Configuration Guide

BSG8ew and BSG12ew/aw/tw 1.0

Business Services Gateway

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NORTEL

Contents

How to Get Help

This section explains how to get help for Nortel products and services.

Getting Help from the Nortel Web site

The best way to get technical support for Nortel products is from the Nortel Technical Support Web site:

http://www.nortel.com/support

This site provides quick access to software, documentation, bulletins, and tools to address issues with Nortel products. More specifically, the site enables you to:

- download software, documentation, and product bulletins
- search the Technical Support Web site and the Nortel Knowledge Base for answers to technical issues
- sign up for automatic notification of new software and documentation for Nortel equipment
- open and manage technical support cases

Getting Help over the phone from a Nortel Solutions Center

If you don't find the information you require on the Nortel Technical Support Web site, and have a Nortel support contract, you can also get help over the phone from a Nortel Solutions Center.

In North America, call 1-800-4NORTEL (1-800-466-7835).

Outside North America, go to the following Web site to obtain the phone number for your region:

http://www.nortel.com/callus

Getting Help from a specialist by using an Express Routing Code

To access some Nortel Technical Solutions Centers, you can use an Express Routing Code (ERC) to quickly route your call to a specialist in your Nortel product or service. To locate the ERC for your product or service, go to:

http://www.nortel.com/erc

Getting Help through a Nortel distributor or reseller

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.

Configuration fundamentals

Wide area network

Wide area network (WAN) configuration includes configuring Ethernet ports. For more information, see WAN configuration (page 15) and WAN advanced configuration (page 83).

Local area network

Local area network (LAN) configuration includes configuring the virtual interface, Ethernet LAN settings, and wireless LAN settings. For more information, see VLAN configuration (page 37) and LAN advanced configuration (page 97).

Virtual local area network

Virtual local area network (VLAN) configuration includes configuring basic VLAN settings, VLAN port settings, static VLAN, and VLAN Spanning Tree Protocol (STP). For more information, see VLAN configuration (page 37) and VLAN advanced configuration (page 111).

Wireless network

Wireless network (WLAN) configuration includes configuring the access point, radio, MAC filtering, security, and wireless multi media. For more information, see Wireless network configuration (page 43) and LAN advanced configuration (page 97).

IP routing

IP routing configuration includes configuring routing protocols such as Open Shortest Path First (OSPF), Routing Information Protocol (RIP), Route Redistribution (RRD), and Virtual Router Redundancy Protocol (VRRP). For more information, see IP routing advanced configuration (page 127).

Dynamic host control protocol

Dynamic Host Control Protocol (DHCP) configuration includes configuring DHCP server and DHCP relay settings. For more information, see DHCP advanced configuration (page 145).

Multicast/IGMP

Multicast configuration includes configuring Dynamic Multicast and Internet Group Management Protocol (IGMP) snooping. For more information, see Multicast advanced configuration (page 153).

Quality of Service

Quality of Service (QoS) configuration includes configuring basic QoS settings, policy map settings, class map settings, and queue settings. For more information, see QoS configuration (page 71) and QoS advanced configuration (page 159).

Virtual private network

Virtual Private Network (VPN) configuration includes configuring VPN IP security (IPsec), traffic selector table, IPsec Security Authentication (SA) table, and Internet Key Exchange (IKE) pre-shared secret. For more information, see VPN configuration (page 55) and VPN advanced configuration (page 165).

Session initiation protocol

Session Initiation Protocol (SIP) configuration includes configuring the SIP server, SIP system, SIP protocol, routing rules, user provisioning, and Foreign Exchange Office (FXO)/Foreign Exchange Subscriber (FXS). For more information, see SIP configuration (page 47) and SIP advanced configuration (page 177).

Port management

Port management configuration includes configuring Ethernet and (Power of Ethernet) PoE ports. For more information, see Port management advanced configuration (page 197).

Introduction

This document describes how to configure the Business Service Gateway (BSG) using the Web user interface.

Navigation

WAN configuration

This section describes the procedures to configure the Wide Area Network (WAN) setup for the Business Services Gateway (BSG) system.

WAN configuration navigation

The following sections provide information for configuring the WAN:

- Ethernet (page 15)
- DSL (page 23)
- T1/E1 (page 26)

Ethernet

The following sections describe WAN Ethernet configuration.

- "Ethernet WAN configuration" on page 15
- "PPPoE WAN configuration" on page 19

Ethernet WAN configuration

This section describes Ethernet WAN configuration. Ethernet appears under WAN configuration if you are connected to a BSG8ew or BSG12ew.

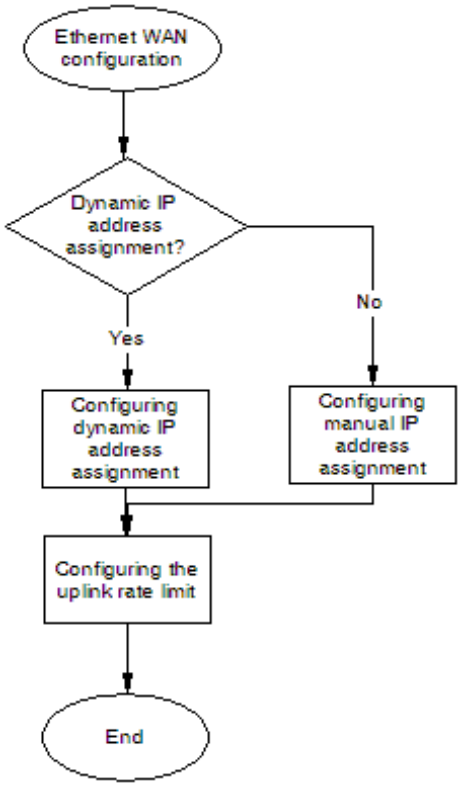
Prerequisites for WAN configuration

- You must have SYSTEM - READ WRITE permission.

Ethernet WAN configuration procedures

The following task flow shows the sequence of procedures to perform to configure the Ethernet WAN.

Figure 1 Ethernet WAN configuration procedures



Configuring dynamic IP address assignment

Complete this procedure to configure the Ethernet WAN for dynamic IP address assignment.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, Ethernet**. The WAN Configuration pane appears.
2	From the **Interface** list, select the required interface.
3	From the **Encapsulation Mode** list, select **Ethernet**.
4	From the **MAC Cloning** list, select **Enable**.
5	In the **MAC Address** field, type the MAC Address.
6	For **IP Address Assignment**, select **Dynamic**.
7	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring Ethernet WAN.

Variable	Value
Interface	Select an Interface to be configured.
Encapsulation Mode	Set the encapsulation mode to Ethernet. The WAN interface operates as a normal Ethernet interface.
MAC Cloning	Select the MAC cloning status. Enable - the BSG uses the configured MAC address as the source of Ethernet frames instead of the MAC address of the BSG WAN port. Disable - disables MAC Cloning. You can enable MAC cloning only if the Encapsulation Mode is Ethernet. The default value is Disable.
MAC Address	Type the MAC address, if the MAC cloning is enabled.
IP Address Assignment	Select Dynamic for the system to assign the IP address for the specified VLAN from the Dynamic Host Configuration Protocol (DHCP) server.

Configuring manual IP address assignment

Complete this procedure to configure the Ethernet WAN for manual IP address assignment. The IP Address Assignment field has a default value of Manual.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, Ethernet**. The WAN Configuration pane appears.
2	From the **Interface** list, select the required interface.
3	From the **Encapsulation Mode** list, select **Ethernet**.
4	In the **WAN IP Address** field, type the IP address.
5	In the **Subnet Mask** field, type the subnet mask.
6	In the **Gateway IP Address** field, type the Gateway IP Address.
7	In the **Primary DNS** field, type the Primary Domain Name System (DNS) IP address.
8	In the **Secondary DNS** field, type the Secondary DNS IP address.
9	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring Ethernet WAN.

Variable	Value
Interface	Select an Interface to be configured.
Encapsulation Mode	Set the encapsulation mode to Ethernet. The WAN interface operates as a normal Ethernet interface.
WAN IP Address	Type the WAN IP address, if the IP Address Assignment is manual.
Subnet Mask	Type the subnet mask, if the IP Address Assignment is manual.
Gateway IP Address	Type the gateway IP Address, if the IP Address Assignment is manual.
Configurable	
Primary DNS	Type the primary DNS server IP address, if the IP Address Assignment is manual.
Secondary DNS	Type the secondary DNS server IP address, if the IP Address Assignment is manual.

Configuring the uplink rate limit

Certain downstream devices cannot handle the high traffic rate from the BSG. This feature allows you to limit the rate of traffic sent on the WAN interface. You should limit the uplink speed only if your WAN bandwidth is less than 100 Mbps and the device in front of the BSG does not support pause frame.

Complete this procedure to configure the uplink rate limit.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, Rate Limit**. The Rate Limit Configuration pane appears.
2	From the **Rate Limit Status** list, select **Enabled**.
3	In the **Uplink Rate Limit** field, type the uplink rate limit provided by your ISP.
4	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring the uplink rate limit.

Variable	Value
Rate Limit Status	Select the rate limit status. • Enabled - enables uplink rate limiting feature • Disabled - disables uplink rate limiting feature The default value is Disabled.
Uplink Rate Limit	Specifies the maximum uplink rate limit over the WAN interface (in bps). The range is 100,000 to 100,000,000 bps.

PPPoE WAN configuration

This section describes PPPoE WAN configuration. You can configure PPPoE WAN if you are connected to a BSG8ew or BSG12ew.

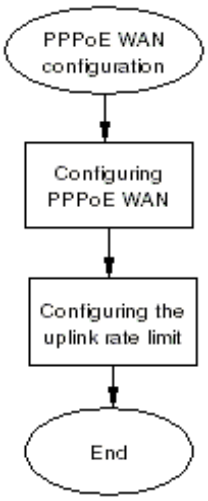
Prerequisites for WAN configuration

- You must have SYSTEM - READ WRITE permission.

PPPoE WAN configuration procedures

The following task flow shows the sequence of procedures to perform to configure the PPPoE WAN.

Figure 2 PPPoE WAN configuration procedures



Configuring the PPPoE WAN

Complete this procedure to configure the PPPoE WAN.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, Ethernet**. The WAN Configuration pane appears.
2	From the **Interface** list, select the required interface.
3	From the **Encapsulation Mode** list, select **PPPoE**.
4	In the **ISP Name** field, type the Internet Service Provider name.
5	In the **User Name** field, type the PPPoE user name supplied by your ISP.
6	In the **Password** field, type the PPPoE password supplied by your ISP.
7	In the **Host Name** field, type the Host name.
8	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring PPPoE WAN.

Variable	Value
Interface	Select an Interface to be configured.
Encapsulation Mode	Set the encapsulation mode PPPoE. The WAN interface operates as a Point-to-Point Protocol (PPP).
ISP Name	Type the name of the Internet Service Provider.
User Name	Type the PPPoE user name.
Password	Type the PPPoE password.
Host Name	Type the host name.

Configuring the uplink rate limit

Certain downstream devices cannot handle the high traffic rate from the BSG. This feature allows you to limit the rate of traffic sent on the WAN interface. You should limit the uplink speed only if your WAN bandwidth is less than 100 Mbps and the device in front of the BSG does not support pause frame.

Complete this procedure to configure the uplink rate limit.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, Rate Limit**. The Rate Limit Configuration pane appears.
2	From the **Rate Limit Status** list, select **Enabled**.
3	In the **Uplink Rate Limit** field, type the uplink rate limit provided by your ISP.
4	Click **Apply**.

End

Variable definitions

The following table describes the variables and values to configure the uplink rate limit.

Variable	Value
Rate Limit Status	Select the rate limit status: • Enabled - enables uplink rate limiting feature • Disabled - disables uplink rate limiting feature The default value is Disabled.
Uplink Rate Limit	Specifies the maximum uplink rate limit over the WAN interface (in bps). The range is 100,000 to 100,000,000 bps.

DSL

DSL appears under WAN configuration if you are connected to a BSG12aw.

On the Digital Subscribe Line (DSL) pages you can configure and control the DSL modem that connects to the BSG. You can also configure the ATM parameters of the modem and access the DSL modem statistics.

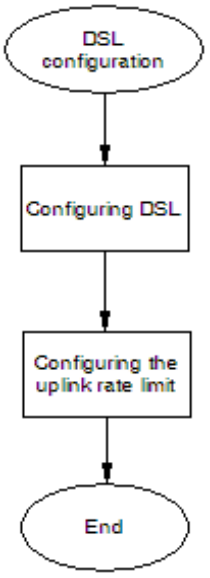
Prerequisites for DSL configuration

- You must have access read/write permission to configure DSL.

DSL configuration procedures

The following task flow shows the sequence of procedures to perform to configure DSL.

Figure 3 DSL configuration procedures



Configuring DSL

Complete this procedure to configure DSL.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, DSL**. The Basic Configuration pane appears.
2	In the **VPI / VCI** field, type the VPI / VCI values.

Your service provider provides you with these values when you set up your account.

3 In the **MRU** field, type the value 1492.

4 Click **Add**.

5 Select the IP Configuration tab.

The PPP Configuration pane appears.

6 In the **User Name** field, type the User Name provided by your service provider.

7 In the **Password** field, type the Password provided by your service provider.

8 Click **Apply**.

End

Variable definitions

This table describes the variables to configure DSL.

Variable	Value
VPI / VCI	The Virtual Path Identifier/Virtual Channel Identifier (VPI/VCI) used by the DSL modem to make a connection. The range is 0 to 255. The default value for VPI is 8 and VCI is 35. These default values do not appear until you add a configuration.
MRU	The Maximum Receivable Unit (MRU) value. MRU specifies the maximum number of bytes received on a link. The default value is 1492.
User Name	The user name for the specified PPP interface, used for authentication. The user name is provided by your service provider.
Password	The password for the specified PPP interface, used for authentication. The password is provided by your service provider.

Configuring the uplink rate limit

Complete this procedure to enable the uplink rate limit. The rate limit value is based on the uplink bandwidth of the ADSL service.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, Rate Limit**. The Rate Limit Configuration pane appears.
2	From the **Rate Limit Status** list, select **Enabled**.
3	In the **Uplink Rate Limit** field, type the uplink rate limit provided by your ISP.
4	Click **Apply**.

End

Variable definitions

The following table describes the variables and values to configure the uplink rate limit.

Variable	Value
Rate Limit Status	Select the rate limit status: • Enabled - enables uplink rate limiting feature • Disabled - disables uplink rate limiting feature The default value is Disabled.
Uplink Rate Limit	Specifies the maximum uplink rate limit over the WAN interface (in bps). The range is 100,000 to 100,000,000 bps.

T1/E1

T1/E1 appears under WAN configuration if you are connected to a BSG12tw.

T1/E1 is a digital WAN carrier facility. T1 transmits DS-1 formatted data at 1.544 MB/s and E1 transmits E1 formatted data at 2.048 MB/s through the telephone e-switching network.

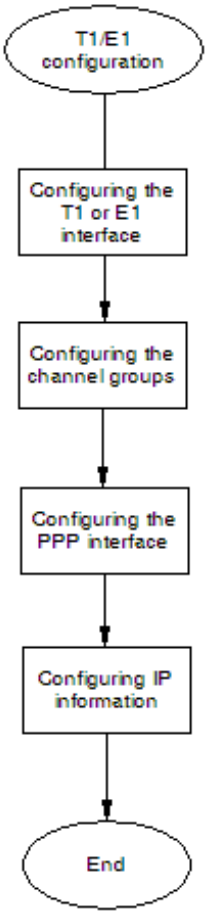
Prerequisites for T1/E1 configuration

- You must have access read/write permission to configure T1/E1.

T1/E1 configuration procedures

The following task flow shows the sequence of procedures to perform to configure T1/E1.

Figure 4 T1/E1 configuration procedures



Configuring the T1 interface

If your BSG is located in North America, configure the T1 interface. This procedure guides you through setting up one T1 interface.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, T1/E1**.

The T1/E1 Configuration pane appears.

2 Select interface 1.

The **Interface Type** field defaults to T1.

3 From the **Framing** list, select **ESF** or **SF**.

The framing you set here must agree with the framing used by the peer.

4 From the **Line Mode** list, select **CSU** or **DSU**.

This setting depends upon the distance between the devices on either end of the T1 line. For shorter distances, use DSU. For longer distances, use CSU. This information should be provided by your service provider.

5 From the **LineBuildOut** list, select **0**, **-7.5**, **-15**, or **-22.5**.

You can configure **LineBuildOut** if Line Mode is CSU.

You should contact your service provider for proper settings for the:

- type of framing
- line coding
- line mode
- line build out
- line length
- clock source

6 From the **Line Length** list, select the line length.

You can configure line length when Line Mode is DSU. This setting depends upon the length of the cable connecting the devices on each end of a T1 line.

7 From the **Transmit ClockSource** list, select **Loop Timing**.

When you select Loop Timing, the remote end provides the clock source. Check with your service provider.

8 Click **Apply**.

End

Variable definitions

This table describes the variables used to configure the T1/E1 interface.

Variable	Value
Interface	The T1/E1 controller.
Framing	The Framing Type for the T1/E1 data line. Options for T1: Extended Super Frame (ESF)— 24 consecutive 193-bit frames of data. Super Frame (SF)—12 consecutive 193-bits of data. Unframed—the non signaling or unframed framing format is a simplified version of the T1 super frame. The default value is ESF.
Line Mode	The Line Mode. Options: Channel Service Unit (CSU)—select if cable length is equal to or more than 655 feet. Data Service Unit (DSU)—select if cable length is less than 655 feet. The default value is CSU.
LineBuildOut	The level of attentuation (in decibels) required for the devices on each end of a T1 line to communicate. Options are: 0 db -7.5 db -15 db -22.5 db You can configure this field only for T1 CSU mode.

Variable	Value
Line Length	The Line Length value. Line Length refers to the length of the cable (in feet) that connects the devices on each end of a T1 line. Options: 0 - 133 134 - 266 267 - 399 400 - 533 534 - 655 The default value is 0 - 133. You can configure the line length only when the Line Mode is DSU.
Transmit ClockSource	The clock source. Options: Local Timing—A local clock source is used or an external clock is attached to the box containing the interface. Loop Timing—Recovered received clock is used to transmit the clock. The default value is Loop Timing.

Configuring the E1 interface

If your BSG is located in Europe, configure the E1 interface. This procedure guides you through setting up one E1 interface.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, T1/E1**. The T1/E1 Configuration pane appears.
2	Select interface 1.
3	From the **Interface Type** list, select **E1**.
4	Reboot the system. You must reboot the system before setting up the E1 parameters.
5	From the BSG navigation pane, select **Configuration, WAN, T1/E1**. The T1/E1 Configuration pane appears.
6	Select interface 1.
7	From the **Framing** list, select **E1** or **E1CRC**. The framing you set here must agree with the framing used by the peer.
8	From the **Line Mode** list, select **CSU** or **DSU**.

This setting depends upon the distance between the devices on either end of the E1 line. For shorter distances, use DSU. For longer distances, use CSU. This information should be provided by your service provider.

9 From the **Line Length** list, select the line length.

You can configure line length only when Line Mode is DSU. This setting depends upon the length of the cable connecting the devices on each end of a E1 line.

10 From the **Transmit ClockSource** list, select **Loop Timing**.

When you select Loop Timing, the remote end provides the clock source. Check with your service provider.

11 Click **Apply**.

End

Variable definitions

This table describes the variables used to configure the T1/E1 interface.

Variable	Value
Interface	The T1/E1 controller.
Interface Type	The interface type for the given interface. Options: T1 E1 The default value is T1. If you change the interface type, you must reboot the system before configuring the remaining parameters.
Framing	The Framing Type for the T1/E1 data line. Options for E1: E1—a single E1 frame consists of 256 bits, grouped into 32 octets or time slots. The timeslots are numbered 0 to 31. E1CRC The default value is E1CRC.
Line Mode	The Line Mode. Options: Channel Service Unit (CSU)—select if cable length is equal to or more than 655 feet. Data Service Unit **(**DSU)—select if cable length is less than 655 feet. The default value is CSU.

