLAN ID recognized by this switch.
Maximum Number of Supported VLANs	Maximum number of VLANs that can be configured on this switch.

Displaying current VLANs

The VLAN Current Table page shows the current port members of each VLAN and whether or not the port supports VLAN tagging. Use VLAN tagging to assign ports to a large VLAN group that crosses several switches. However, to create a small port-based VLAN for one or two switches, you can disable tagging.

Use the VLAN Current Table page to display current VLANs. To open this page from the main menu, choose **Applications > VLAN > 802.1Q VLAN > Current Table** and select the VLAN ID from the list.

VLAN Current Table page items

Item	Description
VLAN ID	ID of the configured VLAN (1-4094).
Up Time at Creation	Time this VLAN was created (System Up Time).
Status	Indicates how this VLAN was added to the switch: • Dynamic Generic VLAN Registration Protocol (GVRP): Automatically learned through GVRP. • Permanent: Added as a static entry.
Egress Ports	Lists all the VLAN port members.
Untagged Ports	Lists untagged VLAN port members.

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Displaying LLDP local device information

Use the LLDP Local Device Information page to display the LLDP information for the local switch and its local ports. To open this page from the main menu, choose **Applications > LLDP > Local Information**.

LLDP Local Device Information page items

Item	Description
LLDP Local Device Information	
Chassis Type	Identification type for the switch.
Chassis ID	The switch identification number.
System Name	Administrator contact name for the switch.
System Description	Description for the switch.
System Capabilities Supported	Functions supported by the switch.
System Capabilities Enabled	Functions currently enabled on the switch.
Management Address	The IPv4 address for the switch.
Local Device Port Information	
Port	Port name.
Port Desc	Location and number of the port.
Port ID	MAC address for the port.
Trunk	Trunk number if the port is a member.

Displaying LLDP remote device information

Use the Remote Port Information and Remote Trunk Information pages to display the Link Layer Discovery Protocol (LLDP) information for the remote devices connected to the interfaces. To open these pages from the main menu, choose **Applications > LLDP > Remote Port Information** or choose **Applications > LLDP > Remote Trunk Information**.

Remote Port Information and Remote Trunk Information page items

Item	Description
Local Port	The port number of the connected device.
Local Trunk	The trunk number.
Chassis ID	The chassis MAC address where the remote device is located.
Port ID	The MAC address of the port on the remote device.
Port Name	The name of the port on the remote device.
System Name	The name of the remote device.

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Displaying detailed LLDP remote information

Use the Remote Information Detail page to display the detailed LLDP information for a remote device connected to a local port on this switch.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > LLDP > Remote Information Detail**.
2	Select the required port or trunk interface and number.
3	Click **Query**, or click **Reload**.

—End—

Displaying LLDP device statistics

Use the LLDP Device Statistics page to display LLDP neighbor connection statistics for this switch. To open this page from the main menu, choose **Applications > LLDP > Device Statistics**.

LLDP Device Statistics page items

Item	Description
LLDP Device Statistics	
Neighbor Entries List Last Updated	Time since the LLDP neighbor entry list was last updated.
New Neighbor Entries Count	Number of the neighbor entries on the list
Neighbor Entries Dropped Count	Number of the neighbor entries dropped from the list.
Neighbor Entries AgeOutCount	Number of aged out neighbor entries.
Reinitialization Delay (0-10)	Delay in seconds for reinitialization.
LLDP Port Statistics	
NumFramesRecvd	Number of frames received on the port.
NumFramesSent	Number of frames sent by the port.
NumFramesDiscarded	Number of frames discarded by the port.

Displaying detailed LLDP device statistics

Use the LLDP Device Statistics Detail page to display detailed LLDP neighbor connection statistics for each port.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > LLDP > Device Statistics Detail**.
2	Select the required port or trunk interface and number.
3	Click **Query**, or click **Reload**.

—End—

Variable definitions

Variable	Value
Frames Discarded	Number of frames discarded by the port.
Frames Invalid	Number of invalid frames.
Frames Received	Number of frames received by the port.
Frames Sent	Number of frames sent by the port.
TLVs Unrecognized	Number of Time Length Values (TLVs) unrecognized by the port.
TLVs Discarded	Number of TLVs discarded by the port.
Neighbor Ageouts	Number of aged out neighbor entries.

Displaying the address table

Use the Dynamic Addresses page to display the MAC addresses learned by monitoring the source address for traffic entering the switch.

Procedure steps

Step	Action
1	From the main menu, choose **Applications > Address Table > Dynamic Addresses**.
2	Specify the search type by selecting the appropriate check boxes (Interface, MAC Address, or VLAN).
3	Select the method of sorting the displayed addresses.
4	Click **Query**.

—End—

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Variable definitions

Variable	Value
Interface	Select to search by a port or trunk.
MAC Address	Select to search by physical address associated with this interface.
VLAN	Select to search by VLAN ID (1-4094).
Address Table Sort Key	Select sort method. (Options: Address, VLAN, or interface [port or trunk]).
Dynamic Address Counts	The number of addresses dynamically learned.
Current Dynamic Address Table	Lists all the dynamic addresses.

Displaying system information

This page displays the system information including a descriptive name, location, and contact information. To open this page from the main menu, choose **Administration > System Information**.

System Information page items

Item	Description
sysDescription	Description of the switch.
sysUpTime	Length of time the management agent has been operational.
sysContact	Administrator responsible for the system.
sysName	Name assigned to the switch.
sysLocation	The system location.

Displaying 802.1X global settings

The 802.1X protocol provides client authentication. To open this page from the main menu, choose **Administration > Security > 802.1X > Information**.

802.1X Information page items

Item	Description
802.1X System Authentication Control	The global setting for 802.1X.

Displaying 802.1X port statistics

The switch can display statistics for 802.1x protocol exchanges for any port.

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Procedure steps

Step	Action
1	From the main menu, choose **Administration > Security > 802.1X > Statistics**.
2	Select the required port and then click **Query**.
3	Click **Reload**.

—End—

802.1X statistics parameters table

Parameter	Description
Rx EAPOL Start	The number of EAP Over Local Area Network (EAPOL) Start frames received by this authenticator.
Rx EAPOL Logoff	The number of EAPOL Logoff frames received by this authenticator.
Rx EAPOL Invalid	The number of EAPOL frames received by this authenticator in which the frame type is not recognized.
Rx EAPOL Total	The number of valid EAPOL frames of any type received by this authenticator.
Rx EAP Resp/Id	The number of Extensible Authentication Protocol (EAP) Resp/Id frames received by this authenticator.
Rx EAP Resp/Oth	The number of valid EAP Response frames (other than Resp/Id frames) received by this authenticator.
Rx EAP LenError	The number of EAPOL frames received by this authenticator in which the Packet Body Length field is invalid.
Rx Last EAPOLVer	The protocol version number carried in the most recently received EAPOL frame.
Rx Last EAPOLSrc	The source MAC address carried in the most recently received EAPOL frame.
Tx EAPOL Total	The number of EAPOL frames of any type transmitted by this authenticator.
Tx EAP Req/Id	The number of EAP Req/Id frames transmitted by this authenticator.
Tx EAP Req/Oth	The number of EAP Request frames (other than Rq/Id frames) transmitted by this authenticator.

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Managing firmware

You can upload or download firmware to or from a Trivial File Transfer Protocol (TFTP) server, or you can copy files to and from switch units. By saving runtime code to a file on a TFTP server, you can later download that file to the switch to restore operation. You can also set the switch to use new firmware without overwriting the previous version. You must specify the method of file transfer, along with the file type and file names as required.

Up to two copies of the system software (the runtime firmware) can be stored in the file directory on the switch. The currently designated startup version of this file cannot be deleted.

Use the procedures in this section to manage your BES50 firmware.

- "Downloading system software from a server" (page 115)
- "Deleting files" (page 116)
- "Setting the startup code" (page 116)

Downloading system software from a server

When you download runtime code, you can specify the destination file name to replace the current image, or you can first download the file by using a different name from the current runtime code file, and then set the new file as the startup file.

Procedure steps

Step **Action**

1 From the main menu, choose **Configuration > File > Software Maintenance**.

2 From the list, select **Software Download**.

3 Type in the TFTP server IP address.

4 From the file type list, select **Image**.

5 Type in the source file name of the software to download.

6 Select the destination file name of the switch runtime image to overwrite, or type in a new file name.

7 Click **Submit**.

8 If you replaced the current firmware used for startup and want to start using the new operation code, reboot the system by choosing **Adminstration > Reset** from the main menu.

—End—

Variable definitions

Variable	Value
TFTP Server IP Address	Enter the TFTP server IP address.
File Type	Select Image for operational code or Config for configuration file.
Source File Name	Type in the source file name. The file name must not contain slashes (\ or /), the leading letter of the file name must not be a period (.), and the maximum length for file names is 32 characters for files on the switch. (Valid characters: A-Z, a-z, 0-9, .,-, _)
Destination File Name	Type in the file name of the switch runtime image to overwrite, or type a new file name.

Deleting files

Use this procedure to delete files from the switch.

Procedure steps

Step Action

1 From the main menu, choose **Configuration > File > Delete**.

2 Select the check box beside the name of the file that you want to delete.

3 Click **Submit**.

> **ATTENTION**
> You cannot delete the file currently designated as the startup code.

—End—

Setting the startup code

Use this procedure to set the startup code.

Procedure steps

Step Action

1 If you download to a new destination file, choose **Configuration > File > Set Start-Up**.

2 Mark the operation code file used at startup, and click **Submit**.

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3 To start the new firmware, from the main menu choose **Administration > Reset**.

—End—

Testing port cable connections

Use this procedure to diagnose broken cables. This test measures the continuity of the cable.

Prerequisites

- Disconnect the remote end of the cable.
- Ensure that the remote port is idle during the test. An active remote port interferes with the cable test result and gives false reading.

Procedure steps

Step Action

1 From the main menu, choose **Administration > Cable Test**.

2 For each port, click **Test**.

The test result and last update of the test appears. Each number represents a fault distance in meters for both transmit and receive. For example, 0,0 represents no fault found during the cable test. 20,20 represents a fault 20 meters from the switch in the cable line for transmit and receive.

—End—

Variable definitions

Variable	Value
Port	The port number.
Test Result	The test result.
Cable Fault Distance	The cable fault distance.
Last Update	The date when the test was conducted.
Action	Click to conduct the cable test.

Troubleshooting

Use the procedures in this section to troubleshoot the BES50 series switch.

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Navigation

- "Power LED does not light after power on" (page 118)
- "Link LED does not light after connection is made" (page 118)
- "Cannot connect by using a Web browser or SNMP software" (page 119)
- "Forgotten IP address or password" (page 119)
- "Cannot display left menu panel of the Web-based user interface" (page 120)
- "Determining the BES50 IP address allocated by the DHCP server" (page 120)

Power LED does not light after power on

Use the procedure in this section to troubleshoot this problem.

Probable causes

The AC power cord may be defective.

Procedure steps

Step	Action
1	Check for loose connections.
2	Check the power outlet by using it for another device.
3	Replace the AC power cord

—End—

Link LED does not light after connection is made

Use the procedure in this section to troubleshoot this problem.