Variable	Value
Line Length	The Line Length value. Line Length refers to the length of the cable (in feet) that connects the devices on each end of an E1 line. Options: 0 - 133 134 - 266 267 - 399 400 - 533 534 - 655 The default value is 0 - 133. You can configure the line length only when the Line Mode is DSU.
Transmit ClockSource	The clock source. Options: Local Timing—A local clock source is used or an external clock is attached to the box containing the interface. Loop Timing—Recovered received clock is used to transmit the clock. The default value is Loop Timing.

Configuring the channel groups

Complete this procedure to configure the T1/E1 channel groups.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, T1/E1, Channel Group**. The T1/E1 Channel Group Configuration pane appears.
2	In the **Channel Group Index** field, type the channel group index. The Channel Group Index identifies a group of channels on the T1 interface.
3	In the **Time Slot** field, type the channel number or the range of channel numbers. This channel numbers are provided by your service provider.
4	Click **Add**.

End

Variable definitions

This table describes the variables that appear on the T1/E1 Channel Group Configuration page.

Variable	Value
Channel Group	This identifies an instance of channel grouping on a T1 or E1 interface. The format is Serialx/y where x is either 1 for port 1 or 2 for port 2 and y is the Channel Group Index.
Channel Group Index	The Channel Group Index. This identifies a grouping of channels on the T1 interface. The range is 1to 64.
Interface	This identifies which of the two T1/E1 interfaces on the BSG. Possible values are t1e1-1 or t1e1-2.
Time Slot	The time slots. The range is 1to 24 for T1 and 2 to 32 for E1.

Configuring the PPP interface

Complete this procedure to configure the PPP interface.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, T1/E1, PPP Configuration**. The PPP Configuration pane appears.
2	From the **Serial Interface** list, select Serial1/1.
3	From the **Authentication Required** list, select **YES** or **NO**. Your service provider will notify you if authentication is required.
4	From the **Server/Client** list, select **Server** or **Client**. This is available only if authentication is required.
5	In the **User Name** field, type the user name. If you selected Client, type the BSG user name. If you selected Server, type the peer user name.
6	In the **Password** field, type the password. If you selected Client, type the BSG password. If you selected Server, type the peer password.
7	From the **Link Type** list, select **Public**.
8	Click **Apply**.

End

Variable definition

This table describes the variables that appear on the PPP Configuration page.

Variable	Value
Serial Interface	The serial Interface on which you layer the PPP interface.
Authentication Required	Select whether authentication is required for the PPP interface. Options: YES—enables the Server/Client, User Name, and Password fields. NO—authentication is not required for PPP interface.
Server/Client	Select whether the Server or Client is required for authentication. This field is available only if authentication is required. Options: Server - authenticates the peer at the time of negotiation. Client - authenticated by the peer router at the time of negotiation.
User Name	The User Name required for the Server or Client that requires authentication. This field is available only if authentication is required.
Password	The password for the specified user. This field is available only if authentication is required.
Keep Alive	Enter the Keep Alive Time Out value in seconds. This denotes that the connection will be lost if no Echo response packet is received within the timeout value. The default value is 10.
Link Type	The PPP link type. Options: Public—adds the default route for the PPP interface. Private—no default route is added for the PPP interface. The default value is Private.
MTU	Specifies the Maximum Transmission unit. Maximum value is 1500.

The configuration table displays the following additional information:

Field Name	Description
PPP Interface	Read-only field. Specifies the name of the PPP interface and the serial interface over which it is layered.
Bundle	Specifies whether the PPP interface can be bundled to form a multilink or not. Options are Yes and No. Select Yes to bundle the PPP interface to form a multilink. Select No to unbundle a PPP interface. • When a PPP interface is bundled to form a multilink, you cannot configure the user name and password for that PPP interface.
Bundle With	Lists the available Multilink interfaces. Select the required multilink interface for a specific PPP interface.
Status	Read-only field to indicate the admin status of the PPP interface.

Configuring IP information

Complete this procedure to configure IP information.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, T1/E1, IP Configuration**. The IP Configuration pane appears.
2	From the **PPP/MP** list, select **PPP1**. This is the PPP interface you just created.
3	From the **IP Address Assignment** buttons, select **Manual** or **Dynamic**.
4	In the **IP Address** field, type the IP address of PPP interface. Set this field if IP Address Assignment is Manual.
5	In the **Subnet Mask** field, type the subnet mask of the IP address. Set this field if IP Address Assignment is Manual.
6	In the **Peer IP Address** field, type the IP address of the peer. Set this field if IP Address Assignment is Manual.
7	In the **Primary DNS** field, type the primary DNS server IP address. Set this field if IP Address Assignment is Manual.
8	In the **Secondary DNS** field, type the secondary DNS server IP address. Set this field if IP Address Assignment is Manual.

9 *In the **Peer DNS** field, type the DNS server IP address of the peer.

Set this field if IP Address Assignment is Manual.

10 Click **Apply**.

End

Variable definitions

This table describes the variables that appear on the IP Configuration page.

Variable	Value
PPP/MP Interface	The PPP/Multilink interface for which the IP address is configured.
IP Address Assignment	The IP address assignment mode. Options: Dynamic—obtains the IP address dynamically from the peer. Manual configuration is not required. Manual—configure the IP address manually. Manually configure the IP Address, Subnet Mask, and Peer IP Address fields.
IP Address	The IP address of the PPP/Multilink interface, if IP Address Assignment is Manual.
Subnet Mask	The Subnet Mask for the IP address, if IP Address Assignment is Manual.
Peer IP Address	The Peer IP address, if IP Address Assignment is Manual.
Primary DNS Server	The Primary DNS server IP address, if IP Address Assignment is Manual.
Secondary DNS Server	The Secondary DNS server IP address, if IP Address Assignment is Manual.
Peer DNS*	The Peer DNS server IP address, if IP Address Assignment is Manual.

* The Peer DNS should only be configured if this BSG will act as the PPP server. In this case only, when a PPP is established between this BSG and the other peer which obtains its IP address and DNS dynamically, the peer DNS configured on this BSG will be assigned as the primary DNS on the peer.

VLAN configuration

This section describes the procedures for configuring the virtual local area network (VLAN) settings for the Business Service Gateway (BSG).

VLAN1 is the default VLAN. The BSG provides VLAN1 as a fully functioning VLAN using all eight ports.

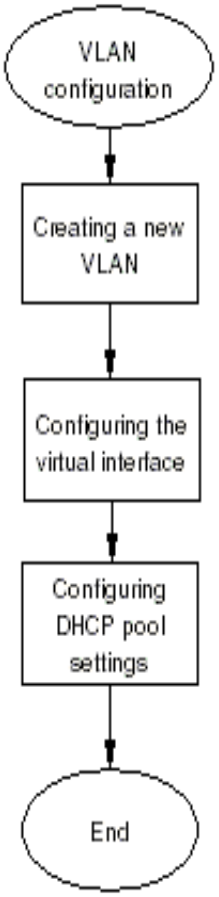
Prerequisites to VLAN configuration

- You must have SYSTEM - READ WRITE, L2 - READ WRITE, and L3 - READ WRITE permission to access the information on the VLAN configuration panels.

VLAN configuration procedures

The following task flow shows the sequence of procedures to perform to configure a VLAN.

Figure 5 VLAN configuration procedures



VLAN configuration navigation

Creating a new VLAN

Complete this procedure to create a new VLAN.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, VLAN Setup, Static VLAN** tab. The Static VLAN Configuration pane appears.
2	In the **VLAN ID** field, type the VLAN ID.

3 In the **VLAN Name** field, type the VLAN name.

4 In the **Member Ports** field, type the numbers and/or ranges of member ports.

5 In the **Untagged Ports** field, type the numbers and/or ranges of untagged ports.

6 Click **Add**.

7 From the BSG navigation pane, select **Configuration, VLAN, Setup**, **Port Setting** tab.

The VLAN Port Settings pane appears.

8 Select the port setting that you want to modify.

This is the list of member ports you added to the new VLAN in step 4.

9 In the **PVID** field, type the port VLAN ID.

Use the same value you entered for **VLAN ID** in step 2.

10 Click **Apply**.

End

Variable definitions

The following table describes the variables and values for creating a VLAN.

Variable	Value
VLAN ID	Type a unique VLAN ID that you want to configure as a static VLAN.
VLAN Name	Type the VLAN name.
Member Ports	Type the member port number list for a VLAN. Member ports represent the set of ports permanently assigned to the VLAN egress list. Frames that belong to the specified VLAN are forwarded on the ports in the egress list. Enter a comma separated list of ports or port ranges. For example, 1-6, 9, 11.
Untagged Ports	Type the untagged port number list for a VLAN. Enter a comma separated list of ports or port ranges. For example, 1-6, 9, 11. The Untagged Ports list must be a subset of the Member Ports.
PVID	Type the port VLAN ID.

Configuring the virtual interface

Complete this procedure to configure the virtual interface. You must configure a virtual interface if hosts on the new VLAN need to communicate with other hosts on other VLANs or on the WAN.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, LAN, Virtual Interfaces**. The IP Address Configuration pane appears.

2 In the **VLAN ID** field, type the VLAN ID.

3 In the **IP Address** field, type the IP address.

4 In the **Subnet Mask** field, type the subnet mask address.

5 In the **MTU** field, type the MTU value.

6 Click **Add**.

End

Variable definitions

The following table describes the variables and values for configuring the virtual interface.

Variable	Value
VLAN ID	Type the VLAN identifier.
IP Address Assignment	Select the IP address assignment mode. Select Manual to manually assign the IP address. Select Dynamic for the System to assign the IP address for the specified VLAN from Dynamic Host Configuration Protocol (DHCP) server configured in BSG.
IP Address	Type the IP address, if the IP address assignment is Manual.
Subnet Mask	Type the subnet mask for the LAN, if the IP address assignment is Manual.
MTU	Type the Maximum Transmission Unit value. The range is 90 to 9902. The default value is 1500. If using Fast Ethernet, the MTU frame size must not be larger than 1522.

Configuring DHCP pool settings

Complete this procedure to configure DHCP pool settings. You must configure DHCP pool settings if hosts on the new VLAN need to communicate with other hosts on other VLANs or on the WAN.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, DHCP, DHCP Server, Pool Settings** tab. The DHCP Pool Settings pane appears.
2	In the **DHCP Pool Id** field, type the pool ID.
3	In the **DHCP Pool Name** field, type the name of the pool.
4	In the **Subnet Pool** field, type the subnet pool IP address. Use the same value you entered for **Subnet Mask** when you configured the virtual interface.
5	In the **Network Mask** field, type the network mask IP address.

6 In the **Start IP Address** field, type the first IP address of the range you want to use.

7 In the **End IP Address** field, type the last IP address of the range you want to use.

8 Click **Add**.

9 Select the **Pool Options** tab.

The DHCP Pool Option Settings pane appears.

10 From the **Pool Name** list, select the DHCP Pool Name you configured on the Pool Settings pane.

11 From the **Option** list, select **NetMask (IP Format)**.

12 In the **Value** field, type the client subnet mask.

13 Click **Add**.

14 From the **Option** list, select **Default Router (IP Format)**.

15 In the **Value** field, type the default router for the client subnet.

16 Click **Add**.

17 From the **Option** list, select **Domain Name Server (IP Format)**.

18 In the **Value** field, type the domain name server used for IP address resolution.

19 Click **Add**.

End

Variable definitions

The following table describes the variables and values to configure DHCP settings.

Variable	Value
DHCP Pool Id	Type the pool ID for the DHCP pool.
DHCP Pool Name	Type the pool name for the DHCP pool.
Subnet Pool	Type the subnet of the IP address in the pool.
Network Mask	Type the subnet mask of the IP address in the pool.
Start IP Address	Type the first IP address in the pool. The DHCP server uses this IP address for dynamic allocation.
End IP Address	Type the last IP address in the pool.
Pool Name	Select the pool name.

Variable	Value
Option	The DHCP option. Select one of the following options: • Netmask (IP Format) – the client subnet mask (RFC 950). The code for the subnet mask is 1 and its length is 4 octets. • Default Router (IP format) – a list of IP addresses for routers on the client subnet. The code for the default router option is 3 and its length is 4 octets. The length must always be a multiple of 4. • Timer servers (IP format) – a list of time servers (RFC 868) available to the client. The code for the time server option is 4 and its length is 4 octets. The length must always be a multiple of 4. • Name server (IP format) – a list of name servers available to the client. The code for this option is 4. The length must always be a multiple of 4. • Domain Name Server (IP format) – the Domain Name Server IP address is configured and is sent as an option in DHCP offers. • Domain Name (String) – this domain name is used by the client to resolve host names through the Domain Name System. • Enter option code manually – the option code must be entered manually.
Option Code	For the Enter option code manually option, you must enter the code. For all other options, this field is automatically updated.
Value	Type the option value.

Wireless network configuration

This section describes the procedures to configure the wireless network for the Business Services Gateway (BSG) system.

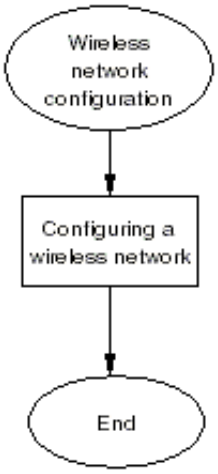
Prerequisites to wireless network configuration

- You must have WIRELESS - READ WRITE permission.
- You must configure DHCP pool settings for the VLAN used for the wireless network.
- You must configure the radio port as a member port of the VLAN used for the wireless network.

Wireless network configuration procedures

The following task flow shows the sequence of procedures to perform to configure a wireless network.

Figure 6 Wireless network configuration procedures



Configuring a wireless network

Complete this procedure to configure a wireless network.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, LAN, Wireless, Security** tab. The Security Settings pane appears.

2 From the list of security settings, select the first default **SSID**.

The first SSID is enabled.

3 From the **Authentication Type** list, choose an authentication type.

4 From the **Pre-Authentication Status** list, select **Enabled** or **Disabled**.

This field is available only if **Authentication Type** is set to **WPA**, **WPA2**, **WPA-WPA2-Mixed,** or **Open1x**.

5 From the **Pre Shared Key Type** list, select **HEX** or **ASCII**.

This field is available only if **Authentication Type** is set to **WPA-PSK**, **WPA2-PSK**, or **WPA-WPA2-PSK-Mixed**.

6 In the **Pre Shared Key** field, type the pre-shared key value.

This field is available only if **Authentication Type** is set to **WPA-PSK**, **WPA2-PSK**, or **WPA-WPA2-PSK-Mixed**.

7 From the **Cipher Suite** list, select the cipher used for data encryption.

This field is available only if **Authentication Type** is set to **WPA, WPA2, WPA-WPA2-Mixed, WPA-PSK**, **WPA2-PSK**, or **WPA-WPA2-PSK-Mixed**.

8 In the PMK SA Lifetime field, type the maximum lifetime of a PMK in the PMK cache.

This field is available only if **Authentication Type** is set to **WPA, WPA2, WPA-WPA2-Mixed, WPA-PSK**, **WPA2-PSK**, **WPA-WPA2-PSK-Mixed**, or **Open1x**.

9 Click **Apply**.

10 Select the **Basic Settings** tab.

The **Basic WLAN Page** pane appears.

11 From the **Access Point** list, select **Enabled**.

12 From the **Country Code** list, select the appropriate country.

13 From the **Radio Mode** list, select **Mixed**.

14 Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring the wireless network.

Variable	Value
Select	Select the first default SSID to configure security settings.
Authentication Type	Specifies the method used to authenticate wireless clients. Select the Authentication Type for stations that use this SSID. Select Open if authentication is not required. Select Open1X to use 802.1x authentication. Select Shared to use a shared key. Select WPA, WPA2, or WPA-WPA2-Mixed if Radius server is used for authentication. Select WPA-PSK, WPA2-PSK, or WPA-WPA2-PSK-Mixed if authentication uses a preshared key.
Pre-Authentication	Specifies the preauthentication status. Select Enabled to enable the Robust Security Networks Association (RSNA) pre authentication on this entity. Stations authenticate to different APs, if present, but associate to a single AP. Select Disabled to disable the RSNA pre authentication. Stations authenticate to a single AP. This field is available only if Authentication Type is set to WPA, WPA2, or WPA-WPA2-Mixed.
Pre Shared Key Type	Specifies the preshared key type, either Hex or ASCII. If you select Hex, you must provide a Hex key in the PreSharedKey field. If you select ASCII, you must provide ASCII characters in the PreSharedKey field. The pass-phrase is an ASCII character string, whereas the manual key is a string of hexadecimal numbers. This option is enabled only when the authentication type is WPA-PSK, WPA2-PSK, or WPA-WPA2-PSK-Mixed.
Pre Shared Key	Specifies the preshared key. If the PreSharedKey (PSK) Type is Hex, the PSK length must be 64. If the PSK Type is ASCII, the PSK length ranges between 8 and 63. This option is enabled only when the authentication type is WPA-PSK, WPA2-PSK, or WPA-WPA2-PSK-Mixed.

Variable	Value
Cipher Suite	Specifies the required pair wise cipher and is used for data encryption. It consists of an organizationally unique identifier (OUI) (the first 3 octets) and a cipher suite identifier (the last octet). Select one of the following options: • AES-CCMP • TKIP • WEP • AES-CCMP-TKIP • AES-CCMP-WEP • TKIP-WEP • AES-CCMP-TKIP-WEP. This field is used in conjunction with the Authentication Type. If you select WPA for Authentication Type, the BSG supports TKIP. If you select WPA2, the BSG supports AES-COMP and TKIP.
PMK SA Lifetime	Type the Pair wise Master Key (PMK) SA (Security Association) Lifetime value. This represents the maximum lifetime of a PMK in the PMK cache. The valid range is 1 to 4294967295. The default value is 43200.
Access Point	The Access Point represents the status of radio in the BSG. Select Enabled to activate the radio. Select Disabled to deactivate the radio. You must select a country code before you enable the access point.
Country Code	Select the required country code. A country code is required to set up the proper regulatory restrictions for channel availability and transmission power. You must disable the radio (Access Point) before you set the country code.
Radio Mode	Select the required radio mode. Select one of the following options: • 802.11b - For a network with all 802.11b clients, select 802.11b mode. The BSG has a single 802.11b radio. • 802.11g - For a network with all 802.11g clients, select the 802.11g mode. • Mixed - Select Mixed Mode for a network with many 802.11g devices with a lesser population of 802.11b clients. Performance degradation can occur.

SIP configuration

This section describes the procedures to configure SIP for the Business Services Gateway (BSG) system.

Note: You should configure the emergency number (for example, 911) before you use the SIP server. This ensures that an emergency call originating on your system reaches its destination if the SIP server becomes unavailable. To configure the emergency number, see Configuring FXO (page 52).

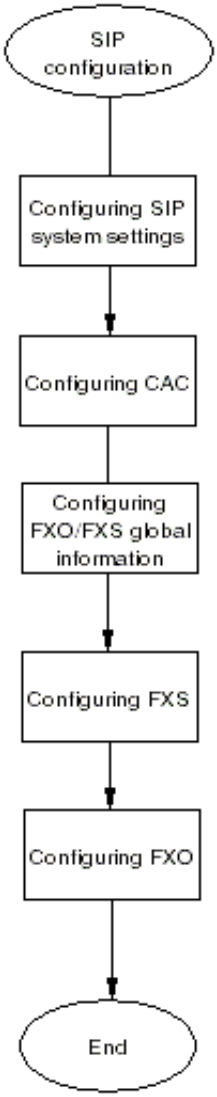
Prerequisites to SIP configuration

- You must have VOICE - READ WRITE permission.
- The Internal SIP Server must be enabled. See Central SIP server configuration parameters (page 179).

SIP configuration procedures

The following task flow shows the sequence of procedures to perform to configure SIP.

Figure 7 SIP configuration procedures



SIP configuration navigation

Configuring SIP system settings

Complete this procedure to configure SIP system settings.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, SIP, System Configuration**. The Central SIP Server Configuration pane appears.
2	In the **Managed Domain Name** field, type the domain name of your voice service provider.
3	In the **Central SIP Server Address** field, type the central SIP server IP address.
4	From the **Transport** list, select the transport protocol to use for the port.
5	In the **Port** field, type the port number to use for the transport protocol.
6	In the **Poll Interval** field, type the number of seconds for the interval time.
7	In the **Poll Retries** field, type the number of times the server tries to connect.
8	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring SIP system settings.