Probable causes

The switch port, network card, or cable may be defective.

Procedure steps

Step	Action
1	Check that the switch and attached device are both powered up.
2	Check that the network cable is connected to both devices.
3	Verify that Category 5 or better cable is used for 10/100 Mbps connections, Category 5 or 5e cable is used for 1000 Mbps

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connections, and the length of any cable does not exceed 100 meters (328 feet).

4 Check the network card and cable connections for defects.

5 Replace the defective card or cable if necessary.

—End—

Cannot connect by using a Web browser or SNMP software

If you cannot connect by using a Web browser or SNMP software, perform the following steps.

Procedure steps

Step **Action**

1 Check that the switch is powered up.

2 Check network cabling between the management station and the switch.

3 Check that there is a valid network connection to the switch and that the port you are using is not disabled.

4 Make sure that the management station VLAN interface is configured with a valid IP address, subnet mask, and default gateway.

5 Make sure that the management station has an IP address in the same subnet as the switch IP interface to which it is connected.

6 If you are trying to connect to the switch through the IP address for a tagged VLAN group, confirm that the management station and the ports connecting intermediate switches in the network are configured with the appropriate tag.

—End—

Forgotten IP address or password

If you forget the IP address or administration password, you can return the switch to its factory default state by pressing the reset button located on the front panel for 5 seconds. Upon pressing the reset button, the user name resets to nnadmin, the password resets to PlsChgMe!, and the network address returns to the default 192.168.1.128.

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ATTENTION
The reset button is located inside the switch housing approximately 2.54 cm (1 inch) from the faceplate. Use a nonmetallic object to press the reset button at the location indicated on the front panel. See "BES50FE/GE-12T PWR front panel" (page 127) or "BES50FE/GE-24T PWR front panel" (page 127).

Cannot display left menu panel of the Web-based user interface

If the Web-based user interface does not display the left menu panel, Java Runtime Environment (JRE) may not be installed on the management PC, or Java scripts and Java applets may be disabled. Perform the following checks.

Procedure steps

Step	Action
1	Exit from all existing Web browser sessions.
2	Check that Java Runtime Environment (JRE) version 1.5.0_07-b03 or later is installed on your computer. If not, download the latest version from www.java.com.
3	Check that Java scripting and Java applets are enabled on each of the following: • Web browser • firewall • software that controls Java behavior Refer to the respective documentation for details about enabling Java scripting and Java applets.
4	Launch the Web-based user interface to the BES50 switch.

—End—

Determining the BES50 IP address allocated by the DHCP server

By default, the BES50 tries to obtain IP configuration from a Dynamic Host Configuration Protocol (DHCP) server. If the DHCP server is not reachable when BES50 is initializing (for instance, if the DHCP server is offline, or if a network problem is preventing BES50 from communicating with the DHCP server), the BES50 uses the default IP address 192.168.1.128 until it can successfully obtain IP configuration from a DHCP server. At this point, you can lose Web-based user interface communication to the BES50 that was using the default address.

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Use this procedure to determine the IP address allocated by the DHCP server to BES50.

Procedure steps

Step **Action**

1 From the management PC, launch the Nortel Business Element Manager.

2 In the Navigation Panel, locate the previous IP address of the BES50.

3 If it exists, right-click and delete the BES50.

4 In the Navigation Panel, right-click **Network Elements**, and then choose **Find Network Element > Business Ethernet Switch**.

5 From the Network Device Search dialog box, click **OK** to initiate the IP address discovery process.

The BES50 devices found within the IP address range are added to the Network Elements tree in the Element Navigation Panel.

6 In the Navigation Panel, right-click on the newly discovered IP address or element name and select **Web Page**.

—End—

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BES50 installation options

This chapter describes the procedures for optional installation methods for the Business Ethernet Switch (BES) 50. For standard installation instructions, see the *Business Ethernet Switch 50 Series Quick Install Guide*.

Navigation

- "Installing the BES50 on a brick or concrete wall" (page 123)
- "Installing the BES50 on a wood wall" (page 124)
- "Installing the BES50 on a rack" (page 124)

Installing the BES50 on a brick or concrete wall

Use this procedure to install your BES50 on a brick or concrete wall.

Procedure steps

Step	Action
1	If you mount the switch on a plastered brick or concrete wall, mark the position of the mounting screws on the wall so they line up with the two mounting slots on the bottom of the switch.
2	Drill two holes of appropriate size for the wall plugs and screws (recommended size T3 x 15L). Press the plugs firmly into the drilled holes until they are flush with the surface of the wall.
3	Insert the screws into the wall plugs leaving about 3 mm (0.12 in.) clearance from the wall.
4	Position the Customer Provided Equipment (CPE) over the mounting screws, and then slide it down onto the screws.

—End—

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Installing the BES50 on a wood wall

Use this procedure to install your BES50 on a wood wall.

Procedure steps

Step	Action
1	If you mount the switch on a wood wall, mark the position of the mounting screws on the wall so they line up with the mounting slots on the bottom of the wall mounting base.
2	Insert the screws into the wall leaving about 3 mm (0.12 in.) clearance from the wall.
3	Position the mounting bracket over the mounting screws, and then slide it down onto the screws.
4	Slide the switch onto the mounting bracket.

—End—

Installing the BES50 on a rack

Use this procedure to install your BES50 on a rackmount.

Procedure steps

Step	Action
1	If you mount the switch on a rackmount, you need a rackmount shelf. The rackmount shelf can be mounted in a standard 19-inch equipment rack with screws. The switch then clips into the tabs on the rackmount shelf. These tabs prevent the switch from sliding around or falling off the shelf.
2	Slide one or two switches onto the rack shelf until they snap firmly into place.
3	Mount the rack tray in the rack by using four rack-mounting screws (not provided).
4	If you install multiple switches, mount them in the rack, one below the other, in any order.

—End—

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BES50 fundamentals

Use this information to better under the Business Ethernet Switch (BES) 50 Series switch hardware and software version 1.0.

The BES50FE-12/24T PWR and BES50GE-12/24T PWR are high performance Web-managed switches that deliver performance and control to your network. The BES50FE-12/24T PWR provides 12/24 full-duplex 10/100BASE-TX ports and the BES50GE-12/24T PWR provides 12/24 full-duplex 1000BASE-T ports that significantly improve network performance and boost throughput by using switch features configured through the Web-based user interface. With 24/48FE and 24/48GE of throughput bandwidth, these switches provide the quickest solution to meeting the growing demands on your network.

Ports 1 to 12 on the switches support IEEE 802.3af draft standard (802.3af) Power over Ethernet capabilities. Each port can detect connected 802.3af-compliant network devices, such as IP Phones or wireless access points, and automatically supply the required DC power.

Navigation

Switch architecture

The switches employ a wire-speed, nonblocking switching fabric. This permits simultaneous wire-speed transport of multiple packets at low latency on all ports. The switches also feature full-duplex capability on all ports, which effectively doubles the bandwidth of each connection.

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The switches use store-and-forward switching to ensure maximum data integrity. With store-and-forward switching, the entire packet must be received into a buffer and checked for validity before being forwarded. This prevents errors from being propagated throughout the network.

Power over Ethernet capability

Each switch provides 12 front panel RJ-45 ports that support the IEEE 802.3af Power over Ethernet (PoE) standard. Any 802.3af-compliant device attached to a port can directly draw power from the switch over the Ethernet cable without requiring its own separate power source. This capability gives network administrators centralized power control for devices such as IP Phones and wireless access points, which translates into greater network availability.

Network management options

The switches contain a comprehensive array of LEDs for at-a-glance monitoring of network and port status. They also include a management agent with which you can configure or monitor the switch by using its embedded management software.

You can manage the switch through a network connection (in-band) by using the onboard Web-based user interface.

Hardware components

This section describes the BES50 Series hardware components.

10/100/1000BASE-T ports

The BES50FE-12/24T PWR features 12/24 10/100BASE-T ports and the BES50GE-12/24T PWR features 12/24 10/100/1000BASE-T ports with RJ-45 connectors located on the front panel of the switch. All ports support automatic MDI/MDI-X operation, so you can use straight-through cables for all network connections to PCs or servers, or to other switches or hubs.

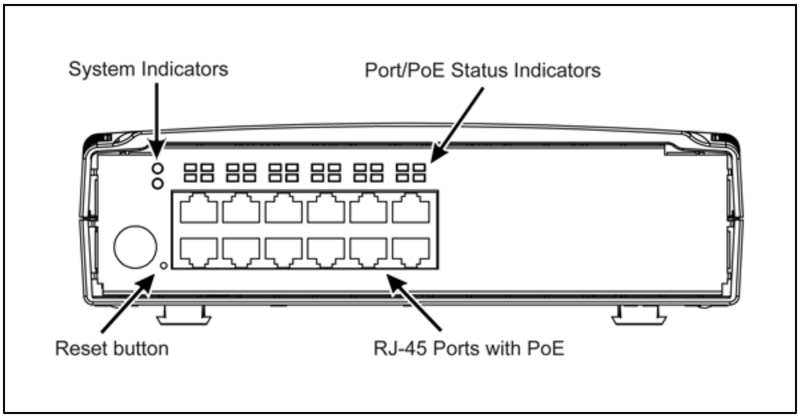
Each of these ports support autonegotiation, so the optimum transmission mode (half or full duplex) and data rate (10, 100, or 1000 Mbps) can be selected automatically. If a device connected to one of these ports does not support autonegotiation, the communication mode of that port can be configured manually.

Each port also supports IEEE 802.3x autonegotiation of flow control, so the switch can automatically prevent port buffers from becoming saturated.

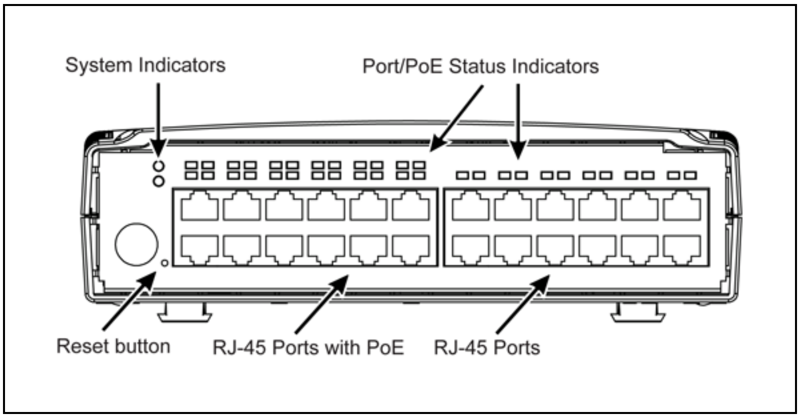
Port, PoE, and system status LEDs

The front panel of the switch also includes a display panel for key system, port, and PoE indications that simplify installation and network troubleshooting. The LEDs, which are located on the front panel for easy viewing, are shown in "BES50FE/GE-12T PWR front panel" (page 127) and "BES50FE/GE-24T PWR front panel" (page 127) and described in the following tables.

BES50FE/GE-12T PWR front panel



BES50FE/GE-24T PWR front panel



Port status LEDs

LED	Condition	Status
Link/Act	On green (GE) / amber (FE)	A valid network connection is established with the port.
	Flashing green (GE) / amber (FE)	Traffic is passing through the port.
	Off	A valid network connection is not established with the port.

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LED	Condition	Status
PoE (1-12)	On Green	A Power over Ethernet device is connected to the port.
	Off	A Power over Ethernet device is not connected to the port.

System status LEDs

LED	Condition	Status
Power	On Green	The switch is receiving power.
	Off	The switch is not receiving power.
System	On Green	System POST completed successfully.
	Flashing Green	System POST is in progress.
	Off	System POST failed.

Power supply socket

The DC power socket is for the AC power adapter. It is located on the front panel of the switch.

Reset button

When pressed for 5 seconds, the reset button reinitializes the switch. This returns the switch to the factory default settings if, for example, you forget the default IP address, your user name, or your password.

Key software features

The following table lists the BES50 Series key software features.

Feature	Description
Power over Ethernet	Powers attached devices using IEEE 802.3af Power over Ethernet (PoE)
Configuration backup and restore	Backup to TFTP server
Authentication	Web-based user interface—User name and password, RADIUS SNMP v1/2c—Community strings SNMP version 3—MD5 or SHA password Port—IEEE 802.1X, MAC address filtering
Access Control Lists	Supports up to 32 IP or MAC ACLs for advanced security/filtering purposes
DHCP client	Supported
Port configuration	Speed, duplex mode, and flow control

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Feature	Description
Rate limiting	Input and output rate limiting per port
Port mirroring	One or more ports mirrored to single analysis port
Port trunking	Supports port trunking using either static or dynamic trunking (LACP)
Broadcast storm control	Supported
Static address	Up to 8K MAC addresses in the forwarding table
IEEE 802.1D bridge	Supports dynamic data switching and address learning
Store-and-forward switching	Supported to ensure wire-speed switching while eliminating bad frames
Spanning Tree Protocol	Supports standard STP and Rapid Spanning Tree Protocol (RSTP)
Virtual LANs	Up to 32 using IEEE 802.1Q, port-based, or private VLANs
Traffic prioritization	Default port priority, traffic class map, queue scheduling, Differentiated Services Code Point (DSCP), and TCP/UDP port

The switch provides a wide range of advanced performance-enhancing features. Flow control eliminates the loss of packets due to bottlenecks caused by port saturation. Broadcast storm suppression prevents broadcast traffic storms from engulfing the network. Untagged (port-based) and tagged Virtual Local Area Networks (VLANs), plus support for automatic Generic VLAN Registration Protocol (GVRP), provide traffic security and efficient use of network bandwidth. CoS priority queueing ensures the minimum delay for moving real-time multimedia data across the network. Some of the management features are briefly described in the following sections. For further information see, "BES50 advanced features fundamentals" (page 139).

Authentication

The switch authenticates management access through a Web browser. User names and passwords can be configured locally or can be verified through a remote authentication server (the Remote Authentication Dial-In User Server [RADIUS]). Port-based authentication is also supported through the IEEE 802.1X protocol. This protocol uses the Extensible Authentication Protocol over LANs (EAPOL) to request user credentials from the 802.1X client, and then uses the Extensible Authentication Protocol (EAP) between the switch and the authentication server to verify the client’s right to access the network through an authentication server (that is, the RADIUS server).

Other authentication options include Simple Network Management Protocol (SNMP) Version 3, IP address filtering for SNMP/Web-based user interface management access, and MAC address filtering for port access.

Access Control Lists

Access Control Lists (ACLs) provide packet filtering for IP frames (based on address, protocol, or TCP/UDP port number) or any frames (based on MAC address or Ethernet type). ACLs can be used to improve performance by blocking unnecessary network traffic or to implement security controls by restricting access to specific network resources or protocols.

An ACL is a sequential list of permit or deny conditions that apply to IP addresses or other more specific criteria. The switch tests ingress packets against the conditions in an ACL one by one. A packet is accepted as soon as it matches a permit rule, or dropped as soon as it matches a deny rule. If no rules match for a list of all permit rules, the packet is dropped; and if no rules match for a list of all deny rules, the packet is accepted.

You must configure a mask for an ACL rule before you can bind it to a port or set the queue or frame priorities associated with the rule. You do this by specifying masks that control the order in which ACL rules are checked. The switch includes two system default masks that pass or filter packets matching the permit and deny rules specified in an ingress ACL. You can also configure up to seven user-defined masks for an ingress ACL.

The following restrictions apply to ACLs:

- Each frame can process a maximum of 32 ACLs.
- Each ACL can process a maximum of 32 rules.
- Due to resource restrictions, do not exceed 10 rules per port.

The active ACLs are checked in the following order:

1. User-defined rules in the ingress IP ACL for ingress ports.
2. Explicit default rule (permit any any) in the ingress IP ACL for ingress ports.
3. If no explicit rule is matched, the implicit default is permit all.

Port configuration

You can manually configure the speed, duplex mode, and flow control used on specific ports, or you can use autonegotiation to detect the connection settings used by the attached device. Use the full-duplex mode on ports whenever possible to double the throughput of switch connections. Also, enable flow control to control network traffic during periods of congestion and prevent the loss of packets when port buffer thresholds are exceeded. The switch supports flow control based on the IEEE 802.3x standard.

Rate limiting

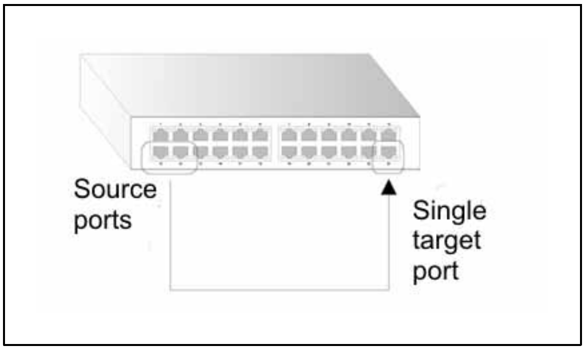
This feature controls the maximum rate for traffic transmitted or received on an interface. Rate limiting is configured on interfaces at the edge of a network to limit traffic into or out of the network. Traffic that falls within the rate limit is transmitted, while packets that exceed the acceptable amount of traffic are dropped.

Port mirroring

The switch can unobtrusively mirror traffic from any port to a monitor port. You can then attach a protocol analyzer or Remote Network Monitoring (RMON) probe to this port to perform traffic analysis and verify connection integrity.

The following figure illustrates port mirroring to a single target port.

Port mirroring



Port trunking

Ports can be combined into an aggregate connection. Trunks can be manually set up or dynamically configured by using IEEE 802.3ad Link Aggregation Control Protocol (LACP). The additional ports dramatically increase the throughput across any connection and provide redundancy by taking over the load if a port in the trunk fails. The switch supports up to six trunks.

Broadcast storm control

Broadcast suppression prevents broadcast traffic from overwhelming the network. When enabled on a port, the level of broadcast traffic passing through the port is restricted. If broadcast traffic rises above a predefined threshold, it is throttled until the level falls back beneath the threshold.

Static addresses

A static address can be assigned to a specific interface on the switch. Static addresses are bound to the assigned interface and are not moved. When a static address is seen on another interface, the address is ignored and is not written to the address table. Static addresses can be used to provide network security by restricting access for a known host to a specific port.

IEEE 802.1D bridge

The switch supports IEEE 802.1D transparent bridging. The address table facilitates data switching by learning addresses and then filtering or forwarding traffic based on this information. The address table supports up to 8K addresses.

Store-and-forward switching

The switch copies each frame into its memory before forwarding the frames to another port. This process ensures that all frames are a standard Ethernet size and are verified for accuracy with the cyclic redundancy check (CRC), thus preventing bad frames from entering the network and wasting bandwidth.

To avoid dropping frames on congested ports, the switch provides 8 MB for frame buffering. This buffer can queue packets awaiting transmission on congested networks.

Spanning Tree Algorithm

The switch supports these spanning tree protocols:

- Spanning Tree Protocol (STP, IEEE 802.1D)—This protocol provides loop detection and recovery by allowing two or more redundant connections to be created between a pair of LAN segments. When there are multiple physical paths between segments, this protocol chooses a single path and disables all others to ensure that only one route exists between any two stations on the network. This prevents the creation of network loops. However, if the chosen path fails for any reason, an alternate path is activated to maintain the connection.
- Rapid Spanning Tree Protocol (RSTP, IEEE 802.1w)—This protocol reduces the convergence time for network topology changes to about 3 to 5 seconds, compared to 30 seconds or more for the older IEEE 802.1D STP standard. This protocol is intended as a complete replacement for STP but can still interoperate with switches running the older standard by automatically reconfiguring ports to STP-compliant mode if they detect STP protocol messages from attached devices.

The Spanning Tree Algorithm (STA) can be used to detect and disable network loops and to provide backup links between switches, bridges, or routers. Using an STA allows the switch to interact with other bridging devices (that is, an STA-compliant switch, bridge, or router) in your network to ensure that only one route exists between any two stations on the network and provide backup links, which automatically take over when a primary link goes down.

The following figure illustrates Spanning Tree Protocol loops.

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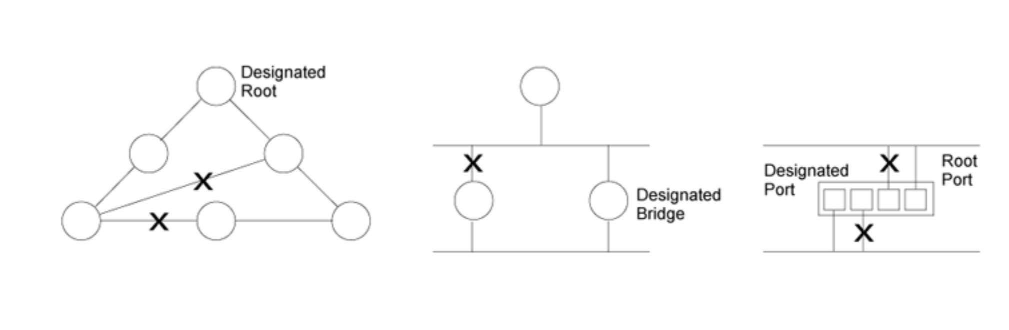
Spanning Tree Protocol loops



STA uses a distributed algorithm to select a bridging device (STA-compliant switch, bridge, or router) that serves as the root of the spanning tree network. It selects a root port on each bridging device (except for the root device), which incurs the lowest path cost when forwarding a packet from that device to the root device. Then it selects a designated bridging device from each LAN, which incurs the lowest path cost when forwarding a packet from that LAN to the root device. All ports connected to designated bridging devices are assigned as designated ports. After determining the lowest cost spanning tree, STA enables all root ports and designated ports and disables all other ports. Network packets are therefore only forwarded between root ports and designated ports, eliminating any possible network loops.

After a stable network topology is established, all bridges listen for Hello Bridge Protocol Data Units (BPDUs) transmitted from the root bridge. If a bridge does not receive a Hello BPDU after a predefined interval (Maximum Age), the bridge assumes that the link to the root bridge is down. This bridge then initiates negotiations with other bridges to reconfigure the network to reestablish a valid network topology.