Variable	Value
Managed Domain Name	Type the domain name of the SIP server. You can also type the IP address of the SIP server in this field. The default name is mydomain.com.
Central SIP Server Address	Type the IP address of the central SIP server. This field is mandatory.
Transport	Select the required transport protocol for SIP. Select one of the following options: • User Datagram Protocol (UDP) - the transport protocol is UDP. • Transmission Control Protocol (TCP) - the transport protocol is TCP. • Transport Layer Security (TLS) - the transport protocol is TLS. The default value is UDP.
Port	Type the port number for the transport protocol. The value ranges from 1 to 65535. The default value is 5060. This default value appears only after the Central SIP Server is configured.
Poll Interval	Type the SIP poll interval value in seconds. The value ranges from 10 to 600 seconds. The default value is 30 seconds.
Poll Retries	Type the poll retry value. The value ranges from 1 to 10. The default value is 2.

Configuring CAC

Complete this procedure to configure CAC settings.

Note: If the maximum number of simultaneous SIP calls across the WAN is reached, the next SIP call attempt fails and the caller hears fast busy tone.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, SIP, System Configuration, CAC** tab. The Call Admission Control Configuration pane appears.
2	From the list of rows, select the appropriate WAN link.
3	In the **Maximum Calls Allowed** field, type the maximum simultaneous calls allowed on the WAN link.
4	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring CAC settings.

Variable	Value
Select	Select a row.
WAN Link	Select the required WAN link.
Maximum Calls Allowed	The maximum simultaneous calls allowed on each WAN link. The range is 1 to 50 for BSG8ew. The range is 1 to 100 for BSG12ew/aw/tw. The default value is 20.
Active Calls	The number of calls currently active on the WAN link. The range is 0 to 50 for BSG8ew. The range is 0 to 100 for BSG12ew/aw/tw.

Configuring FXS/FXO global information

Complete this procedure to configure FXS/FXO global information.

Note: For BSG8ew, FXS2 (port 2) maintains connection to FXO during power outage for emergency dialing. For BSG12ew/aw/tw, FXS1 (port 1) maintains connection to FXO during power outage for emergency dialing.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, SIP, FXO/FXS**. The Global Configuration pane appears.
2	From the **Country Code** list, select the country code.
3	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring FXS/FXO global information.

Variable	Value
Country Code	The country code. The default value is Canada/US.

Configuring FXS

Complete this procedure to configure FXS information.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, SIP, FXO/FXS, FXS** tab. The Foreign Exchange Subscriber (FXS) Configuration pane appears.
2	From the **FXS Channel** list, select **Line 1**.
3	Select the **Channel Enable** check box to enable the channel.
4	In the **Channel Number** field, type the channel number.
5	In the **Password** field, type the password to access the FXS channel.
6	Click **Apply**.
7	From the **FXS Channel** list, select **Line 2**.
8	Select the **Channel Enable** check box to enable the channel.
9	In the **Channel Number** field, type the channel number.
10	In the **Password** field, type the password to access the FXS channel.
11	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring FXS information.

Variable	Value
FXS Channel	Select the required FXS channel. Select one of the following options: • Line1 • Line2
Channel Enable	Select this check box to enable the administrative status of the FXS channel. The default value is disabled.
Channel Number	Type the FXS channel number. The maximum length of the channel number is 31 digits. This field is mandatory.
Display Name	Type the display name for the FXS Channel.
Password	Type the password to access the FXS Channel.

Configuring FXO

Complete this procedure to configure FXO information.

Note: Use this procedure to configure the emergency number. You should configure the emergency number before you use the SIP server. This ensures that an emergency call originating on your system reaches its destination if the SIP server becomes unavailable.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, SIP, FXO/FXS, FXO** tab. The Foreign Exchange Office (FXO) Configuration pane appears.
2	From the **FXO Channel** list, select **Line-1**.
3	Select the **Channel Enable** check box to enable the FXO channel.
4	In the **Channel Number** field, type the FXO line number or SIP user number.
5	In the **Password** field, type the password to access the FXO channel.
6	In the **Forward Number** field, type the number to which the FXO calls are forwarded.
7	In the **Ring Count** field, type the maximum number of rings within which the FXO must get the answer from the remote number.
8	In the **Emergency Number** field, type the emergency number.
9	In the **On Hook Detection Time** field, type the on-hook detection time.
10	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring FXO information.

Variable	Value
FXO Channel	Select the required FXO channel.
Channel Enable	Select this check box to enable the administrative status of the FXO channel. The channel is available for use only when it is enabled.
Channel Number	Type the FXO channel number. This is the number which identifies the FXO line for an incoming call.
Password	Type the password to access the FXO Channel.
Forward Number	Type the forward number. This number is used when an incoming call on the FXO channel requires forwarding.
Emergency Number	Type the emergency number of the contact.
Ring Count	Type the ring count. This is the maximum number of rings within which FXO must get an answer from the remote number. The minimum value is 1 and maximum value is 6. The default value is 2. This default appears after you configure the channel number.
On Hook Detection Time	Type the on-hook detection time. The value ranges from 100 to10000 milliseconds. The default value is 2000 milliseconds. This default appears after you configure the channel number.

VPN configuration

This section describes the procedures to configure the Virtual Private Network (VPN) for the Business Services Gateway (BSG) system.

Note: If you are connecting two BSG units at either end of the VPN tunnel, ensure that the IP addresses are different.

Prerequisites for VPN configuration

- You must have VPN - READ WRITE permission.

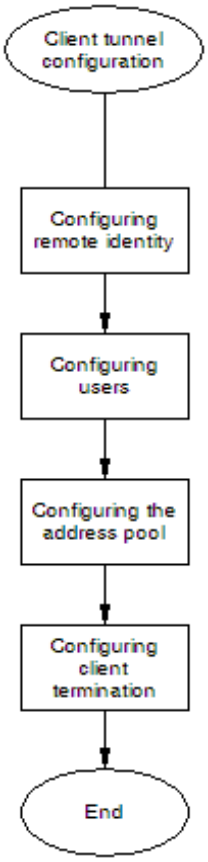
VPN configuration navigation

- Client tunnel configuration procedures (page 55)
- Branch office tunnel configuration procedures (page 64)

Client tunnel configuration procedures

The following task flow shows the sequence of procedures to perform to configure a client tunnel.

Figure 8 Client tunnel configuration procedures



Client tunnel configuration navigation

Configuring remote identity (client)

Complete the following procedure to configure the remote identity.

Procedure steps

Step	Action

1 From the BSG navigation pane, select **Configuration, VPN**, **VPN Settings**.

The VPN Global Settings pane appears.

2 From the **Remote Identity Type** list, select **IPV4, FQDN, EMAIL,** or **KEYID**.

3 In the **Remote Identity Value** list, type the value corresponding to the selected Remote Identity Type.

4 In the **PreShared Key** field, type a string of text which is the key that VPN uses to authenticate before receiving any other credentials.

5 Click **Add**.

End

Variable definitions

The following table describes the variables and values for configuring VPN global settings.

Variable	Value
Remote Identity Type	The user identity type that uniquely identifies the peer. Select one of the following: • IPV4 - specifies the IP address • FQDN- specifies the fully qualified domain name (an unambiguous domain name that denotes the position of the node in the DNS tree hierarchy) • EMAIL - specifies the email of the peer • KEYID - specifies the string that uniquely identifies the peer
Remote Identity Value	Type the value corresponding to the selected Remote Identity Type.
PreShared Key	Type a string of text which is the key that VPN uses to authenticate before receiving any other credentials.

Configuring users

Complete the following procedure for each remote user.

Procedure steps

Step Action

1 From the BSG navigation pane, select **Configuration, VPN, Users**.

The Database for VPN Remote Users pane appears.

2 In the **User Name** field, type the user name.

3 In the **Password** field, type the password.

4 Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring the user database.

Variable	Value
User Name	Type the user name. The range is 1 to 31 characters.
Password	Type the password for the user. The range is 1 to 31 characters.

Configuring the address pool

Complete this procedure to configure the VPN client address pool.

Prerequisites

Note: The address pool cannot be in the same subnet as DHCP addresses.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, VPN, Users, Address Pool** tab. The IP Address Pool for VPN Remote Users pane appears.
2	In the **Pool Name** field, enter the pool name.
3	In the **Start IP Address** field, enter the starting IP address for the address pool.
4	In the **End IP Address** field, enter the ending IP address for the address pool.
5	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring the VPN address pool.

Variable	Value
Pool Name	Type the name of the address pool. Addresses within the pool are allocated to remote users when they make VPN connection requests.
Start IP Address	Type the first IP address of the pool.
End IP Address	Type the last IP address of the pool.

Configuring client termination

Complete this procedure to configure client termination.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, VPN, Users, Client Termination** tab. The VPN Client Termination pane appears.
2	Click the **Policy Action, Create** check box.
3	In the **Policy Name** field, type the policy name.
4	From the **Interface Name** list, select the WAN interface.
5	From the **Policy Status** list, select **ACTIVE**.
6	From the **Policy Type** list, select **IKE Pre-Shared**.
7	In the **IKE (Phase 1) Proposal** box, from the **IPSec Encryption** list, select the encryption standard.
8	From the **IPSec Authentication** list, select the authentication.
9	From the **DH Group** list, select **Group 1**, **Group 2**, or **Group 5**.
10	From the **Life Time** list, select the **Seconds**, **Minutes**, or **Hours**.
11	In the **Life Time Value** field, enter the life time value.
12	From the **Peer Identity Type** list, select **IPV4**, **FQDN**, **EMAIL**, or **KEYID** for the peer identity type.
13	From the **Peer Identity Value** field, select the peer identity value. The list contains the Remote Identity values entered on the VPN Global Settings screen.
14	From the **Local Identity Type** list, select **IPV4**, **FQDN**, **EMAIL**, or **KEYID** for the local identity type.
15	In the **Local Identity Value** field, enter the local identity value.
16	In the **Traffic Selector** box, in the **Local Address** field, enter the source IP address of outbound traffic.
17	In the **Local Address Mask** field, enter the local network mask of outbound traffic. The local address is a local network on the LAN side of the BSG.
18	In the **Remote Address** field, enter the destination IP address of outbound traffic. The remote address is the same network as the client address pool.
19	In the **Remote Address Mask** field, enter the destination network mask of outbound traffic.
20	From the **Protocol** list, select the type of traffic you want to protect.
21	In the **IPSec (Phase 2) Proposal** box, from the **Protocol** list, select **ESP** or **AH**.

22 From the **Encryption** list, select an IPSec encryption.

23 From the **Authentication** list, select the preferred authentication method.

24 From the **Preferred Forward Secrecy** list, select a PFS option.

25 From the **Life Time** list, select the **Seconds**, **Minutes**, or **Hours**.

26 In the **Life Time Value** field, enter the life time value.

27 Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring client termination.

Variable	Value
Policy Action	Select this check box to create a policy action.
Policy Name	Type a IPsec policy name. Each policy must have a unique name. The range is 1 to 63 characters. Policy name **ALL** is not allowed.
Existing Policies	Select an existing policy for the IPsec policy.
Interface Name	Select the WAN interface for which you want to apply the policy.
Policy Status	Select the status of the IPsec policy. Select INACTIVE to disable the policy on the specified interface. Select ACTIVE to enable the policy on the specified interface. The default is INACTIVE.
Policy Type	Select the policy type. Select one of the following: • IKE XAUTH • IKE Pre-Shared
IKE Phase 1 Proposal table	
IPSec Encryption	Select the IPSec Encryption. Select one of the following options: • Data Encryption Standard (DES) – a standard for encrypting data that uses a 64 bit key to encrypt data, but only 56 bits are used. This standard is considered inadequate for data protection. • Triple Data Encryption Standard (3DES) – processes each block of data using a different key each time, resulting in a significantly more secure message. • Advanced Encryption Standard (AES128, AES192, AES256) – has a fixed block size of 128 bits and a key size of 128, 192 or 256 bits. Due to the fixed block size of 128 bits, AES operates on a 4x4 array of bytes. Select DES if you require network speed. Select 3-DES if you require network security.

Variable	Value
IPSec Authentication	Select the preferred authentication method. Select one of the following options: • HMAC-MAC5 - the message authentication code is calculated using the MD5 cryptographic hash function. This cryptographic hash function has some additional security properties with a 128-bit hash value, which is commonly used to check the integrity of files. • HMAC-SHA1 - the message authentication code is calculated using the SHA1 algorithm. This cryptographic hash function computes a condensed digital representation to a high degree of probability.
DH Group	Select the required Diffie-Hellman (DH) group. DH key exchange is used to establish preshared keys. Select one of the following: • Group 1 – IKE uses a 768-bit Diffie- Hellman Prime modules group for performing the new Diffie-Hellman exchange. • Group 2 – IKE uses a 1024-bit Diffie- Hellman Prime modules group for performing the new Diffie-Hellman exchange. • Group 5 – IKE uses a 1536-bit Diffie- Hellman Prime modules group for performing the new Diffie-Hellman exchange. Select Group 2 for a compromise between network speed and network security.
Life Time	Select the life time unit. Select one of seconds, minutes, or hours.
Life Time Value	Type the life time value. The range is 5 minutes to 8 hours.
Peer Identity Type/Value	Select the identity type to access the remote network. Select one of the following: • IPV4 - IP address • FQDN - Fully Qualified Domain Name • EMAIL - email address of the user • KEYID - uniquely identifies the peer Select the associated value from the list. The list contains the Remote Identity values entered on VPN Global Settings.
Local Identity Type/Value	Select the identity type to access the local network. Select one of the following: • IPV4 - IP address • FQDN - Fully Qualified Domain Name • EMAIL - email address of the user • KEYID - uniquely identifies the peer Type the associated value.
Traffic Selector table	
Local Address	Type the Source IP address of the outbound traffic.
Local Address Mask	Type the Network mask of the outbound traffic.
Remote Address	Type the Destination IP address of the outbound traffic.
Remote Address Mask	Type the Destination mask of the outbound traffic.

Variable	Value
Protocol	Select the traffic protocol for the source or destination address. Select one of the following options: • Any • TCP • UDP • ICMPv4 • AH • ESP When you select a protocol and apply the IPSec policy, the policy is applied on the selected protocol packets only. For example, if ICMPv4, is selected, when you ping from one host to another, only ICMP packets are encrypted or authenticated.
IP Sec Phase 2 Proposal table	
Protocol	Select the authentication protocol. Select one of the following: • ESP - IPSec encrypts and authenticates. • AH - IPSec authenticates only.
Encryption	Select the IPSec Encryption. Select one of the following options: • null – indicates no standard is used for IPsec encryption. • Data Encryption Standard (DES) – a standard for encrypting data that uses a 64 bit key to encrypt data, but only 56 bits are used. This standard is considered inadequate for data protection. • Triple Data Encryption Standard (3DES) – processes each block of data using a different key each time, resulting in a significantly more secure message. • Advanced Encryption Standard (AES128, AES192, AES256) – has a fixed block size of 128 bits and a key size of 128, 192 or 256 bits. Due to the fixed block size of 128 bits, AES operates on a 4x4 array of bytes. Select DES if you require network speed. Select AES256 if you require strong network security.
Authentication	Select the preferred authentication method. Select one of the following: • None - indicates that no authentication method is required. • HMAC-MAC5 - the message authentication code is calculated using the MD5 cryptographic hash function. This cryptographic hash function has some additional security properties with a 128-bit hash value, which is commonly used to check the integrity of files. • HMAC-SHA1 - the message authentication code is calculated using the SHA1 algorithm. This cryptographic hash function computes a condensed digital representation to a high degree of probability.
Preferred Forward Secrecy	Select the Preferred Forward Secrecy (PFS). Select one of the following options: • None - IKE does not use any PFS. • PFS Group 1 - IKE uses a 768-bit Diffie-Hellman Prime modules group for performing the new Diffie-Hellman exchange. • PFS Group 2 - IKE uses a 1024-bit Diffie-Hellman Prime modules group for performing the new Diffie-Hellman exchange. • PFS Group 5 - IKE uses a 1536-bit Diffie-Hellman Prime modules group for performing the new Diffie-Hellman exchange.

Variable	Value
Life Time	Select the life time unit. Select one of seconds, minutes, or hours.
Life Time Value	Type the life time value. The range is 5 minutes to 8 hours.

Enabling VPN (client)

Complete this procedure to enable VPN.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, VPN, VPN Settings, VPN Policy** tab. The VPN Policy pane appears.
2	From the **VPN Status** list**,** select Enabled.
3	Click **Apply**.

End

Variable definitions

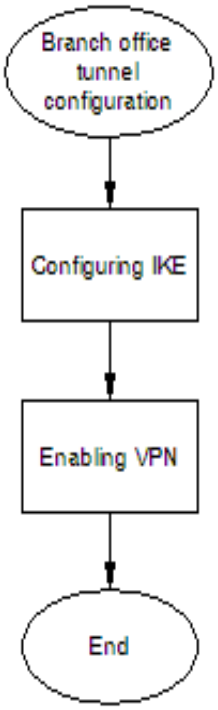
The following table describes the variables and values for viewing the existing VPN policies.

Variable	Value
VPN Status	Select the VPN status. VPN status can be Enabled or Disabled.

Branch office tunnel configuration procedures

The following task flow shows the sequence of procedures to configure a branch office tunnel.

Figure 9 Branch office tunnel configuration procedures



Branch office tunnel configuration navigation

- Configuring remote identity (branch office) (page 64)
- Configuring IKE (page 65)
- Enabling VPN (branch office) (page 69)

Configuring remote identity (branch office)

Complete the following procedure to configure the remote identity.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, VPN**, **VPN Settings**. The VPN Global Settings pane appears.
2	From the **Remote Identity Type** list, select **IPV4, FQDN, EMAIL,** or **KEYID**.
3	In the **Remote Identity Value** list, type the value corresponding to the selected Remote Identity Type.

4 In the **PreShared Key** field, type a string of text which is the key that VPN uses to authenticate before receiving any other credentials.

5 Click **Add**.

End

Variable definitions

The following table describes the variables and values for configuring VPN global settings.

Variable	Value
Remote Identity Type	The user identity type that uniquely identifies the peer. Select one of the following: • IPV4 - specifies the IP address • FQDN- specifies the fully qualified domain name (an unambiguous domain name that denotes the position of the node in the DNS tree hierarchy) • EMAIL - specifies the email of the peer • KEYID - specifies the string that uniquely identifies the peer
Remote Identity Value	Type the value corresponding to the selected Remote Identity Type.
PreShared Key	Type a string of text which is the key that VPN uses to authenticate before receiving any other credentials.

Configuring IKE

Complete the following procedure to configure the IKE pre-shared secret.

Prerequisites

- Before you modify a policy, you must set the Policy Status to INACTIVE.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, VPN, VPN Settings, IKE Pre-shared Secret** tab. The VPN IKE pane appears.
2	Click the **Policy Action**, **Create** check box.
3	In the **Policy Name** field, type the policy name.
4	From the **Interface Name** list, select **Fa0/9**.
5	From the **Policy Status** list, select **ACTIVE**.
6	In the **IPSec Gateway IP Address** field, enter the IP address if you configured the Remote Identity as IPV4. This is the same IP address you entered in Remote Identity Value on the **VPN Global Settings** screen.

7 In the **Traffic Selector** box, in the **Local Address** field, enter the source IP address of outbound traffic.

8 In the **Local Address Mask** field, enter the local network mask of outbound traffic.

9 In the **Remote Address** field, enter the destination network address of outbound traffic.

10 In the **Remote Address Mask** field, enter the destination network mask of outbound traffic.

11 From the **Protocol** list, select **Any**.

12 In the **IKE (Phase 1) Proposal** box, from the **IPSec Encryption** list, select an encryption algorithm.

13 From the **IPSec Authentication** list, select an authentication algorithm.

14 From the **DH Group** list, select a group**.**

15 From the **Exchange Mode** list, select **Main** or **Agressive**.

16 From the **Life Time** list, select the **Seconds**, **Minutes**, or **Hours**.

17 In the **Life Time Value** field, enter the life time value.

18 From the **Peer Identity Type** list, select **IPV4** for the peer identity type.

19 From the **Peer Identity Value** list, select the peer identity value.

The list contains the Remote Identity values entered on the VPN Global Settings screen.