Virtual LANs

The switch supports up to 32 Virtual LANs (VLANs). A VLAN is a collection of network nodes that share the same collision domain regardless of their physical location or connection point in the network. The switch supports tagged VLANs based on the IEEE 802.1Q standard. Members of VLAN groups can be dynamically learned through GVRP, or ports can be manually assigned to a specific set of VLANs. This allows the switch to restrict traffic to the VLAN groups to which a user is assigned. By segmenting your network into VLANs, you can:

- Eliminate broadcast storms, which severely degrade performance in a flat network.
- Simplify network management for node changes and moves by remotely configuring VLAN membership for any port, rather than having to manually change the network connection.

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- Provide data security by restricting all traffic to the originating VLAN, except where a connection is permitted through an external router.
- Use private VLANs to restrict traffic to pass only between data ports and the uplink ports, thereby isolating adjacent ports within the same VLAN and allowing you to limit the total number of VLANs that need to be configured.

Traffic prioritization

The switch prioritizes each packet based on the required level of service by using four priority queues with strict or Weighted Round Robin queuing. It uses IEEE 802.1p and 802.1Q tags to prioritize incoming traffic based on input from the end-station application. These functions can be used to provide independent priorities for delay-sensitive data and best-effort data.

The switch also supports several common methods of prioritizing Layer 3/4 traffic to meet application requirements. Traffic can be prioritized based on the priority bits in the IP frame Type of Service (ToS) octet or the number of the TCP/UDP port. When these services are enabled, the priorities are mapped to a Class of Service value by the switch, and then the traffic is sent to the corresponding output queue.

Configuration backup and restore

You can save the current configuration settings to a file on a TFTP server and later download this file to restore the switch configuration settings.

Network planning

A network switch allows simultaneous transmission of multiple packets through noncrossbar switching. This means that it can partition a network more efficiently than bridges or routers. The switch is one of the most important building blocks in networking technology.

When performance bottlenecks are caused by congestion at the network access point (such as the network card for a high-volume file server), the device experiencing congestion (server, power user, or hub) can be attached directly to a switched port. And, by using full-duplex mode, the bandwidth of the dedicated segment can be doubled to maximize throughput.

When networks are based on repeater (hub) technology, the distance between end stations is limited by a maximum hop count. However, a switch turns the hop count back to zero. Subdividing the network into smaller and more manageable segments, and linking them to the larger network by means of a switch, removes this limitation.

A switch can be easily configured in any network to significantly boost bandwidth while using conventional cabling and network cards.

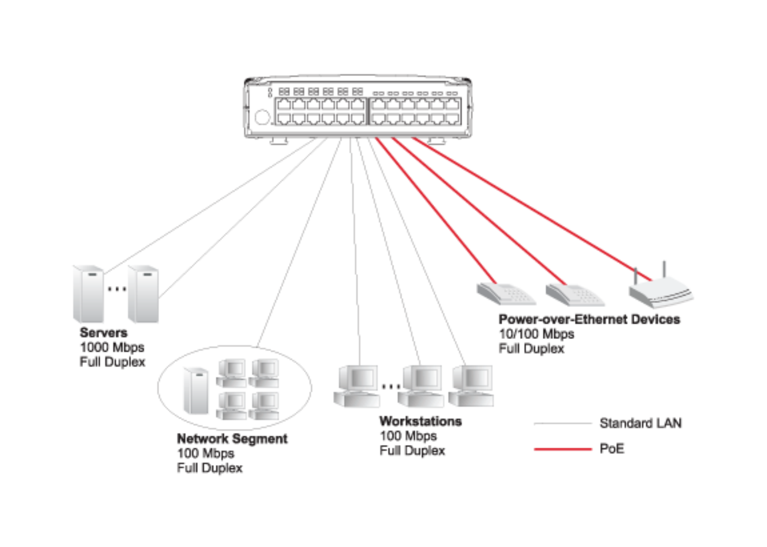
The BES50FE-12/24T PWR and BES50GE-12/24T PWR switches are not only designed to segment your network, but also to provide a wide range of options in setting up network connections. Some typical applications are described in the following sections.

Collapsed backbone

The switches are ideal for mixed Ethernet, Fast Ethernet, and Gigabit Ethernet installations where significant growth is expected in the near future. You can easily build on this basic configuration, adding direct full-duplex connections to workstations or servers. When the time comes for further expansion, you can connect to another hub or switch by using one of the Ethernet ports built into the front panel.

In the figure "Example of collapsed backbone application" (page 135), the switch is operating as a collapsed backbone for a small LAN. It is providing dedicated 10/100/1000 Mbps full-duplex connections to workstations, PoE devices, and servers.

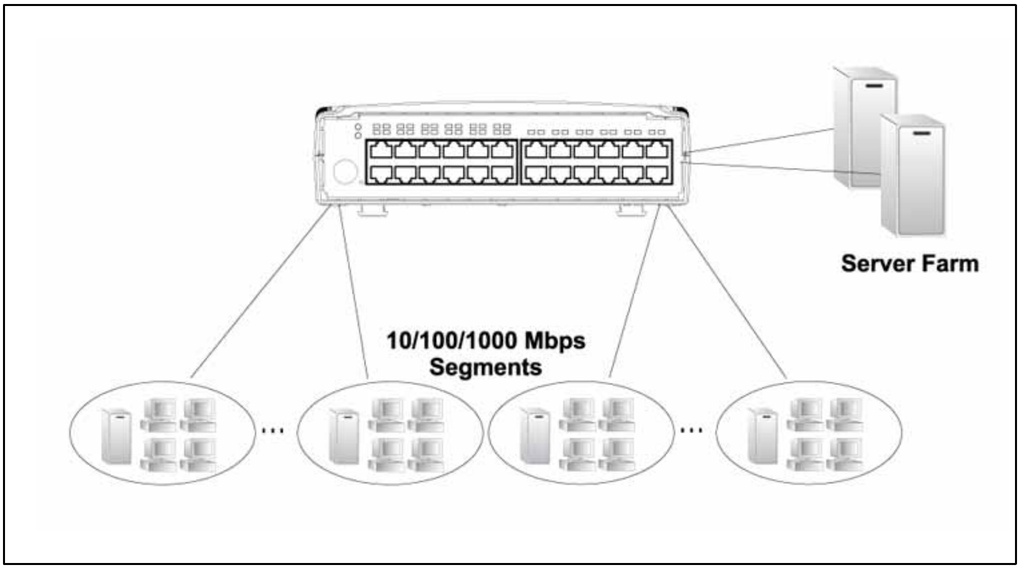
Example of collapsed backbone application



Network aggregation plan

With 12/24 parallel bridging ports (that is, 12/24 distinct collision domains), the switches can collapse a complex network down into a single efficient bridged node, increasing overall bandwidth and throughput. In the figure "Example of network aggregation plan application" (page 136), the ports on the switch are providing 10/100/1000 Mbps connectivity for up to 24 segments.

Example of network aggregation plan application



VLAN connections

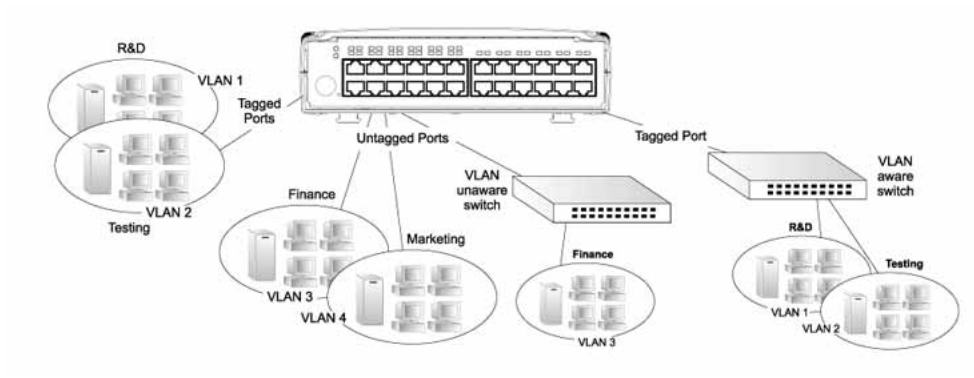
VLANs can be based on port groups, or each data frame can be explicitly tagged to identify the VLAN group to which it belongs. When using port-based VLANs, ports can either be assigned to one specific group or to all groups. Port-based VLANs are suitable for small networks. The BES50FE-12/24T PWR and BES50GE-12/24T PWR switches can be easily configured to support several VLAN groups for various organizational entities.

When you expand port-based VLANs across several switches, you need to make a separate connection for each VLAN group. This approach is, however, inconsistent with the Spanning Tree Protocol, which can easily segregate ports that belong to the same VLAN. When VLANs cross separate switches, you need to use VLAN tagging. This allows you to assign multiple VLAN groups to the trunk ports (that is, tagged ports) connecting different switches.

When connecting to a switch that does not support IEEE 802.1Q VLAN tags, use untagged ports.

The following figure is an example of possible VLAN connections.

Example of VLAN connections



Full-duplex operation only applies to point-to-point access (such as when a switch is attached to a workstation, server, or another switch). When the switch is connected to a hub, both devices must operate in half-duplex mode.

Avoid using flow control on a port connected to a hub unless it is actually required to solve a problem. Otherwise, back pressure jamming signals may degrade overall performance for the segment attached to the hub.

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BES50 advanced features fundamentals

Use the information in this section to further understand the Business Ethernet Switch (BES) 50 advanced management features.

Navigation

Simple Network Management Protocol

Simple Network Management Protocol (SNMP) is a communication protocol designed specifically for managing devices on a network. Equipment commonly managed with SNMP includes switches, routers, and host computers. SNMP is typically used to configure these devices for proper operation in a network environment, as well as to monitor them to evaluate performance or detect potential problems.

Managed devices supporting SNMP contain software, which runs locally on the device and is referred to as an agent. A defined set of variables, known as managed objects, is maintained by the SNMP agent and used to manage the device. These objects are defined in a Management Information Base

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(MIB) that provides a standard presentation of the information controlled by the agent. SNMP defines both the format of the MIB specifications and the protocol used to access this information over the network.

The switch includes an onboard agent that supports SNMP versions 1, 2c, and 3 clients. This agent continuously monitors the status of the switch hardware, as well as the traffic passing through its ports. A network management station can access this information by using management software such as the Element Manager. Access to the onboard agent from clients using SNMP version 1 and version 2c is controlled by community strings. To communicate with the switch, the management station must first submit a valid community string for authentication.

Access to the switch from clients using SNMP version 3 provides additional security features that cover message integrity, authentication, and encryption; as well as controlling user access to specific areas of the MIB tree.

The SNMP version 3 security structure consists of security models, with each model having its own security levels. Three security models are defined, SNMP version 1, SNMP version 2c, and SNMP version 3. Users are assigned to groups that are defined by a security model and specified security levels. Each group also has defined security access to a set of MIB objects for reading and writing, which are known as views. The switch has a default view (all MIB objects) and default groups defined for security models v1 and v2c.

Local engine ID

An SNMP version 3 engine is an independent SNMP agent that resides on the switch. This engine protects against message replay, delay, and redirection. The local engine ID is also used in combination with user passwords to generate the security keys for authenticating and encrypting SNMP version 3 packets.