20 From the **Local Identity Type** list, select **IPV4** for the local identity type.

21 In the **Local Identity Value** field, enter the local identity value.

22 In the **IPSec (Phase 2) Proposal** box, from the **Protocol** list, select **ESP** or **AH**.

23 From the **Encryption** list, select an encryption algorithm.

24 From the **Authentication** list, select an authentication algorithm.

25 From the **IPSec Mode** list, select **Tunnel**.

26 From the **Preferred Forward Secrecy** list, select a PFS option.

27 From the **Life Time** list, select the **Seconds**, **Minutes**, or **Hours**.

28 In the **Life Time Value** field, enter the life time value.

29 Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring IKE preshared secret.

Variable	Value
Policy Action	Select this check box to create a policy action.
Policy Name	Type a IPsec policy name. Each policy must have a unique name.
Existing Policies	Select an existing policy for the IPsec policy.

Variable	Value
Interface Name	Select the name of the interface for which you want to apply the policy.
Policy Status	Select the status of the IPsec policy. Select ACTIVE to make the policy active. The policy becomes active after you press Apply.
IPSec Gateway IP Address	Specifies the Security remote endpoint address. All packets are secure up to this destination.
Traffic Selector table	
Local Address	Type the Source IP address of the outbound traffic.
Local Address Mask	Type the Network mask of the outbound traffic.
Remote Address	Type the Destination IP address of the outbound traffic.
Remote Address Mask	Type the Destination mask of the outbound traffic.
Protocol	Select the traffic protocol for the source or destination address. Select one of the following options: • Any • TCP • UDP • ICMPv4 • AH • ESP When you select a protocol and apply the IPSec policy, the policy is applied on the selected protocol packets only. For example, if you select ICMPv4, when you ping from one host to another, only ICMP packets are encrypted or authenticated.
IKE Phase 1 Proposal table	
IPSec Encryption	Select the IPSec Encryption. Select one of the following options: • Data Encryption Standard (DES) – is a standard for encrypting data that uses a 64 bit key to encrypt data, but only 56 bits are usable. This standard is considered inadequate for data protection as this standard do not match the speed of computer. • Triple Data Encryption Standard (3DES) – processes each block of data using a different key each time resulting in a significantly more secure message. • Advanced Encryption Standard (AES128, AES192, AES256) – has a fixed block size of 128 bits and a key size of 128, 192, or 256 bits. Due to the fixed block size of 128 bits, AES operates on a 4x4 array of bytes. Select DES if you prefer Network speed. Select 3-DES if your choice is Network security.
IPSec Authentication	Select the preferred authentication method. Select HMAC-MAC5, the message authentication code is calculated using the MD5 cryptographic hash function. This cryptographic hash function has some additional security properties with a 128-bit hash value, which is commonly used to check the integrity of files. Select HMAC-SHA1, the message authentication code is calculated using the SHA1 algorithm. This cryptographic hash function computes a condensed digital representation to a high degree of probability.

Variable	Value
DH Group	Select the required Diffie-Hellman (DH) group. DH key exchange is used to establish preshared keys. Select Group 1 – IKE uses a 768-bit Diffie- Hellman Prime modules group for performing the new Diffie-Hellman exchange. Select Group 2 – IKE uses a 1024-bit Diffie- Hellman Prime modules group for performing the new Diffie-Hellman exchange. Select Group 5 – IKE uses a 1536-bit Diffie- Hellman Prime modules group for performing the new Diffie-Hellman exchange.
Exchange	Select the exchange mode. Select Main for the highest level of Security. Select Aggressive for speed.
Life Time	Select the lifetime unit. It can be seconds, minutes, or hours.
Life Time Value	Type the lifetime value.
Peer Identity Type/Value	Select the identity type to access the remote network. Select one of the following: • IPV4 - IP address • FQDN - Fully Qualified Domain Name • EMAIL - email address of the user • KEYID - uniquely identifies the peer Select the associated value from the list. The list contains the Remote Identity values entered on VPN Global Settings.
Local Identity Type/Value	Select the identity type to access the local network. Select one of the following: • IPV4 - IP address • FQDN - Fully Qualified Domain Name • EMAIL - email address of the user • KEYID - uniquely identifies the peer Type the associated value.
IP Sec Phase 2 Proposal table	
Protocol	Select the authentication protocol. Select ESP, IPSec encrypts and authenticates. Select AH, IPSec only authenticates.
Encryption	Select the IPSec Encryption. Select one of the following options: • null – indicates no standard is used for IPsec encryption. • Data Encryption Standard (DES) – indicates a standard for encrypting data that uses a 64 bit key to encrypt data, but only 56 bits are usable. This standard is considered inadequate for data protection as this standard do not match the speed of computer. • Triple Data Encryption Standard (3DES) – processes each block of data using a different key each time resulting in a significantly more secure message. • Advanced Encryption Standard (AES-128, AES-192, AES-256) – has a fixed block size of 128 bits and a key size of 128, 192 or 256 bits. Due to the fixed block size of 128 bits, AES operates on a 4x4 array of bytes.

Variable	Value
Authentication	Select the preferred authentication method. Select None to indicates no authentication method is required. Select HMAC-MAC5, the message authentication code is calculated using the MD5 cryptographic hash function. This cryptographic hash function has some additional security properties with a 128-bit hash value, which is commonly used to check the integrity of files. Select HMAC-SHA1, the message authentication code is calculated using the SHA1 algorithm. This cryptographic hash function computes a condensed digital representation to a high degree of probability.
IPSec Mode	Select the IPSec mode. Select Tunnel, IPSec encrypts the IP header and the Payload. Select Transport, IPSec encrypts only the Payload.
Preferred Forward Secrecy	Select the Preferred Forward Secrecy (PFS). Select one of the following options: • Select None – IKE does not use any PFS. • PFS Group 1 – IKE uses a 768-bit Diffie-Hellman Prime modules group for performing the new Diffie-Hellman exchange. • PFS Group 2 – IKE uses a 1024-bit Diffie-Hellman Prime modules group for performing the new Diffie-Hellman exchange. • PFS Group 5 – IKE uses a 1536-bit Diffie-Hellman Prime modules group for performing the new Diffie-Hellman exchange.
Life Time	Select the lifetime unit. It can be seconds, minutes, or hours. The default value is seconds.
Life Time Value	Type the lifetime value. The default value is 800 seconds.
Anti Replay	Displays the anti replay status. Options: • ENABLE - activates the anti-replay functionality of the security protocol. • DISABLE - deactivates the anti-replay functionality of the security protocol. The default value is ENABLE.

Enabling VPN (branch office)

Complete this procedure to enable VPN.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, VPN, VPN Settings, VPN Policy** tab. The VPN Policy pane appears.
2	From the **VPN Status** list**,** select Enabled.
3	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for viewing the existing VPN policies.

Variable	Value
VPN Status	Select the VPN status. VPN status can be Enabled or Disabled.

QoS configuration

This section describes the procedures to configure Quality of Service (QoS) for the Business Services Gateway (BSG) system.

QoS provides different types and levels of service for network traffic. With QoS you can assign different priorities for different types of traffic and guarantee a certain level of performance.

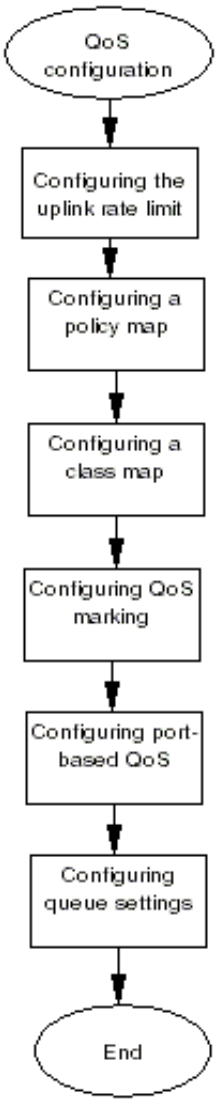
Prerequisites for QoS configuration

- You must have SYSTEM - READ WRITE permission to configure QoS.
- QoS Status must be enabled (it is enabled by default).
- You must know the uplink rate limit. This is provided by your ISP. The total bandwidth you assign to all flows must be less than or equal to the uplink rate.
- You must calculate how much bandwidth to give to the various flows (for example, voice, data, and video).

QoS configuration procedures

The following task flow shows the sequence of procedures to perform to configure QoS.

Figure 10 QoS configuration procedures



QoS configuration navigation

Configuring the uplink rate limit

Complete this procedure to configure the uplink rate limit.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, Uplink Rate Limit**. The Rate Limit Configuration pane appears.
2	From the **Rate Limit Status** list, select **Enabled**.
3	In the **Uplink Rate Limit** field, type the uplink rate limit provided by your ISP.
4	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring the uplink rate limit.

Variable	Value
Rate Limit Status	Select the rate limit status. Select one of the following: • Enabled - enables uplink rate limiting feature • Disabled - disables uplink rate limiting feature The default value is Disabled.
Uplink Rate Limit	Specifies the uplink rate limit over the WAN interface (in bps). The range is 100,000 to 100,000,000 bps.

Configuring a policy map

Complete this procedure to configure a policy map. A policy map defines the committed and peak bandwidth for a type of traffic.

Using TRTCM, the BSG meters the IP packet stream and marks the packets based on Peak Information Rate (PIR) and Committed Information Rate (CIR), and their associated burst sizes (CBS and PBS). TRTCM marks the packet red if it exceeds PIR, yellow if it exceeds CIR, and green if it does not exceed CIR.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, QoS, Policy Map** tab**.** The QOS Policymap Settings pane appears.
2	In the **Police ID** field, type the police ID.
3	In the **PIR (bytes per second)** field, type the Peak Information Rate value.
4	In the **CIR (bytes per second)** field, type the Committed Information Rate value.
5	In the **PBS (Peak frame size (bytes))** field, type the Peak Burst Size value.

6 In the **CBS (Committed frame size (bytes))** field, type the Committed Burst Size value.

7 Click **Add**.

End

Variable definitions

The following table describes the variables and values for configuring policy map settings.

Variable	Value
Police ID	Type the unique ID of the policer.
PIR (bytes per second)	Type the PIR key value in bytes per second. The default value is 3250000.
CIR (bytes per second)	Type the CIR key value in bytes per second. The default value is 3000000.
PBS (Peak frame size (bytes))	Type the PBS key value in bytes per second. The default value is 15000.
CBS (Committed frame size (bytes))	Type the CBS key value in bytes per second. The default value is 10000.

Configuring a class map

A class map classifies a stream of traffic. The BSG uses a class map to decide whether a stream of traffic is voice, Web, email, video, or some other type. Any packets flowing between the source and destination IP addresses are classified according to the class map.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, QoS, Class Map** tab. The QOS Class Map Settings pane appears.
2	In the **Class Map ID** field, type the class map ID.
3	From the **Policy Map ID** list, select a policy map ID.
4	In the **Source IP Address** field, type the IP address.
5	In the **Source Subnet Mask** field, type the subnet mask IP address.
6	In the **Destination IP Address** field, type the destination IP address.
7	In the **Destination Subnet Mask** field, type the destination subnet mask IP address.
8	From the **Protocol** list, select **Any**, **TCP,** or **UDP**.
9	In the **Source Port** field, type the source port number.
10	In the **Destination Port** field, type the destination port number.

11 In the **Incoming DSCP** field, type the incoming Differentiated Service Code Point (DSCP).

12 From the **IP Interface** list, select the required interface.

13 Click **Add**.

End

Variable definitions

The following table describes the variables and values for configuring class maps.

Variable	Value
Class Map ID	Type the Class Map identifier. The value ranges from 1 to 2147483647.
Policy Map ID	Type the Policy Map identifier. The value ranges from 1 to 2147483647.
Source IP Address	Type the source IP address that uniquely defines a packet flow.
Source Subnet Mask	Type the subnet mask for the source IP address.
Destination IP Address	Type the destination IP address that uniquely defines a packet flow.
Destination Subnet Mask	Type the destination subnet mask address for the destination IP address.
Protocol	Select the protocol ID to identify the packet flow. Select one of the following options: • Any – both TCP or UDP packets are classified using the class map. • TCP – only TCP packets are classified using the class map. • UDP – only UDP packets are classified using the class map.
Source Port	Type the source port. The value ranges from 1 to 65535.
Destination Port	Type the destination port. The value ranges from 1 to 65535.
Incoming DSCP	Type the incoming Differentiated Services Code Point (DSCP). The value ranges from 0 to 63.
IP Interface	Select the interface from the list or select Any for any interface to be used for the class map. The default value is Any.

Configuring QoS marking

Complete this procedure to mark outgoing packets with a DSCP value and/or a 802.1p priority value, and place the outgoing packets in a specific QoS queue. The queue where the packet is placed determines the priority of transmission for the packet. For example, voice packets should be destined for strict priority queues, while email packets have lower priority and can be delayed without notice.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, QoS, Marking** tab. The Marking pane appears.
2	Select the class map you want to mark.
3	From the **Outgoing Priority** list, select the priority.
4	In the **Value** field, type the DSCP marking value.
5	Select the **Marking** check box.
6	Click **Apply**.

End

Variable definitions

The following table describes the variables and values to configure markings.

Variable	Value
Select	Select a row.
Class Map	Displays a configured class map identifier.
Outgoing Priority	Select the 802.1p priority. The value ranges from 1 to 7. The default value is 7–802.1p.
Outgoing DSCP	Select the outgoing DSCP from the given list.
Value	Type the marking value.
Marking	Select this check box to enable marking.

Configuring port-based QoS

Complete this procedure to map the 802.1p priority of each queue on a particular port.

Each port has eight queues, and each queue has eight priority settings. This mapping can be done only from LAN ports. The WAN port has a default 802.1p priority to queue mapping that you cannot change. The default mapping for the WAN port is: queue number = 7 - 802.1p priority.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, QoS, Port-based QOS** tab. The Traffic Class Mapping pane appears.
2	In the **Select** field, select a port to configure the traffic class mapping.
3	For each priority field, select the Traffic Class value.

4 Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring port-based QoS.

Variable	Value
Select	Select a row.
Port	Displays the port number.
Port Name	Displays the port name.
Priority0	Select the Traffic Class value for priority 0. The values ranges from 0 to7.
Priority1	Select the Traffic Class value for priority 1. The values ranges from 0 to7.
Priority2	Select the Traffic Class value for priority 2. The values ranges from 0 to7.
Priority3	Select the Traffic Class value for priority 3. The values ranges from 0 to7.
Priority4	Select the Traffic Class value for priority 4. The values ranges from 0 to7.
Priority5	Select the Traffic Class value for priority 5. The values ranges from 0 to7.
Priority6	Select the Traffic Class value for priority 6. The values ranges from 0 to7.
Priority7	Select the Traffic Class value for priority 7. The values ranges from 0 to7.

Configuring queue settings

Complete this procedure to define the minimum and maximum threshold for Green and Amber coloured packets for each of the eight queues for each port.

Queues 0, 1, and 2 are configured as strict priority queues. The weights for these queues default to 0 and cannot be changed. The weights of the remaining queues (queues 3 to 7) can be any value within the range except 0. The remaining queues are configured as weighted round robin (WRR). Packets received in strict priority queues receive immediate service from the scheduler, thereby pre-empting scheduling for WRR queues.

Note: If you add a DSL or T1/E1 WAN configuration, the PPP interface you created appears in the Port No drop-down list. You can select and configure the PPP interface. The defaults for the PPP interface are the same as the defaults for the other ports. If you delete the DSL or T1/E1 WAN configuration, it no longer appears as a selection in the Port No drop-down list.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, QoS, Queue Settings** tab. The Queue Configurations pane appears.
2	From the **Port No** list, select the port for which you want to configure QoS queue settings.
3	In the **Select** field, select the queue that you want to configure.
4	In the **Green Threshold Min** field, type the minimum green threshold value.
5	In the **Green Threshold Max** field, type the maximum green threshold value.
6	In the **Amber Threshold Min** field, type the minimum amber threshold value.
7	In the **Amber Threshold Max** field, type the maximum amber threshold value.
8	In the **Scheduler Weight** field, type the queue weight.
9	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for configuring QoS queue settings.

Variable	Value
Port No	The port number for which the queue settings apply.
Select	Select the queue you want to configure.
Queue	Displays the queue number.
Green Threshold Min	Type the minimum Green Threshold value. Green packets start to drop at the configured minimum depth. The default value is 100.
Green Threshold Max	Type the maximum Green Threshold value. All green packets are dropped at the configured maximum depth. The default value is 200.
Amber Threshold Min	Type the minimum Amber Threshold value. Amber packets start to drop at the configured minimum depth. The default value is 50.
Amber Threshold Max	Type the maximum Amber Threshold value. All amber packets are dropped at the configured maximum depth. The default value is 64.

Variable	Value
Scheduler Weight	Type the queue weight. The range for queues 3 to 7 is 1 to 65535. The default weights are: • queue 0 - 0 (cannot be changed) • queue 1 - 0 (cannot be changed) • queue 2 - 0 (cannot be changed) • queue 3 - 512 (cannot be set to 0) • queue 4 - 256 (cannot be set to 0) • queue 5 - 128 (cannot be set to 0) • queue 6 - 64 (cannot be set to 0) • queue 7 - 32 (cannot be set to 0)
Queueing Strategy	Displays the queueing strategy. Queues 0 to 2 are strict priority. Queues 3 to 7 are weighted round robin.

Advanced configuration

The remaining chapters of this document give a more detailed description of the variables and values on each panel of the user interface.

Navigation

WAN advanced configuration

This section describes configuration information for the wide area network (WAN) for the Business Services Gateway (BSG) system.

Prerequisites for WAN advanced configuration

- You must have SYSTEM - READ WRITE permission to access the WAN configuration panel.

WAN advanced configuration navigation

The following sections provide information for configuring the WAN:

- Ethernet (page 83)
- DSL (page 87)
- T1/E1 (page 89)

Ethernet

The following sections provide information for configuring the Ethernet WAN:

- Ethernet (page 83)
- PPPoE WAN configuration parameters (page 84)
- Rate limit configuration parameters (Ethernet) (page 84)
- Renewing or releasing the WAN lease (page 85)

Ethernet WAN configuration parameters

The following table describes the parameters for Ethernet WAN configuration located at **Configuration, WAN, Ethernet**.

Variable definitions

The following table describes the Ethernet variables and values for configuring Ethernet WAN.

Variable	Value
Interface	Select the Interface you want to configure.
Encapsulation Mode	Set the encapsulation mode to Ethernet. The WAN interface operates as a normal Ethernet interface.

Variable	Value
MAC Cloning	Select the MAC cloning status. Enable - the BSG uses the configured MAC address as the source of Ethernet frames instead of the MAC address of the BSG WAN port. Disable - disables MAC Cloning. You can enable MAC cloning only if the Encapsulation Mode is Ethernet. The default value is Disabled.
MAC Address	Type the MAC address, if the MAC cloning is enabled.
IP Address Assignment	Select the IP Address Assignment status. Select Manual or Dynamic for Ethernet interface.
WAN IP Address	Type the WAN IP address, if the IP Address Assignment is manual.
Subnet Mask	Type the subnet mask, if the IP Address Assignment is manual.
Gateway IP Address	Type the gateway IP Address, if the IP Address Assignment is manual.
Configurable	
Primary DNS	Type the primary DNS server IP address, if the IP Address Assignment is manual.
Secondary DNS	Type the secondary DNS server IP address, if the IP Address Assignment is manual.

PPPoE WAN configuration parameters

The following table describes the parameters for PPPoE configuration located at **Configuration, WAN, Ethernet**.

The following table describes the variables and values for configuring PPPoE WAN.

Variable	Value
Interface	Select an Interface to be configured.
Encapsulation Mode	Set the encapsulation mode PPPoE. The WAN interface operates as a Point-to-Point Protocol (PPP).
ISP Name	Type the name of the Internet Service Provider.
User Name	Type the PPPoE user name.
Password	Type the PPPoE password.
Host Name	Type the host name.