If the local default engine ID is deleted or changed, all SNMP users are cleared and all existing users must be reconfigured.

Remote engine ID

To send inform messages to an SNMP version 3 user on a remote device, you must first specify the engine identifier for the SNMP agent on the remote device where the user resides. The remote engine ID is used to compute the security digest for authenticating and encrypting packets sent to a user on the remote host.

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SNMP passwords are localized by using the engine ID of the authoritative agent. For informs, the authoritative SNMP agent is the remote agent. You therefore need to configure the remote agent SNMP engine ID before you can send proxy requests or informs to it.

Port configuration concepts

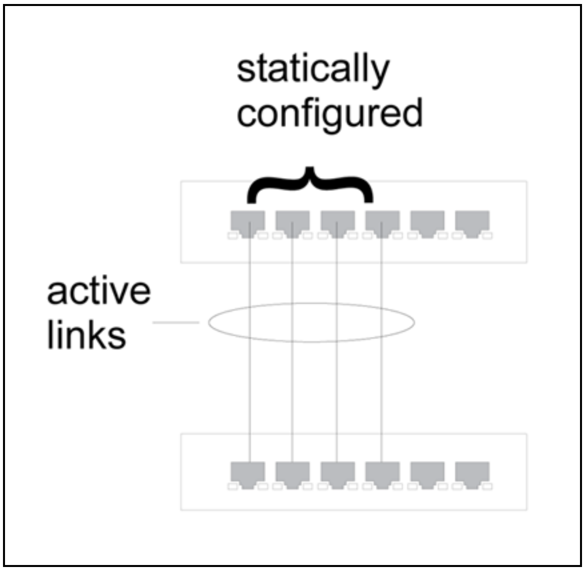
This section describes port configuration concepts.

Trunk groups

You can create multiple links between devices that work as one virtual, aggregate link. A port trunk offers a dramatic increase in bandwidth for network segments where bottlenecks exist, as well as providing a fault-tolerant link between two devices (that is, a single switch or a stack). You can create up to six trunks at a time.

The following figure illustrates a statically configured trunk.

Statically configured trunk



The switch supports both static trunking and dynamic Link Aggregation Control Protocol (LACP). Static trunks must be manually configured at both ends of the link, and the switches must comply with the IEEE802.3ad link aggregation standard. However, LACP-configured ports can automatically negotiate a trunked link with LACP-configured ports on another device. You can configure any number of ports on the switch as LACP, as long as they are not already configured as part of a static trunk. If ports on another device are also configured as LACP, the switch and the other device negotiate a trunk link between them. If an LACP trunk consists of more than four ports, all other ports are placed in standby mode. If one link in the trunk fails, one of the standby ports is automatically activated to replace it.

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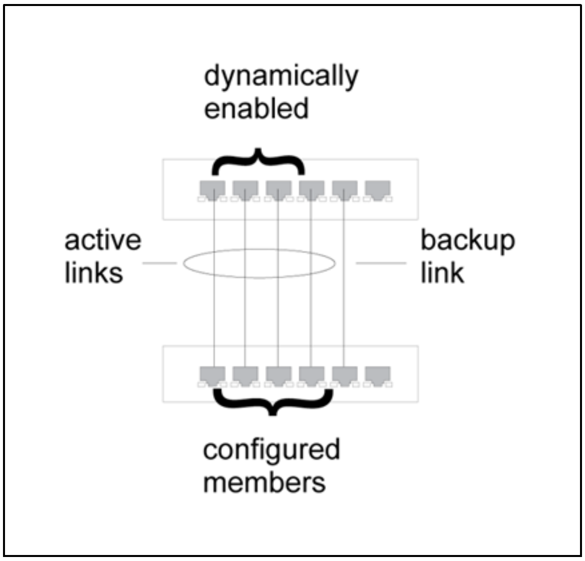
The following figure illustrates a dynamically configured trunk.

Dynamically configured trunk



Besides balancing the load across each port in the trunk, the other ports provide redundancy by taking over the load if a port in the trunk fails. However, before you make any physical connections between devices, use the Web interface to specify the trunk on the devices at both ends.

Power over Ethernet

The switch can provide DC power to a wide range of connected devices, eliminating the need for an additional power source and cutting down on the amount of cables attached to each device. After the switch is configured to supply power, it initializes an automatic detection process that is authenticated by a PoE signature from the connected device. Detection and authentication prevent damage to non-802.3af compliant devices.

Switch power management enables total switch power and individual port power to be controlled within a configured power budget. Port power can be automatically turned on and off for connected devices, and a per-port power priority can be set so that the switch never exceeds its allocated power budget. When a device is connected to a switch port, its power requirements are detected by the switch before power is supplied. If the power required by a device exceeds the power budget of the port or the whole switch, power is not supplied.

Ports can be set to one of three power priority levels: critical, high, or low. To control the power supply within the switch budget, ports set at critical or high priority have power enabled in preference to those ports set at low priority. For example, when a device is connected to a port set to critical priority, the switch supplies the required power, if necessary, by dropping power to ports set for a lower priority. If power is dropped to low-priority ports and later the power demands on the switch fall back within its budget, the dropped power is automatically restored.

Switch power budget

You can define a maximum PoE power budget for the switch (power available to all switch ports) so that power is centrally managed, preventing overload conditions at the power source. If the power demand from devices connected to the switch exceeds the power budget setting, the switch uses port power priority settings to limit the supplied power.

Port PoE power

If a device is connected to a switch port and the switch detects that it requires more than the power budget of the port, no power is supplied to the device (that is, the port power remains off).

If the power demand from devices connected to switch ports exceeds the power budget set for the switch, the port power priority settings are used to control the supplied power. For example:

- If a device is connected to a low-priority port and causes the switch to exceed its budget, port power is not turned on.
- If a device is connected to a critical or high-priority port and causes the switch to exceed its budget, port power is turned on, but the switch drops power to one or more lower priority ports.

Power is dropped from low-priority ports in sequence starting from port number 12.

IEEE 802.1Q VLANs

In large networks, routers are used to isolate broadcast traffic for each subnet into separate domains. The switch provides a similar service at Layer 2 by using Virtual Local Area Networks (VLANs) to organize any group of network nodes into separate broadcast domains. VLANs confine broadcast traffic to the originating group and can eliminate broadcast storms in large networks. They also provide a more secure and clean network environment.

An IEEE 802.1Q VLAN is a group of ports that can be located anywhere in the network, but communicate as though they belong to the same physical segment.

VLANs help to simplify network management by allowing you to move devices to a new VLAN without having to change any physical connections. VLANs can be easily organized to reflect departmental groups (such as Marketing or R&D), usage groups (such as e-mail), or multicast groups (used for multimedia applications such as videoconferencing).

VLANs provide greater network efficiency by reducing broadcast traffic, and they allow you to make network changes without having to update IP addresses or IP subnets. VLANs inherently provide a high level of network security because traffic must pass through a configured Layer 3 link to reach a different VLAN.

The switch supports the following VLAN features:

- up to 32 VLANs based on the IEEE 802.1Q standard
- distributed VLAN learning across multiple switches using explicit or implicit tagging and GVRP protocol
- port overlapping, allowing a port to participate in multiple VLANs
- end stations that belong to multiple VLANs
- passing traffic between VLAN-aware and VLAN-unaware devices
- priority tagging

Assigning ports to VLANs

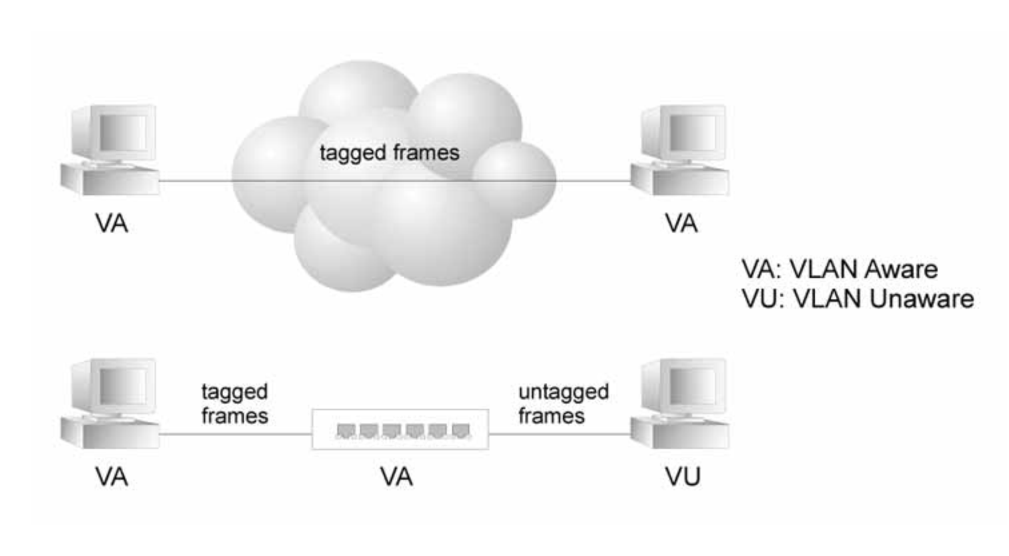
Before you enable VLANs for the switch, you must first assign each port to the VLAN groups in which it will participate. By default, all ports are assigned to VLAN 1 as untagged ports.

Add a port as a tagged port if you want the port to carry traffic for one or more VLANs, and for any intermediate network devices, or for the host at the other end of the connection support VLANs. Assign ports on the other VLAN-aware network devices along the path to carry this traffic to the same VLANs, either manually or dynamically by using Generic VLAN Registration Protocol (GVRP).

Add a port as an untagged port if you want the port to participate in one or more VLANs, but not on the intermediate network devices nor on the host at the other end of the connection support VLANs.

The following figure illustrates tagged and untagged frames.

Tagging or untagging VLAN frames



ATTENTION

VLAN-tagged frames can pass through VLAN-aware or VLAN-unaware network interconnection devices, but the VLAN tags should be stripped off before passing the frame on to any end-node host that does not support VLAN tagging.

The following concepts apply to VLAN configuration:

- VLAN classification—When the switch receives a frame, it classifies the frame in one of two ways. If the frame is untagged, the switch assigns the frame to an associated VLAN (based on the default VLAN ID of the receiving port). But if the frame is tagged, the switch uses the tagged VLAN ID to identify the port broadcast domain of the frame.
- Port overlapping—Port overlapping can be used to allow access to commonly shared network resources among different VLAN groups, such as file servers or printers. If you implement VLANs that do not overlap, but still need to communicate, you can connect them by using an external router.
- Untagged VLANs—Untagged (or static) VLANs are typically used to reduce broadcast traffic and to increase security. A group of network users assigned to a VLAN form a broadcast domain that is separate from other VLANs configured on the switch. Packets are forwarded only between ports that are designated for the same VLAN. Untagged VLANs can be used to manually isolate user groups or subnets. However, use IEEE 802.3 tagged VLANs with GVRP whenever possible to fully automate VLAN registration.

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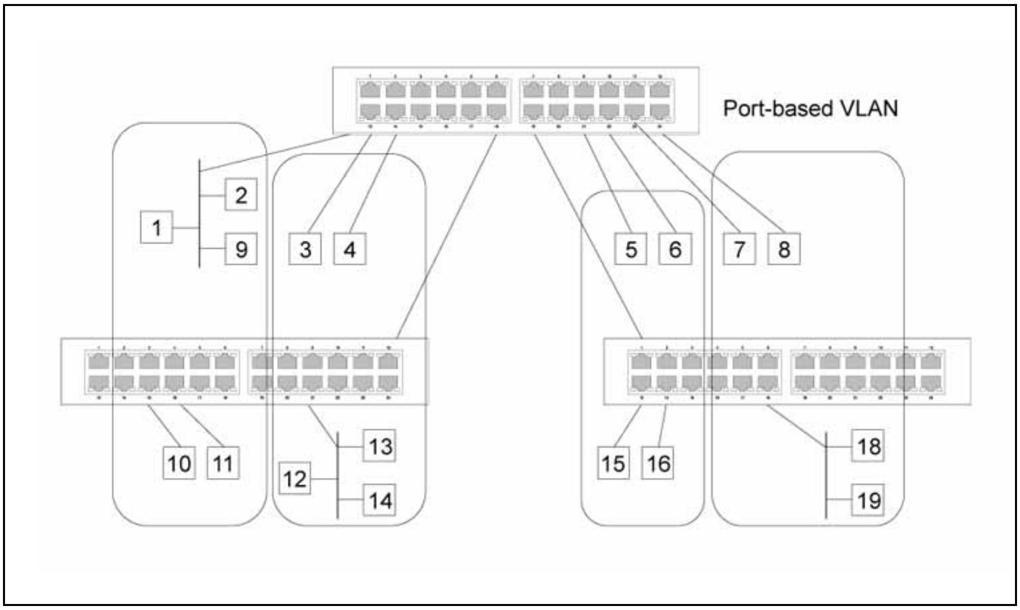
- Automatic VLAN registration— GARP VLAN Registration Protocol (GVRP) defines a system whereby the switch can automatically learn the VLANs to which each end station is assigned. If an end station (or its network adapter) supports the IEEE 802.1Q VLAN protocol, it can be configured to broadcast a message to your network indicating the VLAN groups it wants to join. When the switch receives these messages, it automatically places the receiving port in the specified VLANs and then forwards the message to all other ports. When the message arrives at another switch that supports GVRP, it also places the receiving port in the specified VLANs and passes the message on to all other ports. VLAN requirements are propagated in this way throughout the network, allowing GVRP-compliant devices to be automatically configured for VLAN groups based solely on end-station requests.

The following figure illustrates how you can you port-based VLANs.

Using port-based VLANs



To implement GVRP in a network, first add the host devices to the required VLANs (using the operating system or other application software) so that these VLANs can be propagated onto the network. For both the edge switches attached directly to these hosts and the core switches in the network, enable GVRP on the links between these devices. Also, determine security boundaries in the network and disable GVRP on ports to prevent advertisements being propagated, or forbid ports from joining restricted VLANs.

ATTENTION
If your host devices do not support GVRP, then configure static or untagged VLANs for the switch ports connected to these devices. You can still enable GVRP on these edge switches, as well as on the core switches in the network.

Tagged and untagged frames

Ports on the switch can be assigned to multiple tagged VLANs. Ports on the BES50FE-12/24T PWR can be assigned to multiple untagged VLANs, however, ports on the BES50GE-12/24T PWR can be assigned to only one untagged VLAN. Each port on the switch is capable of passing tagged or untagged frames.

For BES50GE-12/24T, if a port is already an untagged member of VLAN 1, making it an untagged member of VLAN 2 disassociates it from VLAN 1. The same result happens from VLAN 2 to VLAN 1.

When forwarding a frame from the switch along a path that contains any VLAN-aware devices, the switch should include VLAN tags. When forwarding a frame from the switch along a path that does not contain any VLAN-aware devices (including the destination host), the switch must first strip off the VLAN tag before forwarding the frame. When the switch receives a tagged frame, it passes this frame on to the VLANs indicated by the frame tag. However, when the switch receives an untagged frame from a VLAN-unaware device, it first decides where to forward the frame, and then it inserts a VLAN tag reflecting the ingress port default VID.

GVRP (global setting)

GARP VLAN Registration Protocol (GVRP) defines a way for switches to exchange VLAN information to register VLAN members on ports across the network. VLANs are dynamically configured based on join messages issued by host devices and propagated throughout the network. GVRP must be enabled to permit automatic VLAN registration and to support VLANs that extend beyond the local switch.

Link Layer Discovery Protocol

Link Layer Discovery Protocol (LLDP) allows devices on the network to share information about themselves for simplified troubleshooting, enhanced network management, and maintaining an accurate network topology. LLDP-capable devices periodically transmit information in messages called Type Length Value (TLV) fields to neighbor devices.

Class of Service

With Class of Service (CoS), you can specify which data packets have greater precedence when traffic is buffered in the switch due to congestion. The switch supports CoS with four priority queues for each port. Data

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packets in a high-priority port queue are transmitted before those in the lower priority queues. You can set the default priority for each interface and configure the mapping of frame priority tags to the switch priority queues.

Default priority for interfaces

You can specify the default port priority for each interface on the switch. All untagged packets entering the switch are tagged with the specified default port priority and then sorted into the appropriate priority queue at the output port.

The switch provides four priority queues for each port. It uses Weighted Round Robin to prevent head-of-queue blockage.

The default priority applies for an untagged frame received on a port set to accept all frame types (the port receives both untagged and tagged frames). This priority does not apply to IEEE 802.1Q VLAN tagged frames. If the incoming frame is an IEEE 802.1Q VLAN tagged frame, the IEEE 802.1p User Priority bits are used.

If the output port is an untagged member of the associated VLAN, these frames are stripped of all VLAN tags prior to transmission.

CoS values and egress queues

The switch processes Class of Service (CoS) priority tagged traffic by using four priority queues for each port, with service schedules based on Weighted Round Robin (WRR). Up to eight separate traffic priorities are defined in IEEE 802.1p. The default priority levels are assigned according to recommendations in the IEEE 802.1p standard as shown in the "Mapping CoS values to egress queues table" (page 78).

The priority levels recommended in the IEEE 802.1p standard for various network applications are shown in the "CoS priority levels table" (page 78). However, you can map the priority levels to the switch output queues in any way that benefits application traffic for your own network.

Weighted Round-Robin (WRR) queuing

You can set the switch to service the queues based on a strict rule that requires all traffic in a higher priority queue to be processed before lower priority queues are serviced, or you can use WRR queuing that specifies a relative weight of each queue. WRR uses a predefined relative weight for each queue that determines the percentage of service time the switch services each queue before moving on to the next queue. This prevents the head-of-line blocking that can occur with strict priority queuing.

The switch uses the WRR algorithm to determine the frequency at which it services each priority queue. The traffic classes are mapped to one of the four egress queues provided for each port. You can assign a weight to each of these queues (and thereby to the corresponding traffic priorities). This weight sets the frequency at which each queue is polled for service, and subsequently affects the response time for software applications assigned a specific priority value.

Layer 3/4 priorities to CoS values

The switch supports several common methods of prioritizing Layer 3/4 traffic to meet application requirements. Traffic priorities can be specified in the IP header of a frame by using the priority bits in the Type of Service (ToS) octet or the number of the TCP/UDP port. If priority bits are used, the ToS octet can contain six bits for Differentiated Services Code Point (DSCP) service. When these services are enabled, the priorities are mapped to a Class of Service value by the switch, and the traffic is then sent to the corresponding output queue.

DSCP priority

The DSCP is six bits wide, allowing coding for up to 64 different forwarding behaviors. The DSCP replaces the ToS bits, and it retains backward compatibility with the three precedence bits so that non-DSCP compliant, ToS-enabled devices do not conflict with the DSCP mapping. Based on network policies, different kinds of traffic can be marked for different kinds of forwarding. The DSCP default values are defined in the "Mapping DSCP priority table" (page 81). All DSCP values that are not specified are mapped to CoS value 0.

Address tables

Switches store the addresses for all known devices. This information is used to pass traffic directly between the inbound and outbound ports. All the addresses learned by monitoring traffic are stored in the dynamic address table. You can also manually configure static addresses that are bound to a specific port.

Static addresses

A static address can be assigned to a specific interface on the switch. Static addresses are bound to the assigned interface and do not move. When a static address is seen on another interface, the address is ignored and is not written to the address table.

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Dynamic addresses

The dynamic address table contains the MAC addresses learned by monitoring the source address for traffic entering the switch. When the destination address for inbound traffic is found in the database, the packets intended for that address are forwarded directly to the associated port. Otherwise, the traffic is flooded to all ports.

Voice VLAN—autodetection device

Voice VLAN is designed for users' voice flow, and it distributes different port precedence in different cases.

The system uses the source MAC address of the traffic traveling through the port to identify the IP Phone data flow. You can either preset an OUI address or adopt the default OUI address as the standard. Here, the OUI address refers to that of a vendor.

Voice VLAN can be configured either manually or automatically. In auto mode, the system learns the source MAC address and automatically adds the ports to a voice VLAN by using the untagged packets sent out when the IP Phone is powered on; in manual mode, however, you must add ports to a voice VLAN manually. Both of the modes forward the tagged packets sent by the IP Phone without learning the address.

Because there are multiple types of IP Phones, you must ensure that the mode on a port matches the IP Phone.

Correspondence between port mode and IP Phone

Voice VLAN mode	Type of IP Phone	Port mode
Auto Mode	Tagged IP Phone	Access: Not supported Trunk: Supported, but the default VLAN of the connected port must exist and cannot be the voice VLAN. The default VLAN is allowed to pass the connected port. Hybrid: Supported, but the default VLAN of the connected port must exist and must be in the tagged VLAN list that is allowed to pass the connected port.
	Untagged IP Phone	Access, Trunk, and Hybrid: Not supported because the default VLAN of the connected port must be the voice VLAN, and the connected port belongs to the voice VLAN; and you must add the port to the voice VLAN manually.

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Voice VLAN mode	Type of IP Phone	Port mode
Manual Mode	Tagged IP Phone	Access: Not supported
	Untagged IP Phone	Trunk: Supported, but the default VLAN of the connected port must exist and cannot be the voice VLAN. The default VLAN is allowed to pass the connected port. Hybrid: Supported, but the default VLAN of the connected port must exist and must be in the tagged VLAN list that is allowed to pass the connected port. Access: Supported, but the default VLAN of the connected port must be the voice VLAN.

Simple Network Time Protocol

Simple Network Time Protocol (SNTP) allows the switch to set its internal clock based on periodic updates from a time server (SNTP or NTP). Maintaining an accurate time on the switch enables the system log to record meaningful dates and times for event entries. If the clock is not set, the switch only records the time from the factory default set at the last bootup.

When the SNTP client is enabled, the switch periodically sends a request for a time update to a configured time server. You can configure up to three time server IP addresses. The switch attempts to poll each server in the configured sequence.

Logon authentication protocols

Remote Authentication Dial-in User Service (RADIUS) is a logon authentication protocol that uses software running on a central server to control access to RADIUS-aware devices on the network. An authentication server contains a database of multiple user name and password pairs with associated privilege levels for each user that requires management access to the switch.