Rate limit configuration parameters (Ethernet)

Certain downstream devices cannot handle the high traffic rate from the BSG. This feature allows you to limit the rate of traffic sent on the WAN interface. You should limit the uplink speed only if your WAN bandwidth is less than 100 Mbps and the device in front of the BSG does not support pause frame.

Variable definitions

The following table describes the variables and values for configuring the uplink rate limit.

Variable	Value
Rate Limit Status	Select the rate limit status: • Enabled - enables uplink rate limiting feature • Disabled - disables uplink rate limiting feature The default value is Disabled.
Uplink Rate Limit	Specifies the maximum uplink rate limit over the WAN interface (in bps). The range is 100,000 to 100,000,000 bps.

Renewing or releasing the WAN lease

Complete this procedure to renew or release the lease.

Prerequisites

- You can renew or release the WAN lease only if the IP Address Assignment is Dynamic.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, WAN, Ethernet**. The WAN Configuration panel appears.
2	In the **Select** field, select the WAN configuration that you want to modify.
3	Select the **Renew** option button if you want to renew the lease term. OR Select the **Release** option button if you want to release the lease.
4	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for renewing and releasing the lease.

Variable	Value
Select	Select the interface entry you want to configure.

Variable	Value
Renew	Click this option button to renew the DHCP lease on the specified interface. This option is enabled only when ‘Dynamic’ option is selected in the IP Address Assignment field.
Release	Click this option button to release the DHCP lease on the specified interface. This option is enabled only when ‘Dynamic’ option is selected in the IP Address Assignment field.

DSL

DSL appears under WAN configuration if you are connected to a BSG12aw.

On the Digital Subscribe Line (DSL) pages you can configure and control the DSL modem that connects to the BSG. You can also configure the ATM parameters of the modem and access the DSL modem statistics.

You must have access read/write permission to configure DSL.

DSL navigation

- DSL Basic Configuration (page 87)
- PPP Configuration (page 88)
- Rate limit configuration parameters (DSL) (page 89)

DSL Basic Configuration

On the DSL Basic Configuration page you can configure DSL parameters.

To access this page, select Configuration, WAN, DSL, Basic Configuration page.

Variable definitions

This table describes the variables that appear on the DSL Basic Configuration page.

Variable	Value
DSL Name	The DSL Name. Options: DSL-1 The default value is DSL-1.
DSL Connection Type	The DSL connection type. Options: Auto—indicates Auto Connection Mode. T1413— indicates T1413 connection mode. GDMT—indicates GDMT connection mode. G-Lite—indicates G-Lite connection mode. ADSL2—indicates ADSL2 connection mode. ADSL2+— indicates ADSL2+ connection mode. The default value is Auto.
VPI / VCI	The Virtual Path Identifier/Virtual Channel Identifier (VPI/VCI) used by the DSL modem to make a connection. The range is 0 to 255. The default value for VPI is 8 and VCI is 35.

Variable	Value
QoS	The required Quality of Service (QoS) parameter. Options: Constant Bit Rate (CBR)— reserves a constant amount of bandwidth. This service supports applications such as voice, video, and circuit emulation. CBR service class is designed for ATM virtual circuits (VC) that require a static amount of bandwidth that is continuously available for the duration of the active connection. An ATM VC configured as CBR can send cells at peak cell rate (PCR) at any time for any duration. It can also send cells at a rate less than PCR. Variable Bit Rate (VBR)— negotiates the Peak Cell Rate (PCR), the Sustainable Cell Rate (SCR), and the Maximum Burst Size (MBS). Typical VBR sources are compressed voice and video. VBR strives to achieve the best possible quality of the encoded media. VBR-rt makes better use of bandwidth if the traffic is bursty, since the ATM interface reserves bandwidth equal to the SCR only. Unspecified Bit Rate (UBR)— efficiently uses the remaining bandwidth, which dynamically changes in time because of VBR service. Typical applications are computer communications, such as file transfers and e-mail. UBR service provides no feedback mechanism. If the network is congested, UBR cells can be lost. The default value is UBR.
Encapsulation	The encapsulation type. Options: ATM Adaptation Layer 5/Sub Network Access Protocol **(**AAL5/SNAP)— multiple protocols can be transmitted on the same VC. AAL5 sends variable length packets across an Asychronous Transfer Mode (ATM) network. The type 5 adaptation layer is a simplified version of AAL3/4. The AAL type of the cell defines the format of the payload in the ATM cells. Virtual Channel Multiplexer (VC MUX)— only a single protocol can be used on each VC and the protocol is negotiated during the connection establishment phase.
MRU	The Maximum Receivable Unit (MRU) value. MRU specifies the maximum number of bytes received on a link.
Keep Alive Time Out	The Keep Alive Time Out value, in seconds. If no Echo response packet is received within the time-out value, the connection is lost. The default value is 10.
PCR/SCR/MBS	The traffic parameter of the DSL modem. Peak Cell Rate (PCR) / Sustainable Cell Rate (SCR) and Maximum Burst Size (MBS). The range for PCR/SCR/MBS is 0 to 65535. The default value for PCR and SCR is 4000. The default value for MBS is 10.

PPP Configuration

On the Point to Point Protocol (PPP) Configuration page you can configure the IP address of the WAN PPP.

To access this page, select Configuration, WAN, DSL, IP Configuration tab.

Variable definitions

This table describes the variables that appear on the PPP Configuration page.

Variable	Value
PPP Interface	The PPP interface for which you need to configure the IP address.
User Name	The username for the specified PPP interface, used for authentication.
Password	The password for the specified PPP interface, used for authentication.
WAN IP Address	Displays the IP address of the WAN PPP interface.
Subnet Mask	Displays the subnet mask for the WAN interface.
Gateway IP Address	Displays the Gateway IP address for the WAN interface.
Primary DNS Server	Displays the IP address of the Primary DNS server.
Secondary DNS Server	Displays the IP address of the Secondary DNS server.

Rate limit configuration parameters (DSL)

For DSL, the rate limit should be configured. The rate limit value is based on the uplink bandwidth of the ADSL service.

Variable definitions

The following table describes the variables and values for configuring the uplink rate limit.

Variable	Value
Rate Limit Status	Select the rate limit status: • Enabled - enables uplink rate limiting feature • Disabled - disables uplink rate limiting feature The default value is Disabled.
Uplink Rate Limit	Specifies the maximum uplink rate limit over the WAN interface (in bps). The range is 100,000 to 100,000,000 bps.

T1/E1

T1/E1 appears under WAN configuration if you are connected to a BSG12tw.

T1/E1 is a digital WAN carrier facility. T1 transmits DS-1 formatted data at 1.544 MB/s and E1 transmits E1 formatted data at 2.048 MB/s through the telephone e-switching network, using HDB3, AMI, or B8ZS coding.

You must have access read/write permission to configure T1/E1.

T1/E1 navigation

- T1/E1 Configuration (page 90)

T1/E1 Configuration

On the T1/E1 configuration page, you can configure Framing Type, Line Coding, Line Mode, Line Buildout, Line Length and Transmit Clock Source.

To access this page, select Configuration, WAN, T1/E1.

Note: If you change the interface type, you must reboot the system for the change to take effect. After you reboot, the remaining variables are reset to default values. If you want to change the remaining variables, change them after you reboot.

Note: If you change the controller from T1 to E1 or vice versa, the BSG deletes the serial interfaces you created on the controller.

Variable definitions

This table describes the variables that appear on the T1/E1 Configuration page.

Variable	Value
Interface	The T1/E1 controller.
Interface Type	The interface type for the given interface. Options: T1 E1 The default value is T1.

Variable	Value
Framing	The Framing Type for the T1/E1 data line. Options for T1: Extended Super Frame (ESF)— 24 consecutive 193-bit frames of data. Super Frame (SF)—12 consecutive 193-bits of data. Unframed—the non signaling or unframed framing format is a simplified version of the T1 super frame. The default value is ESF. Options for E1: E1—a single E1 frame consists of 256 bits, grouped into 32 octets or time slots. The timeslots are numbered 0 to 31. E1CRC The default value is E1CRC.
Line Coding	The Line coding type of the T1/E1 link. Options: Binary Eight Zero Substitution (B8ZS)—replaces any sequence of eight consecutive zeros with {000VB0VB}. Alternative Mark Inversion (AMI)—encodes a signal by inverting one of the two consecutive high polarity data bits. High Density Bipolar With 3 Zero Substitution (HDB3)—replaces any sequence of four consecutive zeros with 000V or B00v. For T1, the default value is B8ZS. For E1, the default value is HDB3.
Line Mode	The Line Mode. Options: Channel Service Unit (CSU)—select if cable length is equal to or more than 655 feet. Select Data Service Unit **(**DSU)—select if cable length is less than 655 feet. The default value is DSU.
Line BuildOut	The level of attenuation (in decibels) required for the devices on each end of a T1 line to communicate Options: - 0 db - 7.5 db - 15 db - 22.5 db You can configure Line BuildOut only for T1 CSU Line Mode.

Variable	Value
Line Length	The Line Length value. Line Length refers to the length of the cable (in feet) that connects the devices on each end of a T1 line. Options: 0 - 133 134 - 266 267 - 399 400 - 533 534 - 655 The default value is 0 - 133. You can configure the line length only when the Line Mode is DSU.
Transmit ClockSource	The clock source. Options: LocalTiming—A local clock source is used or an external clock is attached to the box containing the interface. LoopTiming—Recovered received clock is used to transmit the clock. The default value is LocalTiming.

Alarms Status

THIS SHOULD BE REMOVED. IT'S DOCUMENTED IN THE ADMIN GUIDE.

On the Alarm Status page you can view the current link status in the system.

To access this page, select Configuration, WAN, T1/E1, Alarms tab.

Variable definitions

This table describes the variables that appear on the Alarms Status page.

Variable	Value
Interface	The T1/E1 controller.
No Alarm	If a green LED is ON (on the T1/E1 link), it indicates that the T1/E1 link is up.
Yellow Alarm	If the Yellow LED is ON (on the T1/E1 link), it indicates far end loss of frame.
Red Alarm	If the Red LED is ON (on the T1/E1 link), it indicates near end loss of frame.

T1/E1 Channel Group Configuration

On the T1/E1 Channel Group Configuration page, you can configure Channel Groups on the T1/E1 links.

To access this page, select Configuration, WAN, T1/E1, Channel Group tab.

Variable definitions

This table describes the variables that appear on the T1/E1 Channel Group Configuration page.

Variable	Value
Interface	The T1/E1 interface on which you create the channel group. Options: t1e1-1 t1e1-2
Channel Group Index	The Channel Group Index. The range is 1to 64.
Time Slot	The time slots. The range is 1to 24 for T1 and 2 to 32 for E1.

PPP Configuration

On the Point to Point Protocol (PPP) configuration page, you can configure the PPP page and layer it above the serial interface (channel group).

To access this page, select Configuration, WAN, T1/E1, PPP Configuration tab.

Variable definition

This table describes the variables that appear on the PPP Configuration page.

Variable	Value
Serial Interface	The serial Interface on which you layer the PPP interface. Options: Serial1/1 Serial2/2
Authentication Required	Select whether authentication is required for the PPP interface. Options: YES—enables the Server/Client, User Name, and Password fields. NO—authentication is not required for PPP interface.

Variable	Value
Server/Client	Select whether the Server or Client is required for authentication. This field is available only if authentication is required. Options: Server - to authenticate the peer at the time of negotiation. Client - to be authenticated by the peer router.
User Name	The User Name required for the Server or Client that requires authentication. This field is available only if authentication is required.
Password	The password for the specified user. This field is available only if authentication is required.
Keep Alive	The Keep Alive Time Out value in seconds. If no Echo response packet is received within the time-out value, the connection is lost. The default value is 10.
Link Type	The PPP link type. Options: Public—adds the default route for the PPP interface. Private—no default route is added for the PPP interface. The default value is Private.
MTU	The Maximum Transmission Unit. The default value is 1500.

IP Configuration

To access this page, select Configuration, WAN, T1/E1, IP Configuration tab.

Variable definitions

This table describes the variables that appear on the IP Configuration page.

Variable	Value
PPP/MP Interface	The PPP/Multilink interface for which the IP address is configured.
IP Address Assignment	The IP address assignment mode. Options: Dynamic—obtains the IP address dynamically from the peer. Manual—manual assignment of the IP address.

Variable	Value
IP Address	The IP address of the PPP/Multilink interface, if IP Address Assignment is Manual.
Subnet Mask	The Subnet Mask for the IP address, if IP Address Assignment is Manual.
Peer IP Address	The Peer IP address, if IP Address Assignment is Manual.
Primary DNS Server	The Primary DNS server IP address, if IP Address Assignment is Manual.
Secondary DNS Server	The Secondary DNS server IP address, if IP Address Assignment is Manual.
Peer DNS	The Peer DNS IP address, if IP Address Assignment is Manual.

Multilink Configuration

On the Multilink Configuration page, you can configure the multilink for T1/E1.

To access this page, select Configuration, WAN, T1/E1, Multilink tab.

Variable definitions

This table describes the variables that appear on the Multilink Configuration page.

Variable	Value
Authentication Required	The Authentication Required setting for the multilink interface. Options: Yes—authentication is required. Enables the Server/Client, User Name, and Password fields. No— authentication is not required for multilink interface. The default value is NO.
Server/Client	Select Server or Client for authentication. Options: Select Server to authenticate your peer at the time of negotiation. Select Client to be authenticated by the peer router.
User Name	The User Name required for the Server or Client that requires authentication.
Password	The password for the specified user.

Variable	Value
Link Type	The multilink type. Options: Public—adds the default route for the multilink interface. Private—no default route is added for the multilink interface. The default value is Private.
MTU	The Maximum Transmission Unit. The default value is 1500.

LAN advanced configuration

This section describes the advanced configuration to configure the local area network (LAN) for the Business Services Gateway (BSG).

LAN advanced configuration navigation

Virtual interface configuration

This section describes configuration of the virtual interface.

Prerequisites for virtual interface configuration

- You must have L3 - READ WRITE permission to access virtual interface configuration.

Virtual interface configuration navigation

Virtual interface configuration parameters

The following section describes the parameters for configuration of the virtual interface located at **Configuration, LAN, Virtual Interfaces**.

Note: You must set the Admin Status to Down before you modify the IP Address or MTU of a configured VLAN interface. The Admin Status field is available after you configure a VLAN interface.

Variable definitions

The following table describes the variables and values for configuring virtual interface.

Variable	Value
VLAN ID	Type the VLAN identifier.
IP Address Assignment	Select the IP address assignment mode. Select Manual to manually assign the IP address. Select Dynamic for the System to assign the IP address for the specified VLAN from Dynamic Host Configuration Protocol server configured in BSG.
IP Address	Type the IP address, if the IP address assignment is Manual.
Subnet Mask	Type the subnet mask for the LAN, if the IP address assignment is Manual.
MTU	Type the Maximum Transmission Unit value. The range is 90 to 9902. The default value is 1500. If using Fast Ethernet, the MTU frame size must not be larger than 1522.

Renewing or releasing the LAN lease

Complete this procedure to renew or release the lease.

Prerequisites

- You can renew or release the LAN lease only if the IP Address Assignment is Dynamic.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, LAN, Virtual Interfaces**. The IP Address Configuration panel appears.
2	In the **Select** field, select the IP address that you want to modify.
3	Select the **Renew** option button to renew the lease. OR Select the **Release** option button to release the lease.
4	Click **Apply**.

End

Variable definitions

The following table describes the variables and values for renewing or releasing the lease.

Variable	Value
Select	Select the IP address to modify.
Renew	Enable Renew if you want to renew the DHCP lease for this interface. Renew is available only if IP Address Assignment is set to Dynamic.
Release	Enable Release if you want to release the DHCP lease for this interface. Release is available only if IP Address Assignment is set to Dynamic.

Ethernet LAN configuration parameters

The following table describes the parameters for configuration of the Ethernet LAN located at **Configuration, LAN, Ethernet**.

Prerequisites

- You must have SYSTEM - READ WRITE permission to access the Ethernet LAN configuration.

Variable definitions

The following table describes the variables and values for configuring the basic LAN settings.

Variable	Description
LAN IP Address Mode	Select the IP address mode. Select Manual to assign the IP address and subnet mask address manually. Select Dynamic to allow the system to assign the IP address.
IP Address	Type the IP address, if the IP address assignment is Manual.
Subnet Mask	Type the subnet mask for the LAN, if the IP address assignment is Manual.

Wireless LAN configuration

This section describes WLAN configuration information.

Prerequisites for LAN configuration

- You must have WIRELESS - READ WRITE permission to access this information.

Wireless LAN configuration navigation

WLAN settings configuration parameters

The following table describes the parameters for configuration of WLAN settings located at **Configuration, LAN, Wireless, Basic Settings** tab.

Variable definitions

The following table describes the variables and values for configuring the basic WLAN settings.

Variable	Value
Access Point	The Access Point represents the status of radio in the BSG. Select Enabled to activate the radio. Select Disabled to deactivate the radio. You must select a country code before you enable the access point.
Country Code	Select the required country code. A country code is required to set up the proper regulatory restrictions for channel availability and transmission power. You must disable the radio (Access Point) before you set the country code.
Radio Mode	Select the required radio mode. Select one of the following options: • 802.11b - For a network with all 802.11b clients, select 802.11b mode. The BSG has a single 802.11b radio. • 802.11g - For a network with all 802.11g clients, select the 802.11g mode. • Mixed - Select Mixed Mode for a network with many 802.11g devices with a lesser population of 802.11b clients. Performance degradation can occur. The default is Mixed.

SSID configuration parameters

The following section describes the parameters for configuration of the SSID located at **Configuration, LAN, Wireless, SSID** tab.

Variable definitions

The following table describes the variables and values for configuring the SSID.

Variable	Value
SSID	Type the SSID. The SSID is alphanumeric and is mapped to the VLAN ID. SSID length ranges between 1 and 32.

Variable	Value
VLAN Identifier	Type the VLAN ID to which SSID users belong. Access points use this VLAN ID to tag the packets from the specified users of the given SSID.
Status	When you configure an SSID, this field appears in the new row. It specifies the activation status of the WLAN SSID. The configured SSID is added with a default status of Enabled. When Enabled, the radio starts sending beacons for the SSID and allows clients to connect to it. Select Disabled to deactivate the radio. The radio stops sending the beacons for the SSID.

WLAN radio configuration parameters

The following section describes the parameters for configuration of the WLAN radio located at **Configuration, LAN, Wireless, Radio** tab.

Variable definitions

The following table describes the variables and values for configuring the WLAN radio.

Variable	Value
Turbo Mode	Specifies the Turbo Mode status. Turbo Mode is used to perform a speed boost to the wireless network. Select Dynamic to allow the BSG to detect whether clients are capable of Turbo Mode. If a client is not capable of turbo mode, the client returns to normal mode. Select Static only when you know that all wireless devices in the network are capable of Turbo Mode. Select Disabled if there are no wireless clients to support turbo mode. The default value is Dynamic.
Beacon Period (ms)	Type the beacon period. The value ranges from 20 to 1000 ms. The default value is 100 ms.
Auto Channel Selection	Select this check box to enable automatic channel selection. The default is Enabled.
Radio Channel	Select the radio channel, if Auto Channel Selection is not enabled.
Transmit Power	Specifies the transmission power. Select one of the following options: • Full (100%) • Half (50%) • Quarter (25%) • Eigth (12.5%) • Minimum The default value is Minimum.
Maximum Supported Rate	Select the link speed of the Radio. Select the maximum supported rate. Options are 1, 2, 5.5, 9, 11, 12, 18, 24, 36, 48, and 54. The default value is 54 Mbps.

Variable	Value
Fragment Length	Type the fragmentation length. The value ranges from 256 to 2346. The default value is 2346.
RTS Threshold	Type the Request To Send threshold. The value ranges from 0 to 2347. The default value is 2347.
Maximum Associated Client	Type the maximum associated client value. The range is 0 to 63. The default value is 63.
Protection Mode	Specifies the Protection mode. The Access Point (AP) protects the data by reserving air space for the time required to transmit the data. Select CTS-only for AP protection by transmitting a CTS frame to all stations. Select CTS/RTS for AP protection by transmitting both a RTS and CTS frame to all stations. The default value is CTS-only.
Preamble	Specifies the preamble length. Some clients do not support a short preamble. They cannot be reached if the preamble is set to Short. Select Short – boosts the performance of the BSG wireless but potential for missed clients. Select Short/Long – all clients are accessible. The default value is Short/Long.
DTIM Period	Type the DTIM Period for radios. The DTIM value range is 1 to 255. The default value is 1.

MAC filtering configuration parameters

The following section describes the parameters for configuration of MAC filtering located at **Configuration, LAN, Wireless, MAC Filtering** tab.

Variable definitions

The following table describes the variables and values for configuring MAC filtering.

Variable	Value
Default Action	Specifies the default MAC filtering option. It applies to MAC addresses that don't appear in the MAC address list. Select Allow to allow traffic for the configured MAC address. Select Deny to stop traffic for the configured MAC address.
MAC Address	Type the MAC address of the wireless client you want to allow or deny.
Action	Specifies the action for the specific MAC address. Select Allow to allow a wireless client whose MAC address matches the configured MAC address of the BSG. Select Deny to deny a wireless client whose MAC address matches that of the configured MAC address.

WLAN security configuration parameters

The following section describes the parameters for advanced configuration of the WLAN radio located at **Configuration, LAN, Wireless, Security** tab.

Variable definitions

The following table describes the variables and values for configuring the WLAN security settings.

Variable	Value
SSID	Type the required SSID for which you want to configure security settings.
Broadcast SSID	Specifies the broadcast SSID status. If you select Enable, beacons sent out by the BSG contain the configured SSID. If you select Disable, beacons sent out by the BSG do not contain the configured SSID. The default value is Enable.
Authentication Type	Specifies the method used to authenticate wire clients. Select the Authentication Type for stations that use this SSID. Select Open if authentication is not required. Select Open1X to use 802.1x authentication. Select Shared to use a shared key. Select WPA, WPA2, or WPA-WPA2-Mixed if Radius server is used for authentication. Select WPA-PSK, WPA2-PSK, or WPA-WPA2-PSK-Mixed if authentication uses a preshared key. The default value is Open.
Pre-Authentication	Specifies the preauthentication status. Select Enable to enable the Robust Security Networks Association (RSNA) preauthentication on this entity. Stations authenticate to different APs, if present, but associate to a single AP. Select Disable to disable the RSNA preauthentication. Stations authenticate to a single AP. This field is available only if Authentication Type is set to WPA, WPA2, or WPA-WPA2-Mixed.
Pre Shared Key Type	Specifies the preshared key type, either Hex or ASCII. If you select Hex, you must provide a Hex key in the PreSharedKey field. If you select ASCII, you must provide ASCII characters in the PreSharedKey field. The pass-phrase is an ASCII character string, whereas the manual key is a string of hexadecimal numbers. This option is enabled only when the authentication type is WPA-PSK, WPA2-PSK, or WPA-WPA2-PSK-Mixed.
Pre Shared Key	Specifies the preshared key. If the PreSharedKey (PSK) Type is Hex, the PSK length must be 64. If the PSK Type is ASCII, the PSK length ranges between 8 and 63. This option is enabled only when the authentication type is WPA-PSK, WPA2-PSK, or WPA-WPA2-PSK-Mixed.

Variable	Value
Cipher Suite	Specifies the required pairwise cipher and is used for data encryption. It consists of an organizationally unique identifier (OUI) (the first 3 octets) and a cipher suite identifier (the last octet). Select one of the following options: • AES-CCMP • TKIP • WEP • AES-CCMP-TKIP • AES-CCMP-WEP • TKIP-WEP • AES-CCMP-TKIP-WEP. This field is used in conjunction with the Authentication Type. If you select WPA for Authentication Type, the BSG supports TKIP. If you select WPA2, the BSG supports AES-COMP and TKIP.
PMK SA Lifetime	Type the Pairwise Master Key (PMK) SA (Security Association) Lifetime value. This represents the maximum lifetime of a PMK in the PMK cache. The valid range is 1 to 4294967295. The default value is 43200.

End

WEP configuration parameters

The following section describes the parameters for advanced configuration of the WEP located at **Configuration, LAN, Wireless, WEP** tab.

Prerequisites

- To configure WEP settings for an SSID, you must set the Authorization Type of the SSID to Open or Shared (see WLAN security configuration parameters (page 105)).

Variable definitions

The following table describes the variables and values for configuring the WEP settings for WLAN.

Variable	Value
SSID	Select the SSID you require to configure WEP settings.
Key Index	The key used for data encryption. Options: 1 2 3 4 If you want to assign the selected key index as the default value, you must select the Set this as default WEP key.
Set this as default WEP Key	If you select this box, you can configure the selected key index as the default value. The default for the first configured WEP is checked. The default for subsequent configured WEPs is unchecked.
Key Type	The required WEP key type, which is the default secret key type. Options: Hex—the manual string is a string of HEX numbers ASCII—the pass-phrase is an ASCII character string.
Key Size	The required key size. Options: 64 Bit 128 Bit 152 Bit. The default value is 64 Bit.
Key Value	The WEP key value.

Wireless multimedia configuration parameters

The following section describes the parameters for advanced configuration of the Wireless Multimedia (WMM) located at **Configuration, LAN, Wireless, WMM** tab.

Variable definitions

The following table describes the variables and variables for configuring wireless multimedia.

Variable	Value
WMM Status	Specifies the Wireless Multimedia (WMM) status. Select Disabled to disable Quality of Service (QoS). Select Supported or Required to enable QoS. The default is Disabled.
Acknowledge Policy	
AC0 (Best Effort)	Select the status of AC0 as either Acknowledge or No Acknowledge. The default value is Acknowledge.
AC1 (Background)	Select the status of AC1 as either Acknowledge or No Acknowledge. The default value is Acknowledge.
AC2 (Video)	Select the status of AC2 as either Acknowledge or No Acknowledge. The default value is Acknowledge.
AC3 (Video)	Select the status of AC3 as either Acknowledge or No Acknowledge. The default value is Acknowledge.
Basic Service Set Parameters	
Log Contention Width Minimum	The minimum contention width of the AP in the radio. The range is 1 to 15. The default values for AC0 through AC3 are 4, 4, 3, and 2.
Log Contention Width Maximum	The maximum contention width of the AP in the radio. The range is 1 to 15. The default values for AC0 through AC3 are 10, 10, 4, and 3.
AIFSN	The arbitrary inter frame sequence (AIFS). The range is 1 to 15. The default values for AC0 through AC3 are 3, 7, 2, and 2.
TXOP Limit	The transmission opportunity of the AP in the radio. The range is 0 to 65535. The default values for AC0 through AC3 are 0, 0, 94, and 47.
Admission Control	The status of admission of WMM parameters. Options: Enabled Disabled. The default value for AC0 through AC3 is Disabled.
Access Point Parameters	
Log Contention Width Minimum	The minimum contention width of the AP in the radio. The range is 1 to 15. The default values for AC0 through AC3 are 4, 4, 3, and 2.
Log Contention Width Maximum	The maximum contention width of the AP in the radio. The range is 1 to 15. The default values for AC0 through AC3 are 6, 10, 4, and 3.

Variable	**Value**
AIFSN	The arbitrary inter frame sequence. The range is 1 to 15. The default values for AC0 through AC3 are 3, 7, 1, and 1.
TXOP Limit	The transmission opportunity of the AP in the radio. The range is 0 to 65535. The default values for AC0 through AC3 are 0, 0, 94, and 47.
Admission Control	The status of admission of WMM parameters. Options: Enabled Disabled The default value for AC0 through AC3 is Disabled.

VLAN advanced configuration

This section describes configuration information for the virtual local Area Network (VLAN) for the Business Service Gateway (BSG).

Prerequisites for VLAN advanced configuration

- You must have L2 - READ WRITE permission to access VLAN configuration.

VLAN advanced configuration navigation

VLAN settings configuration

The following section describes the configuration for VLAN settings.

VLAN settings configuration navigation

VLAN basic settings configuration parameters

The following section describes the parameters for configuration of the VLAN basic settings located at **Configuration, VLAN setup, Basic Settings** tab.

Prerequisites

- You can enable Dynamic VLAN and Multicast learning on a port only after you enable the General Attribute Registration Protocol (GARP) VLAN Registration Protocol (GVRP) status of the port.

Variable definitions

The following table describes the variables and values for configuring the basic VLAN settings.

Variable	Value
Dynamic VLAN Learning	Specifies the Dynamic VLAN learning status. Select Enable to enable the global GARP VLAN Registration Protocol (GVRP) status. Select Disable to disable the global GVRP status. If the status is disabled, then the GVRP is disabled for the current port. The default value is Enable.
Dynamic Multicast Learning	Specifies the Dynamic Multicast learning status. If the status is disabled, then the GMRP is disabled for the current port. The default value is Enable.
Protocol Based VLAN	Specifies the protocol-based learning status. The default value is Enable.

VLAN port settings configuration parameters

You can associate a VLAN ID to a port for port-based VLAN classification.

The following section describes the parameters for configuration of the VLAN port settings located at **Configuration, VLAN setup, Port Settings** tab.

Variable definitions

The following table describes the variables and values for configuring the VLAN port settings.

Variable	Value
Port	Displays the port ID for which you want to configure the VLAN port settings.
Port Name	Type the name of the port.
Port and Protocol Based VLAN	Specifies the port and protocol-based VLAN status. Select Enable – the protocol grouping in VLAN is enabled. Select Disable – the protocol grouping in VLAN is disabled. The VLAN classification on a port will be port and protocol-based as long as the port and protocol-based classification is enabled globally for the device. The default value is Enable.
PVID	Type the port VLAN ID.
Acceptable Frame Types	Specifies the acceptable frame types as Tagged or All. Select Tagged – the switch discards untagged and priority- tagged frames received on the port and processes only the VLAN tagged frames. Select All – the switch accepts all frames, including untagged frames or priority-tagged frames received on the port. The default value is All.

Variable	Value
Tunnel Status	Specifies the tunnel status. Select Enable – the data packets received on the port are tunneled. Select Disable – the data packets received on the port are handled normally. The default value is Disable. To enable 802.1x tunneling on a port, 802.1x (PNAC) Port Control must be set to ForceAuthorized. See Basic port settings configuration parameters (page 197).
STP BPDU Tunnel Status	Specifies the Spanning Tree Bridge Protocol Data Unit (STP BPDU) Tunnel status. Select Enable – the STP BPDUs packets received on the port are not processed but are forwarded like data packets. Select Disable – the packets are handled normally. The default value is Disable. BDTU tunneling status cannot be set if 802.1x tunnel status is disabled.
Ingress Filtering	Specifies the Ingress Filtering status. Select Enable – the device discards incoming frames for VLANs where this port is not a member. Select Disable – the device accepts all incoming frames. The default value is Disable.
Port Mode	Set Port Mode as Access, Trunk, or Hybrid. The default Port Mode is Hybrid.

Static VLAN configuration parameters

The following section describes the parameters for configuration of the static VLAN located at **Configuration, VLAN setup, Static VLAN** tab.

Variable definitions

The following table describes the variables and values for configuring static VLAN settings.

Variable	Value
VLAN ID	Type a unique VLAN ID that you want to configure as a static VLAN.
VLAN Name	Type the VLAN name.
Member Ports	Type the member port number list for a VLAN. Member ports represent the set of ports permanently assigned to the VLAN egress list. Frames that belong to the specified VLAN are forwarded on the ports in the egress list. Enter a comma separated list of ports or port ranges. For example, 1-6, 9, 11.
Untagged Ports	Type the untagged port number list for a VLAN. Enter a comma separated list of ports or port ranges. For example, 1-6, 9, 11. The Untagged Ports list must be a subset of the Member Ports.

Dynamic VLAN configuration parameters

The following section describes the parameters for configuration of the dynamic VLAN located at **Configuration, VLAN setup, Dynamic VLAN** tab.

Prerequisites

- Dynamic VLAN learning can take place only when the GVRP status of the port is enabled.

Variable definitions

The following table describes the variables and values for configuring dynamic VLAN settings.

Variable	Value
Select	Select a row.
Port	Displays the port number.
Port Name	Displays the port name.
Dynamic VLAN Learning	Set the Dynamic VLAN Learning to Enable or Disable. If Enable, GVRP is enabled on the current port if the global GVRP status is enabled for the device. If Disable, GVRP is disabled on the current port even if the global GVRP is enabled. Any GVRP packet received is discarded and no GVRP registrations are propagated from other ports. The default value is Enable.
Restricted VLAN Registration	Set the Restricted VLAN Registration to Enable or Disable. If Enable, VLAN is learned dynamically on the port if the specified VLAN is statically configured in the router. If Disable, GVRP packets are processed normally and VLANs are learned dynamically even if they are not statically configured in the router. The default value is Disable.

VLAN protocol group configuration parameters

The following section describes the parameters for configuration of the protocol group located at **Configuration, VLAN setup, Protocol Group** tab.

Variable definitions

The following table describes the variables and values for configuring the VLAN protocol group settings.

Variable	Value
Frame Type	Frame Type refers to the encapsulation format. Select the frame type for the protocol group. Select one of the following options: • Ethernet • RFC 1042 • SNAP 802.1H • SNAP Other • LLV Other The default value is Ethernet.
Protocol Value	Specifies the protocol value. Select one of the following options: • ARP • IP • RARP • IPX • NOVELL • NETBIOS • APPLETALK • OTHER The default value is ARP. If you select OTHER, enter the protocol value.
Group Identifier	Type the group identifier for the frame type and protocol value combination.

VLAN port protocol configuration parameters

The following section describes the parameters for configuration of the VLAN port protocol located at **Configuration, VLAN setup, Port Protocol** tab.

Variable definitions

The following table describes the variables and values for configuring port VLAN port protocol settings.

Variable	Value
Port	Select the port to set port and protocol-based VLAN classification.
Group ID	Select the group ID of the group of protocols from the Protocol Group Database.
VLAN ID	Select the VLAN ID associated with the group of protocols for each group.

VLAN database display parameters

The VLAN database displays information for a VLAN that is either configured in the device or dynamically created as a result of GVRP requests.

The following section describes the display parameters for the current VLAN database located at **Configuration, VLAN setup, VLAN Database** tab.

Variable definitions

The following table describes the values and variable displayed on the VLAN database panel.

Variable	Value
VLAN ID	Displays the VLAN ID.
Member Ports	Displays the member ports list.
Untagged Ports	Displays the untagged ports list.
Status	Displays the VLAN status.

VLAN STP configuration

Spanning Tree Protocol (STP) is a link management protocol. It provides path redundancy while preventing undesirable loops in the network created by multiple active paths between stations.

STP basic settings configuration parameters

The following section describes the configuration parameters for the STP basic settings located at **Configuration, Spanning Tree, Basic Settings** tab.

Variable definitions

The following table describes the variables and values for configuring the STP basic settings.

Variable	Value
Enable RSTP	Select this option button to enable RSTP.
Enable MSTP	Select this option button to enable MSTP.
Disable both RSTP and MSTP	Select this option to disable the RSTP and the MSTP.

MSTP configuration

MSTP isolates link fluctuations on a particular VLAN segment and provides load balancing. Spanning tree to VLAN mapping can be configured on a per VLAN basis or multiple VLANs can be mapped to the same spanning tree.

Prerequisites to MSTP configuration

- You must disable RSTP and enable MSTP before configuring MSTP. See "STP basic settings configuration parameters" on page 117.

MSTP configuration navigation

MSTP basic settings configuration parameters

The following section describes the parameters for configuration of MSTP basic settings located at **Configuration, Spanning Tree, MSTP, Basic Settings** tab.

Variable definitions

The following table describes the variables and values for configuring the MSTP basic settings.

Variable	Value
MSTP Status	Displays the MSTP status. The status displayed is based on the MSTP setting (Enable or Disable) selected in STP Basic Settings.
Compatibility	Set the compatibility version for MSTP. Select one of the following options: • STP Compatible – indicates that the port is in STP Compatible mode. • RSTP – indicates that the port is in RSTP mode. • MSTP – indicates that the port is in MSTP mode. The default value is MSTP.
Bridge Priority	Type the bridge priority value that is used to select the root bridge. The value ranges from 0 to 61440. The values for bridge priority must be in steps of 4096. The default value is 32768.
Transmit Hold Count	Type the maximum number of packets that can be sent in an interval. The value ranges from 1 to 10. The default value is 3.

Variable	Value
Default Path Cost	Specifies the default path cost version used to configure the path cost as a 16-bit value or a 32-bit value. Select one of the following options: • 16 Bit – uses the 16-bit path cost from IEEE standard 802.1D 1998. The maximum value of the path cost of any port in the spanning tree is 65535. • 32 Bit – uses the 32-bit path cost from IEEE standard 802.1t 1998. The maximum value of the path cost of any port in the spanning tree is 200000. The default value is 32 Bit.
Maximum Age (Seconds)	Type the time period for which the information received in the RSTP Bridge Protocol Data Unit (BPDU) is valid. The value ranges from 6 to 40 seconds. The default value is 20 seconds.
Forward Delay (Seconds)	Type the time period within which the port changes its spanning tree state when moving toward the forwarding state. The value ranges from 4 to 30 seconds. The default value is 15 seconds.
Hop Count (Seconds)	Type the maximum number of bridges that a packet can cross before it is dropped, to avoid infinite looping of the packets. The value ranges from 6 to 40 seconds. The default value is 20 seconds.
Region Name	Type the name of the configuration region. The default value is the region name, which is equal to the Bridge Media Access Control (MAC) address.
Region Version	Type the version number of the configuration. The value ranges from 0 to 65535. The default value is 0.

CIST configuration parameters

The following section describes the parameters for configuration of the CIST located at **Configuration, Spanning Tree, MSTP, CIST Settings** tab.

Variable definitions

The following table describes the variables and values for configuring CIST.

Variable	Value
Select	Select a port.
Port	Displays the port number.
Port Name	Displays the port name.

Variable	Value
Admin Status	Specifies the administrative status of the port. Select Enabled to enable the admin status of the port. Select Disabled to disable the admin status of the port. Set the admin status of the port to override the status of the port in any of the MSTI contexts. The default value is Enabled.
Priority	Type the port priority value. Priority refers to the 4 most significant bits of the port identifier. The value ranges from 0 to 240. The values for port priority must be in steps of 16. The default value is 128.
Path Cost	Type the path cost associated with the port.
Protocol Migration	Select this check box to control migration among MSTP, RSTP, and STP protocols if the other side of the switch runs a different mode. Migration takes place only if this is selected.
Edge Port Admin Status	Specifies the administrative status of the edge port. Select Enabled to enable the admin status of the edge port. Select Disabled **to disable the admin status of** the edge port. The default value is Disabled.
Edge Port Oper Status	Specifies the operational status of the edge port admin status. The value of this field depends on the Edge Port Admin Status. If the Edge Port Admin Status is Enabled then this field is automatically set to True. This value takes effect only when you shut down and restart the port. If the Edge Port Admin Status is Disabled then this field is automatically set to False. This value takes effect only when you shut down and restart the port.
Point to Point Link	Select the administrative point-to-point status of the LAN segment attached to the port. Select one of the following options: • Force True - indicates that this port is always treated as if it is connected to a point-to-point link. • Force False - indicates that this port is treated as having a shared media connection. • Auto - indicates that this port is considered to have a point-to-point link if it is an Aggregator and all of its members are aggregatable, or if the MAC entity is configured for full- duplex operation, either through auto negotiation or by management means. The default value is Auto.
Hello Time (Seconds)	Type the amount of time between the transmission of the configuration BPDUs. This variable is measured in units of hundredths of a second.
Auto Edge Detection	Specifies the Auto Edge Detection status. Select Enabled to dynamically calculate the edge port status. Select Disabled to disable the feature. The default value is Disabled.

MSTP VLAN mapping configuration parameters

The VLAN mapping table contains one entry for each instance of MSTP.