RADIUS uses UDP to offer best effort delivery. Also, RADIUS encrypts only the password in the access-request packet from the client to the server.

Port security

Port security is a feature that allows you to configure a switch port with one or more device MAC addresses that are authorized to access the network through that port.

When port security is enabled on a port, the switch stops learning new MAC addresses on the specified port when it reaches a configured maximum number. Only incoming traffic with source addresses already stored in the dynamic or static address table are accepted as authorized to access the

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network through that port. If a device with an unauthorized MAC address attempts to use the switch port, the intrusion are detected and the switch can automatically take action by disabling the port and sending a trap message.

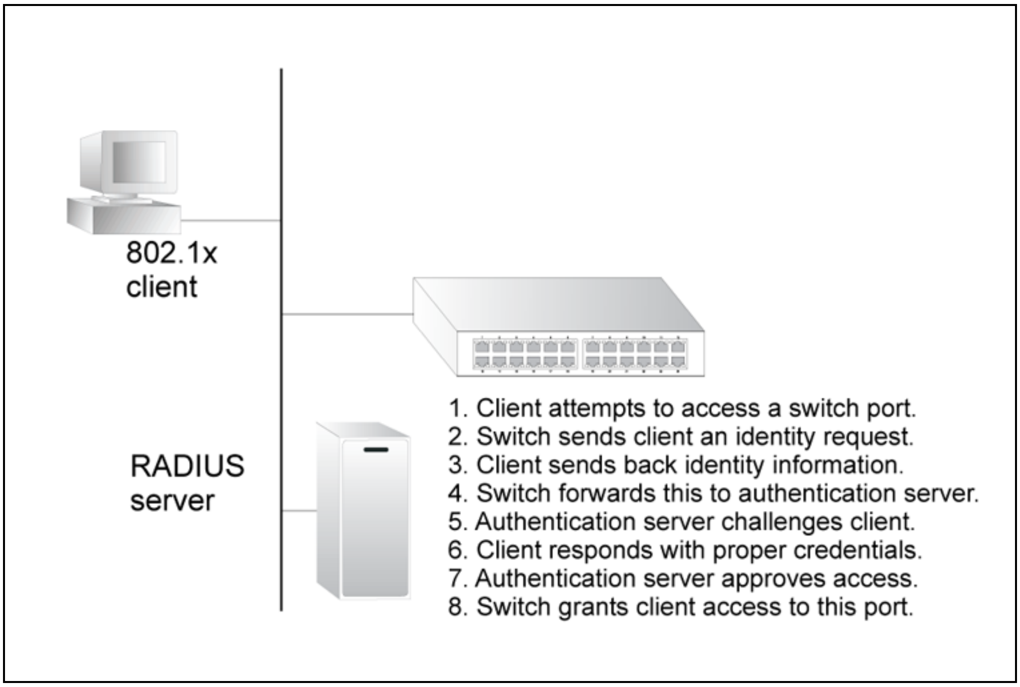
802.1X port authentication

Network switches can provide open and easy access to network resources by simply attaching a client PC. Although this automatic configuration and access is a desirable feature, it also allows unauthorized personnel to easily intrude and possibly gain access to sensitive network data.

The IEEE 802.1X standard defines a port-based access control procedure that prevents unauthorized access to a network by requiring users to first submit credentials for authentication. Access to all switch ports in a network can be centrally controlled from a server, which means that authorized users can use the same credentials for authentication from any point within the network.

The following figure illustrates an 802.1X port authentication configuration.

Configuring 802.1X port authentication



1. Client attempts to access a switch port.
2. Switch sends client an identity request.
3. Client sends back identity information.
4. Switch forwards this to authentication server.
5. Authentication server challenges client.
6. Client responds with proper credentials.
7. Authentication server approves access.
8. Switch grants client access to this port.

The switch uses the Extensible Authentication Protocol over LANs (EAPOL) to exchange authentication protocol messages with the client, and a remote RADIUS authentication server to verify user identity and access rights. When a client (Supplicant) connects to a switch port, the switch (Authenticator) responds with an EAPOL identity request. The client provides its identity (such as a user name) in an EAPOL response to the

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switch, which it forwards to the RADIUS server. The RADIUS server verifies the client identity and sends an access challenge back to the client. The EAP packet from the RADIUS server contains not only the challenge, but the authentication method to be used. The client can reject the authentication method and request another, depending on the configuration of the client software and the RADIUS server. The authentication method must be MD5. The client responds to the appropriate method with its credentials, such as a password or certificate. The RADIUS server verifies the client credentials and responds with an accept or reject packet. If authentication is successful, the switch allows the client to access the network. Otherwise, network access is denied and the port remains blocked.

BES50 reference information

This chapter provides technical specifications and reference information for the BES50 Series switch.

Navigation

System defaults

The switch system defaults are provided in the configuration file Factory_Default_Config.cfg. To reset the switch defaults, set this file as the startup configuration file. See "Downloading system software from a server" (page 115). The following table lists some of the basic system defaults.

System defaults table

Function	Parameter	Default
Authentication	Privileged Level	User name: nnadmin Password: PlsChgMe!
	RADIUS Authentication	Disabled
	802.1X Port Authentication	Disabled
	Port Security	Disabled
Web management	HTTP Server	Enabled
	HTTP Port Number	80

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Function	Parameter	Default
SNMP	SNMP Agent	Enabled
	Community Strings	PlsChgMe!RO (read only) PlsChgMe!RW (read/write)
	Traps	Authentication traps: enabled Link-up-down events: enabled
	SNMP V3	View: defaultview Group: public (read only) private (read/write)
Port configuration	Admin Status	Enabled
	Auto-negotiation	Enabled
	Flow Control	Disabled
Power over Ethernet	Status	Enabled (all ports)
Rate limiting	Input and output limits	Disabled
Port trunking	Static Trunks	None
	LACP	Disabled
Broadcast storm protection	Status	Enabled (all ports)
	Broadcast Limit Rate	64 packets per second
Spanning Tree Protocol	Status	Enabled, STP (Defaults: All values based on IEEE 802.1D)
	Fast Forwarding (Edge Port)	Disabled
Address Table	Aging Time	300 seconds
Virtual LANs	Default VLAN	1
	PVID	1
	Acceptable Frame Type	All
	Ingress Filtering	Enabled For the BES50GE, disabled is not available.
	Switchport Mode (Egress Mode)	Hybrid: tagged/untagged frames
	GVRP (global)	Enabled
	GVRP (port interface)	Disabled

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Function	Parameter	Default
Traffic prioritization	Ingress Port Priority	0
	Weighted Round Robin	For the BES50FE, Queue: 0, 1, 2, 3 Weight: 1, 2, 4, 8 For the BES50GE, Queue: 0, 1, 2, 3, 4, 5, 6, 7 Weight: 1, 2, 4, 6, 8, 10, 12, 14
	IP DSCP Priority	Disabled
IP settings	Management VLAN	1
	IP Address	DHCP assigned, otherwise 192.168.1.128
	Subnet Mask	255.255.255.0
	Default Gateway	0.0.0.0
	DHCP	Enabled
	BOOTP	Disabled
System log	Status	Enabled
	Messages Logged	Levels 0-7 (all)
	Messages Logged to Flash	Levels 0-7
SNTP	Clock Synchronization	Disabled

Twisted-pair cable and pin assignments

CAUTION
Do not plug a phone jack connector into any RJ-45 port. Use only twisted-pair cables with RJ-45 connectors that conform with FCC standards.

For 10/100BASE-TX connections, the twisted-pair cable must have two pairs of wires. For 1000BASE-T connections, the twisted-pair cable must have four pairs of wires. Each wire pair is identified by two different colors. For example, one wire might be red and the other might be red with white stripes. Also, an RJ-45 connector must be attached to both ends of the cable.

CAUTION
Each wire pair must be attached to the RJ-45 connectors in a specific orientation.

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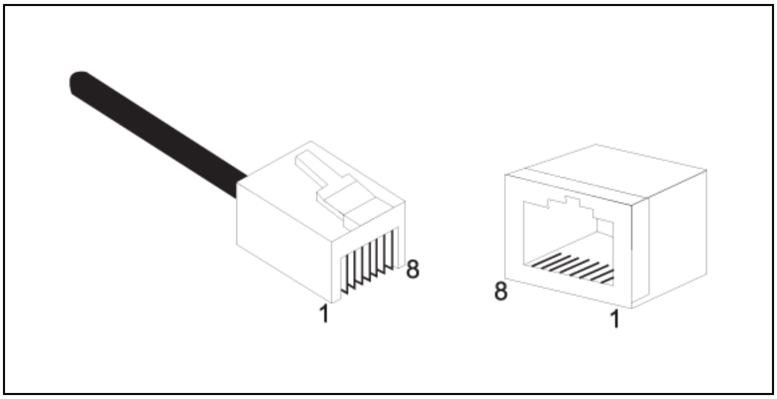
"RJ-45 connector pin numbers" (page 158) illustrates how the pins on the RJ-45 connector are numbered. Be sure to hold the connectors in the same orientation when you attach the wires to the pins.

RJ-45 connector pin numbers



10/100BASE-TX pin assignments

Use unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for RJ-45 connections: 100-ohm Category 3 or better cable for 10 Mbps connections, or 100-ohm Category 5 or better cable for 100 Mbps connections. Also be sure that the length of any twisted-pair connection does not exceed 100 meters (328 feet).

Data is delivered on the standard two wire pairs (1+2, 3+6), and power is supplied by using the two previously spare pairs (4+5, 7+8). The RJ-45 ports on the switch base unit support automatic MDI/MDI-X operation; you can use straight-through cables for all network connections to PCs or servers, or to other switches or hubs. In straight-through cable, pins 1, 2, 3, and 6 at one end of the cable are connected straight through to pins 1, 2, 3, and 6 at the other end of the cable. When using any RJ-45 port on this switch, you can use either straight-through or crossover cable.

10/100BASE-TX pin assignments table

Pin	MDI-X signal name	MDI signal name
1	Receive Data plus (RD+)	Transmit Data plus (TD+)
2	Receive Data minus (RD-)	Transmit Data minus (TD-)
3	Transmit Data plus (TD+)	Receive Data plus (RD+)
4	GND	GND (Positive Vport)
5	GND	GND (Positive Vport)
6	Transmit Data minus (TD-)	Receive Data minus (RD-)
7	-48V	-48V feeding power (Negative Vport)

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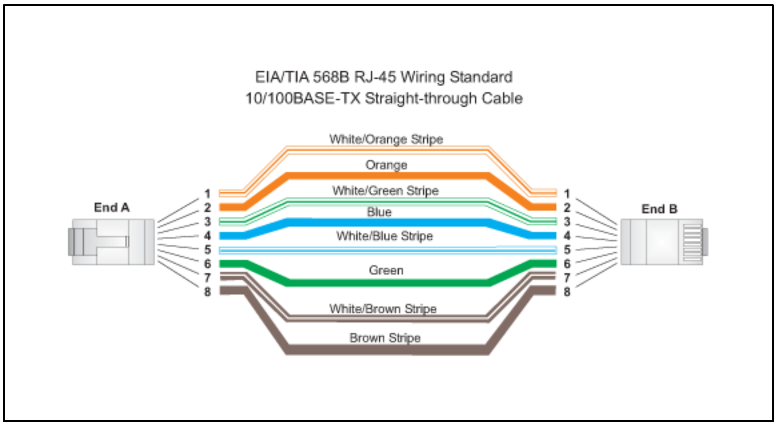
Pin	MDI-X signal name	MDI signal name
8	-48V	-48V feeding power (Negative Vport)
Note: The plus (+) and minus (-) signs represent the polarity of the wires that make up each wire pair.		

Straight-through wiring

If the twisted-pair cable is to join two ports and only one of the ports has an internal crossover (MDI-X), the two pairs of wires must be straight-through. (When autonegotiation is enabled for any RJ-45 port on this switch, you can use either straight-through or crossover cable to connect to any device type.)

You must connect all four wire pairs as shown in the following diagram to support Gigabit Ethernet connections.

Straight-through wiring diagram



Crossover wiring

If the twisted-pair cable is to join two ports and either both ports are labeled with an “X” (MDI-X) or neither port is labeled with an “X” (MDI), a crossover must be implemented in the wiring. (When autonegotiation is enabled for any RJ-45 port on this switch, you can use either straight-through or crossover cable to connect to any device type.)

You must connect all four wire pairs as shown in the following diagram to support Gigabit Ethernet connections.

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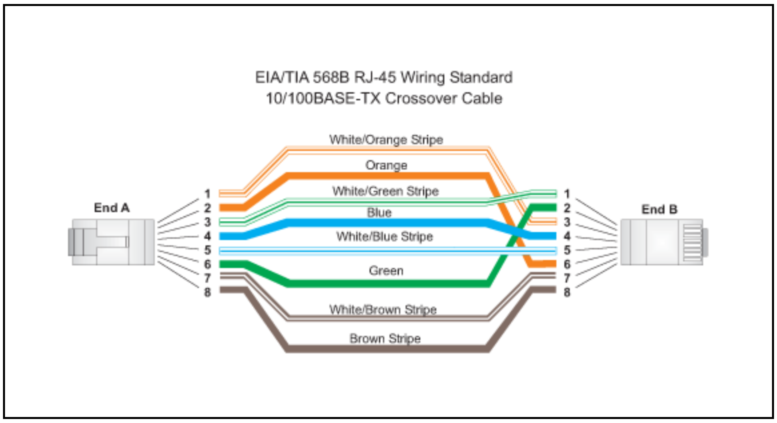
Crossover wiring diagram



1000BASE-T pin assignments

All 1000BASE-T ports support automatic MDI/MDI-X operation, so you can use straight-through cables for all network connections to PCs or servers, or to other switches or hubs.

The "1000BASE-T MDI and MDI-X port pinouts table" (page 160) shows the 1000BASE-T MDI and MDI-X port pinouts. These ports require that all four pairs of wires be connected. Note that for 1000BASE-T operation, all four pairs of wires are used for both transmit and receive.

Use 100-ohm Category 5, 5e, or 6 unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for 1000BASE-T connections. Also be sure that the length of any twisted-pair connection does not exceed 100 meters (328 feet).

1000BASE-T MDI and MDI-X port pinouts table

Pin	MDI signal name	MDI-X signal name
1	Bi-directional Data One Plus (BI_D1+)	Bi-directional Data Two Plus (BI_D2+)
2	Bi-directional Data One Minus (BI_D1-)	Bi-directional Data Two Minus (BI_D2-)
3	Bi-directional Data Two Plus (BI_D2+)	Bi-directional Data One Plus (BI_D1+)
4	Bi-directional Data Three Plus (BI_D3+)	Bi-directional Data Four Plus (BI_D4+)
5	Bi-directional Data Three Minus (BI_D3-)	Bi-directional Data Four Minus (BI_D4-)
6	Bi-directional Data Two Minus (BI_D2-)	Bi-directional Data One Minus (BI_D1-)

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Pin	MDI signal name	MDI-X signal name
7	Bi-directional Data One Plus (BI_D4+)	Bi-directional Data One Plus (BI_D3+)
8	Bi-directional Data Four Minus (BI_D4-)	Bi-directional Data Three Minus (BI_D3-)

Cable testing for existing Category 5 cable

Installed Category 5 cabling must pass tests for Attenuation, Near-End Crosstalk (NEXT), and Far-End Crosstalk (FEXT). This cable testing information is specified in the ANSI/TIA/EIA-TSB-67 standard. Additionally, cables must also pass test parameters for Return Loss and Equal-Level Far-End Crosstalk (ELFEXT). These tests are specified in the ANSI/TIA/EIA-TSB-95 bulletin, “The Additional Transmission Performance Guidelines for 100 Ohm 4-Pair Category 5 Cabling.”

When you test your cable installation, be sure to include all patch cables between switches and end devices.

Adjusting existing Category 5 cabling to run 1000BASE-T

If your existing Category 5 installation does not meet one of the test parameters for 1000BASE-T, you can apply three measures to try to correct the problem:

1. Replace any Category 5 patch cables with high-performance Category 5e or Category 6 cables.
2. Reduce the number of connectors used in the link.
3. Reconnect some of the connectors in the link.

Specifications

The tables in this section list the BES50 Series specifications.

Software features

Feature	Description
Authentication	Local, RADIUS, Port (802.1X), Port Security
Access Control Lists	IP
PoE	Power over Ethernet
Port configuration	10BASE-T: 100-ohm Category 3 or better twisted-pair 100BASE-TX: 100-ohm Category 5 or better twisted pair 1000BASE-T: 100-ohm Category 5, 5e, or 6 twisted-pair
Flow control	Full Duplex: IEEE 802.3x Half Duplex: Back pressure
Broadcast storm control	Traffic throttled above a critical threshold

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Feature	Description
Port mirroring	Multiple source ports, one destination port
Rate limits	Input limit
Port trunking	Static trunks (IEEE802.3ad link aggregation compliant) Dynamic trunks (Link Aggregation Control Protocol)
Spanning Tree Algorithm	Spanning Tree Protocol (STP, IEEE 802.1D) Rapid Spanning Tree Protocol (RSTP, IEEE 802.1w)
VLAN support	Up to 32 groups; port-based or tagged (802.1Q), GVRP for automatic VLAN learning, private VLANs
Class of Service	Supports eight levels of priority and Weighted Round Robin Queueing
Multicast filtering	IGMP Snooping (Layer 2)
Additional features	BOOTP client SNTP (Simple Network Time Protocol) SNMP (Simple Network Management Protocol) RMON (Remote Monitoring, groups 1,2,3,9) SMTP Email Alerts

Management features

Feature	Description
In-band management	Web-based HTTP
Software loading	TFTP in-band
SNMP	Management access through the MIB database Trap management to specified hosts
RMON	Groups 1, 2, 3, 9 (Statistics, History, Alarm, Event)

Physical characteristics

Feature	Description
Ports	BES50FE-12/24T PWR: 12/24 10/100BASE-TX, with auto-negotiation BES50GE-12/24T PWR: 12/24 10/100/1000BASE-T, with auto-negotiation
Network interface	Ports 1-12/24: RJ-45 connector, auto MDI/X 10BASE-T: RJ-45 (100-ohm, UTP cable; Categories 3 or better) 100BASE-TX: RJ-45 (100-ohm, UTP cable; Category 5 or better) 1000BASE-T: RJ-45 (100-ohm, UTP cable; Category 5, 5e, or 6)
Buffer architecture	8 Mbytes
Aggregate bandwidth	8.8 Gbps
Switching database	8K MAC address entries

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Feature	Description
Power over Ethernet	15.4 W maximum per port 350 mA continuously
LEDs	System: PWR (Power Supply), System, Ports: Link/Act (Link/Activity), PoE (Power over Ethernet)
Weight	BES50FE/GE-12T: 2.0 kg (4.04 lbs) BES50FE/GE-24T: 2.2 kg (4.85 lbs)
Size (HxWxD)	6.7 x 21.8 x 31.8 cm (2.64 x 8.60 x 12.51 in.)
Temperature	Operating: 0 °C to 40 °C (32 °F to 104 °F) Storage: -40 °C to 70 °C (-40 °F to 158 °F)
Humidity	Operating: 0% to 95% (non-condensing)
Power supply	AC Input: 90 to 264 VAC, 50 to 60 Hz, 2.5A DC Output: 48 V, 2.5A
Power consumption	BES50FE-12T PWR: 15 Watts BES50FE-24T PWR: 18 Watts BES50GE-12T PWR: 31 Watts BES50GE-24T PWR: 38 Watts
Maximum current	1.2 A @ 110 VAC 0.6 A @ 240 VAC

Switch features

Feature	Description
Spanning Tree Protocol	IEEE 802.1D Spanning Tree Protocol
Forwarding mode	Store-and-forward
Throughput	Wire speed
Flow control	Full Duplex: IEEE 802.3-2002 Half Duplex: Back pressure
Broadcast storm suppression	Traffic throttled above a critical threshold
VLAN support	Up to 16 groups; port-based or with 802.1Q VLAN tagging, GVRP for automatic VLAN learning, private VLANs
Multicast switching	IGMP Snooping
Quality of Service	Supports four levels of priority and Weighted Round Robin Queueing (which can be configured by VLAN tag or port), Layer 3/4 priority mapping: IP Precedence, IP DSCP

Standards

Standard	Description
Software standards	IEEE 802.1D Spanning Tree Protocol and traffic priorities IEEE 802.1p Priority tags IEEE 802.1Q VLAN

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Standard	Description
	IEEE 802.1X Port Authentication IEEE 802.3 Ethernet IEEE 802.3u Fast Ethernet IEEE 802.3x Full-duplex flow control (ISO/IEC 8802-3) IEEE 802.3ab 1000BASE-T IEEE 802.3ac VLAN tagging IEEE 802.3ad Link Aggregation Control Protocol DHCP Client (RFC 1541) IP (RFC 791/950) RMON (RFC 1757 groups 1,2,3,9) SNMP (RFC 1157) SNMPv2 (RFC 2571) SNTP (RFC 2030) TFTP (RFC 1350)
Hardware standards	IEEE 802.3 Ethernet IEEE 802.3u Fast Ethernet IEEE 802.3ab Gigabit Ethernet IEEE 802.3af Power over Ethernet IEEE 802.1D Bridging IEEE 802.3ad Link Aggregation IEEE 802.1Q VLAN Bridge Management IEEE 802.1x Port access control IEEE 802.3x full-duplex flow control ISO/IEC 8802-3 Carrier sense multiple access with collision detection (CSMA/CD)

Compliances

The following table lists compliances associated with the BES50 Series.

Feature	Description
Emissions	Industry Canada Class A EN55022 (CISPR 22) Class A EN 61000-3-2/3 FCC Class A VCCI Class A C-Tick—AS/NZS 3548 (1995) Class A
Immunity	EN 61000-4-2/3/4/5/6/8/11
Safety	CSA/CUS (UL60950-1, CSA 22.2 NO60950-1) EN60950 (TÜV/GS) IEC 60950-1 (CB)

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SMB

Using the Nortel Business Ethernet Switch 50 Series

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