The following section describes the parameters for configuration of MSTP VLAN mapping located at **Configuration, Spanning Tree, MSTP, VLAN Mapping** tab.

Variable definitions

The following table describes the variables and values for configuring the VLAN mapping for MSTP.

Variable	Value
MSTP Instance ID	Type the MSTP Instance ID. The Common Instance Spanning Tree (CIST) is generated by default and has instance ID number 0. The allowable values range from 1 to 16.
Add VLAN	Select the VLAN to map to the MSTP instance.
Delete VLAN	Select the VLAN to unmap from the MSTP instance.

MSTP port settings configuration parameters

The following section describes the parameters for configuration of the MSTP port settings located at **Configuration, Spanning Tree, MSTP, Port Settings** tab.

Variable definitions

The following table describes the variables and values to configure the MSTP port settings.

Variable	Value
Select	Select a row.
Port	Displays the port number.
Port Name	Displays the port name.
MSTP Instance ID	Displays the instance ID of the STP that the port is associated with.
MSTP Status	Specifies the current state of the port. Select Enabled to enable the MSTP on the current port. Select Disabled to disable the MSTP on the current port.
Priority	Type the priority of the port. The value ranges from 0 to 240. The default value is 128.
Cost	Type the cost associated with the port. This value is added to the cost of any path that includes this port. The value ranges from 1 to 200000000. The default value is 200000.

CIST port status display parameters

The following section describes the display parameters for the CIST port status located at **Configuration, Spanning Tree, MSTP, CIST Port Status** tab.

Variable definitions

The following table describes the variables and values displayed on the MSTP CIST Port Status panel.

Variable	Value
Port	Displays the port number.
Port Name	Displays the port name.
Designated Root	Displays the unique Bridge Identifier of the Bridge recorded as the Root for the segment to which the port is attached.
Designated Bridge	Displays the Bridge Identifier which this port considers to be the Designated Bridge for this port segment.
Designated Port	Displays the Port Identifier on the Designated Bridge for this port segment.
Designated Cost	Displays the path cost of the Designated Port of the segment connected to this port.
Regional Root	Displays the unique Bridge Identifier recorded as the CIST Regional Root Identifier in the transmitted configuration BPDUs.
Regional Path Cost	Displays the port contribution to the path cost of paths towards the CIST Regional Root, which includes this port.
Type	Displays the operational point-to-point status of the LAN segment attached to this port. The status indicates whether a port is considered to have a point-to-point connection or Shared media.
Role	Displays the current role of the port as defined by the Spanning Tree Protocol (STP).
Port State	Displays the current state of the port as defined by the application of the STP.

RSTP configuration

RSTP provides rapid recovery of connectivity when a bridge/bridge port or a local area network (LAN) fails. RSTP avoids the delay by calculating an alternate root port and immediately switching over to it, if available. Using RSTP, the switch immediately brings the alternate port to the forwarding state without the delays caused by the listening and learning states.

Prerequisites to RSTP configuration

- You must disable MSTP and enable RSTP before configuring RSTP. See STP basic settings configuration parameters (page 117).

RSTP configuration navigation

RSTP basic settings configuration parameters

The following section describes the configuration parameters for the RSTP basic settings located at **Configuration, Spanning Tree, RSTP, Basic Settings** tab.

Variable definitions

The following table describes the variables and values for configuring RSTP basic settings.

Variable	Value
RSTP Status	Displays the RSTP status. RSTP status is set in STP Basic Settings.
Compatibility	Specifies the compatibility for RSTP as RSTP or STP compatible version. Select RSTP for the port to transmit only RSTP BPDUs. Select STP Compatible for the port to transmit RSTP BPDUs or Topology Change Notification BPDUs (Config/TCN BPDUs). The default value is RSTP.
Bridge Priority	Type the bridge priority value used to select the root bridge.
Transmit Hold Count	Type the maximum number of packets that can be sent in an given interval, to avoid flooding. The value ranges from 1 to 10. The default value is 3.
Default Path Cost Version	This field indicates the number of bits used to calculate the path cost of all ports running in the spanning tree protocol. Select the Default Path Cost value for backward compatibility with STAP. If you select 16 Bit, the maximum value of the path cost field of any port in the spanning tree is 65535. If you select 32 Bit, the maximum value of the path cost field of any port in the spanning tree is 200000. See "RSTP port settings configuration parameters" on page 124 for the path cost setting for each port.

RSTP timers configuration parameters

The following section describes the configuration parameters for the RSTP timers located at **Configuration, Spanning Tree, RSTP, Timers** tab.

Attention: To set the Maximum Age and Forward Delay Parameters, satisfy the following relation:

2 * (Forward Delay - 1.0) >= Max Age

To set the Hello Time and Maximum Age parameters, satisfy the following relation:

Max Age >= 2 * (Hello Time + 1.0)

Variable definitions

The following table describes the variables and values for configuring the RSTP timers.

Variable	Value
Maximum Age (secs)	Type the time period for which the information received in RSTP BPDU is valid. The value ranges from 6 to 40 seconds. The default value is 20 seconds.
Hello Time (secs)	Type the time interval between two successive configuration BPDUs. The default value is 2 seconds.
Forward Delay (secs)	Type the time taken for ports to transit from one state to another. The default value is 15 seconds.

RSTP port settings configuration parameters

The following section describes the configuration parameters for the RSTP port settings located at **Configuration, Spanning Tree, RSTP, Port Settings** tab.

Variable definitions

The following table describes the variables and values for configuring the RSTP port settings.

Variable	Value
Select	Select a row.
Port	Displays the port.
Port Name	Displays the name of the port.

RSTP Status	Specifies the RSTP protocol status. Select Enabled to enable the Spanning Tree on the selected port. Select Disabled to disable the Spanning Tree on the selected port. The port is set to forwarding directly at the hardware level.
Priority	Type the port priority value used in role selection.
Path Cost	Type the path cost associated with the port.
Protocol Migration	Select this check box if you want to enable protocol migration. Protocol migration controls the migration among RSTP and STP protocols, if the other side of the router runs a different mode. Migration takes place only if this variable is enabled.
Edge Port Admin Status	Specifies the administrative status of the edge port. Select Enabled to enable the admin status of the edge port. Select Disabled **to disable the admin status of** the edge port. The default value is Disabled.
Edge Port Oper Status	Specifies the operational status of the edge port admin status. The value of this field depends on the Edge Port Admin Status. If the Edge Port Admin Status is Enabled then this field is automatically set to True. This value takes effect only when you shut down and restart the port. If the Edge Port Admin Status is Disabled then this field is automatically set to False. This value takes effect only when you shut down and restart the port.
Point to Point Link	Select the administrative point-to-point status of the LAN segment attached to the port. Select one of the following options: • Force True - indicates that this port is always treated as if it is connected to a point-to-point link. • Force False - indicates that this port is treated as having a shared media connection. • Auto - indicates that this port is considered to have a point-to-point link if it is an Aggregator and all of its members are aggregatable, or if the MAC entity is configured for full-duplex operation, either through auto negotiation or by management means.
Auto Edge Detection	Specifies the Auto Edge Detection status. Select Enabled to dynamically calculate the edge port status. Select Disabled to disable the feature. The default value is Disabled.

RSTP port status display parameters

The following section describes the display parameters for the RSTP port status located at **Configuration, Spanning Tree, RSTP, Port Status** tab**.**

Variable definitions

The following table describes the variables and values displayed on the RSTP Port Status panel.

Variable	**Value**
Port	Displays the Port Identifier.

Port Name	Displays the name of the Port.
Designated Root	Displays the unique bridge identifier of the bridge recorded as the Root for the segment to which the port is attached.
Designated Cost	Displays the path cost of the designated port of the segment connected to this port.
Designated Bridge	Displays the bridge identifier of the bridge, which this port considers to be the designated bridge for this port segment
Designated Port	Displays the port identifier of the port on the designated bridge for this port segment.
Type	Displays the operational point-to-point status of the LAN segment attached to this port. This value indicates whether a port is considered to have a point-to-point connection or shared media.
Role	Displays the current role of the port as defined by the Spanning Tree Protocol.
Port State	Displays the current state of the port as defined by application of the Spanning Tree Protocol.

IP routing advanced configuration

This section describes how to configure routing protocols such as Open Shortest Path First (OSPF), Routing Information Protocol (RIP), Route Redistribution (RRD), and Virtual Router Redundancy Protocol (VRRP) for the Business Service Gateway (BSG).

Prerequisites to IP routing advanced configuration

- You must have L3 - READ WRITE permission to access IP routing configuration.

IP routing advance configuration navigation

Static ARP configuration parameters

The following section describes the parameters for configuration of static ARP located at **Configuration, IP Routing, Static ARP**.

Variable definitions

The following table describes the variables and values for configuring Static ARP.

Variable	Value
IP Address	Type the IP address of the host whose MAC address is statically configured in the ARP cache.
MAC Address	Type the MAC address of the host.
Interface	Select the interface on which to configure Static ARP.

Static routes configuration parameters

The following section describes the parameters for configuration of static routes located at **Configuration, IP Routing, Static Routes**.

Variable definitions

The following table describes the variables and values for adding static routes.

Variable	Value
Destination Network	Type the network address of the route.
Subnet Mask	Type the subnet mask for the Destination Network address.
Gateway	Type the Next Hop gateway to reach the IP address.
Interface	Select the outgoing interface. The value ranges from 1 to 4094.
Distance (Metric)	Type the metric value of the destination. The value ranges from 0 to 255.
Routing Protocol	Displays the routing protocol for the given destination network and subnet mask. This field is displayed after you add a static route.

RIP configuration

RIP manages router information within a self-contained network such as a corporate local area network (LAN) or an interconnected group of LANs.

RIP configuration navigation

RIP basic settings configuration parameters

The following section describes the parameters for configuration of RIP basic settings located at **Configuration, IP Routing, RIP, Basic Settings** tab.

Variable definitions

The following table describes the variables and values for configuring the RIP basic settings.

Variable	Value
Space Periodic Updates	Specifies the Space Periodic Update status. Select Enabled to split and send the generated update packets. The default value is Disabled.
Security Level	Specifies the security level of the RIP. Select Minimum to accept RIP 1 packets, even when authentication is in use. Select Maximum to ignore RIP 1 packets, even when authentication is in use. The default value is Maximum.
Neighbor Filter	Specifies the Neighbor Filter status. If you select Enabled, RIP packets from a list of router IP addresses are processed by RIP while packets from other routers are dropped. If you select Disabled, RIP packets from all routers are processed. The default value is Disabled.
Auto-summary	Select the auto summarization status of RIP as Enabled or Disabled. The default value is Enabled.
Retransmission Timeout	Type the retransmission timeout value to retransmit the request update packet or an unacknowledged update response packet. The value ranges between 5 and 10. The default value is 5 seconds.

Variable	Value
Retry Count	Type the retry count value to update request and update response packet. The value ranges between 10 and 40. The default value is 36.
Default Metric	Type the default metric value to set the metric for redistributing routes. The value ranges between 1 and 16. The default value is 1.

Adding a RIP interface

Complete this procedure to add a RIP interface.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, IP Routing, RIP, Interfaces** tab. The RIP Interfaces panel appears.
2	From the **Interface** list, select the interface you want to configure.
3	Click **ADD**.

End

Variable definitions

The following table describes the variable value for adding a RIP interface.

Variable	Value
Interface	Specifies the interface ID for the RIP that you want to configure.

RIP interface configuration parameters

The following section describes the parameters for configuring RIP on an interface located at **Configuration, IP Routing, RIP, Interfaces** tab.

Variable definitions

The following table describes the variables and values for modifying a RIP interface.

Variable	Value
Select	Select an interface on which you want to enable RIP.
Interface	Displays the IP address of the interface ID to modify.

Variable	Value
RIP Status	The admin status of the RIP interface. Select one of the following options: • Enabled - activates the RIP2 process. • Disabled - disables the RIP2 process. • Passive - the RIP2 process runs as a passive process.
Split Horizon	The operational status of Split Horizon. Select one of the following options: • Split Horizon – split horizon is applied on outgoing response packets and the route is not sent on an interface from which the route is learnt. • Poisoned Reverse – the route is sent with the metric value as 16 on an interface from which the route is learnt. • Disabled – the route is sent on all interfaces and the metric is the same as in the RIP routing table. The default value is Poisoned Reverse.
Send Version	The version of RIP packets sent by the router. Select one of the following options: • Do not send - indicates that no packets are sent. • RIP Version 1 - indicates the data packets are sent using a RIP update that is complaint with RFC 1058. • RIP1 Compatible - indicates the RIP-2 updates are broadcast using an RFC 1058 route subsumption rules. • RIP Version 2 - indicates the RIP2 packets are multicasted. The default value is RIP1 Compatible.
Receive Version	The RIP packets to receive. Select one of the following options: • RIP1 - indicates only RIPv1 version packets are accepted. • RIP2 - indicates only RIPv2 version packets are accepted. • RIP1 or RIP2 - indicates both RIPv1 and RIPv2 packets are accepted. • Do not receive - indicates that no packets are accepted. The default value is RIP1 or RIP2.
Route Age Timer (Seconds)	Type the time interval after which the routes are flushed. The value ranges from 30 to 500. The default value is 180.
Update Timer (Seconds)	Type the time interval between successive RIP updates. The value ranges from 10 to 3600. The default value is 30.
Garbage Timer (Seconds)	Type the time interval after which the invalid routes are removed from the routing table. The value ranges from 120 to 180. The default value is 120.

RIP neighbor setting configuration parameters

RIP neighbors settings specifies a list of router addresses from which you can send or receive RIP packets.

The following section describes the parameters for configuration of RIP interfaces located at **Configuration, IP Routing, RIP, Neighbors Settings** tab.

Prerequisites to adding a RIP neighbor setting

- To configure Neighbor IP address, you must enable Neighbor Filter (see RIP basic settings configuration parameters (page 130)).

Variable definitions

The following table describes the variable and value for adding a RIP neighbor setting.

Variable	Value
IP Address	Type the IP address of the neighbor router to which the unicast update is sent.

RIP security settings configuration parameters

The following section describes the parameters for configuration of RIP interfaces located at **Configuration, IP Routing, RIP, Security Settings** tab.

Variable definitions

The following table describes the variables and values for configuring the type of authentication to use on a specific interface.

Variable	Value
Select	Select the RIP interface you want to configure.
IP Address	Displays the IP address of the RIP interface.
Authentication Type	The authentication type. Select one of the following options: • No Authentication - disables authentication. • Simple Password - simple password based authentication. • MD5 - message digest 5 based authentication The default value is No Authentication.
Authentication Key	Type the key used for authentication, if the authentication type is not No Authentication. When you modify the Authentication Type (to a type that requires a key), make sure you also modify the Authentication Key. The authentication key is an octet string with the string length ranging between 0 and 16 alphanumeric characters. The Authentication Key (password) does not appear in the UI after you configure a RIP security setting.

OSPF configuration

The Open Shortest Path First (OSPF) protocol is a link state Interior Gateway Protocol (IGP) used to distribute routing information within a single autonomous system. If a host using OSPF detects a change in the routing table or in the network, it immediately multicasts the change to all other hosts in the network so that all hosts have the same routing table information.

Prerequisites for OSPF configuration

- You must enable RRD before configuring OSPF (see "RRD basic settings configuration parameters" on page 140).
- You must enable global OSPF Status before configuring OSFP interfaces.

OSPF configuration navigation

OSPF basic settings configuration parameters

The following section describes the parameters for configuration of OSPF basic settings located **at Configuration, IP Routing, OSPF, Basic Settings** tab.

Variable definitions

The following table describes the variables and values for configuring OSPF basic settings.

Variable	Value
OSPF Status	Specifies the global status of the protocol in the router. Select Enabled to enable the router to communicate with other OSPF routers. Select Disabled to disable the router from communicating with other OSPF routers. The default value is Disabled.
Router ID	Type the router identifier. The router ID in OSPF has the same format as an IP address but identifies the router independent of its IP address. You can configure an arbitrary value for the IP address for each router; however, each router ID must be unique. To ensure uniqueness, the router ID must match with one of the router IP interface addresses.

Variable	Value
Autonomous System Border Router	Specifies the Autonomous System Border Router. Select Yes to configure the router as an Autonomous System Border Router. If you select No, the router is not configured as an Autonomous System Border Router. The default value is No.
RFC 1583 Compatibility	Specifies the Request for Comments (RFC) 1583 compatibility for choosing the route among multiple Autonomous Systems (AS) for the same destination. To minimize the chance of routing loops, all OSPF routers in an OSPF routing domain must have RFC compatibility set identically. Select Yes to use the preference rules specified by RFC1583. Select No to use the preference rules specified in RFC2178. The default value is Yes.
External Link State Database Limit	Type the maximum number of non-default AS-external-Link State Advertisement (LSA) entries that can be stored in the link state database. The value ranges from -1to 2147483647. The default value is -1.
NSSA ASBR-Default-Route Translator	Select the Not-So-Stubby-Area (NSSA) ASBR default router as either Enabled or Disabled. The default value is Disabled.
ABR-type	Select the ABR-type as Standard, Cisco, or IBM. The default value is Standard.

OSPF area configuration parameters

The following section describes the parameters for configuration of OSPF areas located **at Configuration, IP Routing, OSPF, Area** tab.

Variable definitions

The following table describes the variables and values for adding an OSPF area.

Variable	Value
Area ID	Type the area identifier. The area ID in OSPF has the same format as an IP address but defines a summarization point for Link State Advertisements (LSAs). You may configure up to five areas.
Type	Select the area type for the specified area ID. Select one of the following options: • Normal – Configures the area type as Normal. All the external Link State Advertisements (LSA) (Type 5 LSA) can be flooded through the normal area. • Stub – Configures the area type as Stub. External LSAs cannot be flooded into a stub area (a default route is used to reach the external routes). • NSSA – Configures the area type as Not-So-Stubby-Area (NSSA). Only a limited number of Type 5 external LSAs are translated into Type 7 LSAs and flooded into the NSSA. The default value is Normal.
Send Summary Routers	Specifies the Send Summary Routers status. This controls the import of summary LSAs into the stub area but has no effect on other areas. If you select Yes, the router summarizes and propagates summary LSAs. If you select No, the router does not summarize nor propagate summary LSAs. The default value is No.
NSSA Translator Stability Interval	Type the NSSA Translator Stability Interval. The range is 0 to 2147483647. The default value is 40.

OSPF interface configuration parameters

The following section describes the parameters for configuration of the OSPF interface located **at Configuration, IP Routing, OSPF, Interface** tab.

Variable definitions

The following table describes the variables and values for configuring an OSPF interface.

Variable	Value
Interface	Select the VLAN interface index.
Area ID	A 32-bit integer uniquely identifying the area to which the interface connects. The area ID 0.0.0.0 is used for the backbone area. The default value is 0.0.0.0.

Variable	Value
Priority	Type the priority. This is used in the designated router (DR) election algorithm. The value ranges between 0 and 255. The value 0 signifies that the router is not eligible to become the designated router on a particular network.
Passive Status	Select the Passive Status to either Enable or Disable.
Authentication Type	Specifies the authentication type. Select one of the following options: • None – indicates authentication is not required. • Simple Password – indicates a simple password is required for authentication. • MD5 – indicates message digest 5 based authentication. The default value is None.
MD5 Key ID	If Authentication Type is MD5, type the secret key used to create the message digest appended to the OSPF packet.
Authentication Key	If Authentication Type is set to Simple Password, type the authentication key. The Authentication Key does not appear in the UI after you configure a OSPF area configuration.
Hello Interval	Type the Hello Interval. The range is 1to 65535. The default value is 10 seconds.
Retransmit Interval	Type the Retransmit Interval. The range is 0 to 3600. The default value is 5 seconds.
Transmit Delay	Type the Transmit Delay. The range is 0 to 3600. The default value is 1 second.
Dead Interval	Type the Dead Interval. The range is 0 to 2147483647. The default value is 40 seconds.
Designated Router	Displays the IP Address of the designated router. This field is displayed after you add an OSPF interface.
Status	Specifies the OSPF interface status. Select Enabled to advertise the interface as an internal route to some area. If you select Disabled, the interface is external to OSPF. The default value is Enabled. This field is displayed after you add an OSPF interface.

OSPF virtual interface configuration parameters

The following section describes the parameters for configuration of the OSPF virtual interface located **at Configuration, IP Routing, OSPF, Virtual Interface** tab.

Variable definitions

The following table describes the variables and values for adding an OSPF virtual interface.

Variable	Value
Transit Area ID	Select the transit area ID. This is a list of previously configured OSPF interfaces (see OSPF area configuration parameters (page 135)).
Neighbor Router ID	Type the router ID of the virtual neighbor.
Authentication Type	Specifies the authentication type for an interface. Select one of the following options: • None - indicates authentication is not required. • Simple Password - indicates a simple password is required for authentication. • MD5 - indicates message digest 5 based authentication. The default value is None.
MD5 Key ID	Type the secret key used to create the message digest appended to the OSPF packet if the authentication type is MD5.
Authentication Key	Type the key required for authentication, if authentication is enabled on this interface.
Hello Interval	Type the Hello Interval. The range is 1to 65535.
Retransmit Interval	Type the Retransmit Interval. The range is 0 to 3600.
Transmit Delay	Type the Transmit Delay. The range is 0 to 3600
Dead Interval	Type the Dead Interval. The range is 0 to 2147483647.
Neighbour State	Displays the state of the neighbor router, either Up or Down. This field is displayed after you add an OSPF configuration.

OSPF route information display parameters

The following section describes the display parameters for the OSPF route information located **at Configuration, IP Routing, OSPF, Route Information** tab.

Variable definitions

The following table describes the variables and values displayed on the OSPF Route Information panel.

Variable	Value
IP Address	Displays the IP address of the OSPF router.
Subnet Mask	Displays the subnet mask of the router.
TOS	Displays the Type of Service (TOS) of the OSPF router

Gateway	Displays the gateway of the OSPF router.
Type	Displays the OSPF router type.
Area ID	Displays the area ID of the OSPF router
Cost	Displays the cost of the OSPF router.
Type 2 Cost	Displays the type 2 cost of the OSPF router.
Interface	Displays the interface ID of the OSPF interface.

OSPF link state database display parameters

The following section describes the display parameters for the OSPF link state database located **at Configuration, IP Routing, OSPF, Link State Database** tab.

Variable definitions

The following table describes the variables and values displayed on the OSPF Link State Database panel.

Variable	**Value**
Area ID	Displays the Area ID associated with the OSPF address range.
Type	Displays the area type.
Link ID	Displays the Link Identifier. The value is in the form of an IP address.
ADV Router	Displays all of the router Link State Advertisements (LSAs). If IP address is not included, then the information displayed describes the local router.
Age(seconds)	Displays the route age value.
Sequence Number	Displays the OSPF sequence number. The OSPF sequence number is a 32 bit signed integer. The sequence number starts with the value ‘80000001’h or ‘-7FFFFFFF’h.
Checksum	Displays the checksum value.
Link Count	Displays the link count value.

RRD configuration

Route Redistribution (RRD) allows different routing protocols to exchange routing information.

RRD configuration navigation

RRD basic settings configuration parameters

The following section describes the configuration parameters for the RRD basic settings located **at Configuration, IP Routing, RRD, Basic Settings** tab.

Variable definitions

The following table describes the variables and values for configuring the RRD basic settings.

Variable	Value
RRD Status	Select the RRD status as Enabled or Disabled. Select Enabled to enable route redistribution. Select Disabled to disable route redistribution. Router redistribution is allowed only after you set the As Number and Router ID fields to valid values.
AS Number	Type the Autonomous System (AS) number of the router. The value ranges from 1 to 65535. The default value is 0.
Router ID	Type the router ID. The router ID must be one of the IP addresses of the IP interfaces configured in the switch.

RRD RIP settings configuration parameters

The following section describes the parameters for configuration of the RRD RIP settings located **at Configuration, IP Routing, RRD, RIP** tab.

Variable definitions

The following table describes the variables and values for configuring RRD RIP settings.

Variable	Value
RIP Status	Select the RIP status. Select Enabled to allow route redistribution in the RIP. Select Disabled to stop route redistribution in the RIP.

Default Metric	Type the default metric value of the router. The default value is 3.
Import	Select a route from the following options: • Direct routes — Direct Routes are populated in the RIP routing database. • Static routes — Static routes are populated in the RIP routing database. • OSPF routes — OSPF routes are populated in the RIP routing database. • BGP routes — BGP routes are populated in the RIP routing database.
Route Tag Type	Specifies whether the route tag is manually entered or automatically generated. Select Manual — the Route Tag must be entered manually. Select Automatic — the Route Tag is generated automatically and the Route Tag field is disabled.
Route Tag	Type the route tag, if the Route Tag Type is Manual. The value ranges from 0 to 65535.

RRD OSPF settings configuration parameters

The following section describes the parameters for configuration of the RRD OSPF settings located **at Configuration, IP Routing, RRD, OSPF** tab.

Prerequisites

- You must configure the router as an Autonomous System (AS) border router before you can configure route redistribution.

Variable definitions

The following table describes the variables and values for configuring RRD OSPF settings.

Variable	**Value**
OSPF Status	Select the OSPF status as Enabled or Disabled. Select Enabled to allow router redistribution in the OSPF. Select Disabled to disable router redistribution in the OSPF.
Import	Select a route from the following options: • Direct routes — Direct Routes are populated in the OSPF routing database • Static routes — Static routes are populated in the OSPF routing database. • RIP routes — RIP routes are populated in the OSPF routing database. • BGP routes — BGP routes are populated in the OSPF routing database.

VRRP configuration

With VRRP, you can configure several routers on a multi-access link using the same virtual IP address.

VRRP configuration navigation

- VRRP basic settings configuration parameters (page 142)
- VRRP settings configuration parameters (page 142)

VRRP basic settings configuration parameters

The following section describes the parameters for configuration of the VRRP basic settings located **at Configuration, IP Routing, VRRP, Basic Settings** tab.

Variable definitions

The following table describes the variable and value for configuring VRRP basic settings.

Variable	Value
VRRP Status	Specifies the VRRP status. Select Enabled to enable VRRP in the router and restart VRRP on all the VRRP-enabled interfaces. This status enables the reception of VRRP packets. Select Disabled to disable VRRP in the router and shut down VRRP on all VRRP-enabled interfaces. This status disables the reception of VRRP packets. The default value is Disabled.

VRRP settings configuration parameters

The following section describes the parameters for configuration of the VRRP settings located **at Configuration, IP Routing, VRRP, VRRP Settings** tab.

Variable definitions

The following table describes the variables and values for configuring VRRP settings.

Variable	Value
Virtual Router ID	Type the virtual ID associated with the virtual router.
Interface	Select the interface to be configured. This is the interface on which VRRP is enabled.

Variable	Value
Primary IP Address	Type the primary IP address for the virtual router. When the virtual router transitions from backup state to master state and in case more than one IP address exists for a given interface index, the primary IP address specifies the real IP address of the master router (the IP address that is listed as the source in the VRRP advertisement last received). If the primary IP address is set to 0.0.0.0, the IP address that is numerically lowest is selected.
Priority	Type the priority for the Virtual Router master election process. The value ranges from 0 to 255, although the range of values you may enter is 1 to 254. Higher values indicate higher priority. A priority value of 0 is set by the master router to indicate that this router has ceased to participate in VRRP. A backup virtual router must transition to become a new master. A priority value of 255 is used for the router that owns the associated IP addresses. The default value is 100.
Authentication Type	Select the Authentication type used for VRRP protocol exchanges between virtual routers. If you select No Authentication, the VRRP Protocol exchange values are not authenticated. If you select Simple Text Password, the VRRP Protocol exchanges are authenticated by a clear text password. The default value is No Authentication.
Authentication Key	Type the authentication key for the virtual router, if the Authentication Type is Simple Text Password.
Advertisement Interval (Seconds)	Type the time interval for sending the advertisement packets. Only the master router sends VRRP advertisements. The value ranges from 1 to 255. The default value is 1.
Pre-emption	Specifies the preemption status. Select Enable to enable preemption mode. Select Disable to disable preemption mode. The default value is Enable.
Oper State	Displays the current state of the virtual router. The current state may be one of the following: • Initialize - the virtual router is waiting for a startup event. • Backup - the virtual router is monitoring the availability of the master router. • Master - the virtual router is forwarding packets with IP addresses that are associated with the router.

DHCP advanced configuration

This section describes the advanced configuration for Dynamic Host Configuration Protocol (DHCP) server and the relay settings for Business Service Gateway (BSG).

Prerequisites for DHCP advanced configuration

- You must have SYSTEM - READ WRITE permission to access DHCP configuration.

DHCP advanced configuration navigation

- DHCP server configuration (page 146)
- DHCP relay settings configuration parameters (page 151)

DHCP server configuration

The following sections provide configuration information for the DHCP server.

DHCP server configuration navigation

DHCP basic settings configuration parameters

The following section describes the parameters for configuration of DHCP basic settings located at **Configuration, DHCP, DHCP Server, Basic Settings** tab**.**

Variable definitions

The following table describes the variables and values for configuring DHCP basic settings.

Variable	Value
DHCP Server	Select the DHCP server status. Select Enabled to enable the DHCP server and process DHCP client requests. Select Disabled to disable the DHCP server and stop processing client requests. The default value is Enabled.
Blocked IP Address Re-use Timer (seconds)	Type the reuse timeout value used by the DHCP server. This timer value represents the amount of time the DHCP server entity waits for the DHCP request from the client before reusing the offer. The value 0 disables the timer. The value ranges from 1 to 120. The default value is 5 seconds.
ICMP Echo Check for Assigned IP	Select the ICMP Echo status. Select Enabled to enable the DHCP Server to probe for the IP address before allocating the IP address to a client through the ICMP echo message. Select Disabled to automatically allocate the IP address. The default value is Disabled.
Next Server Address	Type the IP address of the next server.
Boot FileName	Type the name of the boot file. The default value is None.

DHCP global options configuration parameters

DHCP global options provide a framework for passing configuration information to hosts on a TCP/IP network.

The following section describes the parameters for configuration of DHCP global options located at **Configuration, DHCP, DHCP Server, Global Options** tab**.**

Variable definitions

The following table describes the variables and values for configuring DHCP global options settings.

Variable	Value
Option	The DHCP option. Select one of the following options: • Netmask (IP Format) – the client subnet mask (RFC 950). The code for the subnet mask is 1 and its length is 4 octets. • Default Router (IP format) – a list of IP addresses for routers on the client subnet. The code for the default router option is 3 and its length is 4 octets. The length must always be a multiple of 4. • Timer servers (IP format) – a list of time servers (RFC 868) available to the client. The code for the time server option is 4 and its length is 4 octets. The length must always be a multiple of 4. • Name server (IP format) – a list of name servers available to the client. The code for this option is 4. The length must always be a multiple of 4. • Domain Name server (IP format) – the Domain Name Server IP address is configured and is sent as an option in DHCP offers. • Domain Name (String) – this domain name is used by the client to resolve host names through the Domain Name System. • Enter option code manually – the option code must be entered manually.
Option Code	For the Enter option code manually option, you must enter the code. For all other options, this field is automatically updated.
Value	Type the value for the option code.

DHCP pool settings configuration parameters

The following section describes the parameters for configuration of DHCP pool settings located at **Configuration, DHCP, DHCP Server, Pool Settings** tab**.**

Variable definitions

The following table describes the variables and values to add a DHCP pool setting.

Variable	Value
DHCP Pool Id	Type the pool ID for the DHCP pool.
DHCP Pool Name	Type the pool name for the DHCP pool.
Subnet Pool	Type the subnet of the IP address in the pool.

Variable	Value
Network Mask	Type the subnet mask of the IP address in the pool. The default value is 255.255.255.0.
Start IP Address	Type the first IP address in the pool. The DHCP server uses this IP address for dynamic allocation.
End IP Address	Type the last IP address in the pool.
Lease Time	Type the time interval for which the IP address is valid. The default least time is 1 hour.
Utilization Threshold	Enter the DHCP pool utilization threshold value. The threshold value is a percentage. If pool utilization is above this value, a trap is sent. If pool utilization is set to 0, the trap is disabled. The value ranges from 0 to 100. The default value is 75.
Infinite Lease Time	Select this check box to assign the maximum lease time associated with the server pool.
Status	Displays the status of the pool setting entry. Status is Up or Down. This field is displayed after you add a pool setting entry.

DHCP pool options configuration parameters

The following section describes the parameters for configuration of DHCP pool options located at **Configuration, DHCP, DHCP Server, Pool Options** tab**.**

Variable definitions

The following table describes the variables and values to add a DHCP pool option.

Variable	Value
Pool Name	Select the pool name.
Option	The DHCP option. Select one of the following options: • Netmask (IP Format) – the client subnet mask (RFC 950). The code for the subnet mask is 1 and its length is 4 octets. • Default Router (IP format) – a list of IP addresses for routers on the client subnet. The code for the default router option is 3 and its length is 4 octets. The length must always be a multiple of 4. • Timer servers (IP format) – a list of time servers (RFC 868) available to the client. The code for the time server option is 4 and its length is 4 octets. The length must always be a multiple of 4. • Name server (IP format) – a list of name servers available to the client. The code for this option is 4. The length must always be a multiple of 4. • Domain Name server (IP format) – the Domain Name Server IP address is configured and is sent as an option in DHCP offers. • Domain Name (String) – this domain name is used by the client to resolve host names through the Domain Name System. • Enter option code manually – the option code must be entered manually.

Variable	Value
Option Code	For the Enter option code manually option, you must enter the code. For all other options, this field is automatically updated.
Value	Type the option value.

DHCP host option configuration parameters

The following section describes the parameters for configuration of DHCP host options located at **Configuration, DHCP, DHCP Server, Host Options** tab**.**

Variable definitions

The following table describes the variables and values for configuring a DHCP host option.

Variable	Value
Host MAC Address	Type the host MAC address.
Pool Name	Select the pool name.
Option	The DHCP option. Select one of the following options: • Netmask (IP Format) – the client subnet mask (RFC 950). The code for the subnet mask is 1 and its length is 4 octets. • Default Router (IP format) – a list of IP addresses for routers on the client subnet. The code for the default router option is 3 and its length is 4 octets. The length must always be a multiple of 4. • Timer servers (IP format) – a list of time servers (RFC 868) available to the client. The code for the time server option is 4 and its length is 4 octets. The length must always be a multiple of 4. • Name server (IP format) – a list of name servers available to the client. The code for this option is 4. The length must always be a multiple of 4. • Domain Name server (IP format) – the Domain Name Server IP address is configured and is sent as an option in DHCP offers. • Domain Name (String) – this domain name is used by the client to resolve host names through the Domain Name System. • Enter option code manually – the option code must be entered manually.
Option Code	For the Enter option code manually option, you must enter the code. For all other options, this field is automatically updated.
Value	Type the option value.

DHCP host IP settings configuration parameters

The following section describes the parameters for reserving IP addresses for DHCP clients based on their MAC address, located at **Configuration, DHCP, DHCP Server, Host MAC-IP** tab**.** Reserving IP addresses ensures that DHCP clients always get the same IP addresses.

Variable definitions

The following table describes the variables and values for configuring DHCP host IP settings.

Variable	Value
Host MAC Address	Type the MAC address of the host.
Pool Name	Select the pool name.
Host IP	Type the IP address of the host.
Identifier	Type the IP address of the identifier. The identifier is a string of maximum length 63.

DHCP client access configuration parameters

The following section describes the parameters for configuration of DHCP client access located at **Configuration, DHCP, DHCP Server, Client Access** tab**.**

Variable definitions

The following table describes the variables and values for adding a client access information for DHCP.

Variable	Value
Device Name	Type the DHCP device name. The maximum string length is 63 characters. The space character cannot appear in the device name.
Device Status	Specifies the device status. The device status restricts DHCP service to a set of clients. Select one of the following options: • Enable – only the clients in the Allow list are serviced. All other DHCP requests are dropped by the server. • Disable – all the DHCP requests on the client are dropped. • Compatible – the request from the client is serviced only if there are no clients in the Allow list. The default value is Compatible.

DHCP relay settings configuration parameters

The following section describes the parameters for configuration of DHCP relay settings located at **Configuration, DHCP, DHCP Relay.**

Variable definitions

The following table describes the variables and values for configuring DHCP relay settings.

Variable	Value
Service DHCP-Relay	Select the Service DHCP-Relay status. Select Enabled to activate the relay agent. Select Disabled to deactivate the relay agent. The default value is Disabled.
IP DHCP Relay Information Option	Select the IP DHCP Relay Information Option status. This option controls the processing related to Relaying Agent information. Select Enabled to start processing the relay agent information options. The processing includes inserting the options before relaying a packet from a client to a server and examining or stripping of options before relaying a packet from a server to a client. Select Disabled to stop processing relay agent information options. The default value is Disabled.
DHCP Server Address	Type the IP address of the DHCP server where the relay agent forwards the packets from the client.

Multicast advanced configuration

Multicast is a technique for delivering a message to multiple recipients.

This section describes advanced configuration for Dynamic Multicast (GMRP) and Internet Group Management Protocol (IGMP) snooping.

Prerequisites for multicast advanced configuration

- You must have L2 - READ WRITE permission to access multicast configuration.

Multicast advanced configuration navigation

- Dynamic multicast configuration parameters (page 153)
- IGMP snooping configuration (page 154)

Dynamic multicast configuration parameters

The following section describes the parameters for configuration of dynamic multicast located at **Configuration, Multicast, Dynamic Multicast**.

Variable definitions

The following table describes the variables and values for configuring dynamic multicast.

Variable	Value
Select	Select the port you want to configure.
Port	Type the port on which GMRP and the Restricted Group Registration are configured.
Port Name	Type the port name.
Dynamic Multicast Status	Select the GMRP port status. At the system level, Dynamic Multicast and IGMP Snooping are mutually exclusive - only one can be enabled at a time. Select Enabled to enable data transmission to multiple recipients using the same stream. Select Disabled to disable multicast routing. The default value is Enabled.
Restricted Group Registration	Select the Restricted Group Registration status. This field allows you to restrict the multicast groups learned through GMRP learning. Select Enabled to enable Restricted Group Registration. Select Disabled to disable Restricted Group Registration. The default value is Disabled.

IGMP snooping configuration

A host uses IGMP to inform a router when it joins or leaves an Internet Multicast group. IGMP snooping allows the switch to “listen in” on the IGMP conversation between hosts and routers by processing the layer 3 IGMP packets sent in a multicast network.

When IGMP snooping is enabled on the BSG, it analyses all the IGMP packets between hosts connected to the BSG and multicast routers in the network. When the BSG hears an IGMP report from a host for a given multicast group, it adds the host’s port number to the multicast list for that group. When an IGMP leave is received from a host, the BSG removes the host’s port from the table entry.

Prerequisites to IGMP snooping advanced configuration

- You must disable Dynamic Multicast Learning before you can enable IGMP Snooping (see VLAN basic settings configuration parameters (page 111)).

IGMP snooping configuration navigation

IGMP snooping basic settings configuration parameters

The following section describes the parameters for configuration of the IGMP snooping basic settings located at **Configuration, Multicast, IGMP Snooping, Basic Settings** tab.

Variable definitions

The following table describes the variables and values for configuring IGMP basic settings.

Variable	Value
IGMP Snooping Status	Select the global status of IGMP Snooping in the router. Select Enable to enable IGMP Snooping in all the existing VLAN interfaces. Select Disable to disable IGMP Snooping in all the existing VLAN interfaces. The default value is Disabled.
Proxy Reporting	Select the Proxy Reporting status in the router. If you select Enable, the router generates reports and forwards them to the router based on the available host information. If you select Disable, the switch forwards all V3 reports and a single V2 report to the router. The default value is Enable.
Multicast Forwarding Mode	Select the Multicast Forwarding Mode. Select IP Based if the hardware supports programming of S, G, and *, G entries. Select MAC Based if the hardware supports only MAC-based multicast tables. This configuration takes effect when you reboot the system. The default value is IP Based.
Report Forwarding	Select whether the reports are forwarded on all the ports or only on the router ports. Select All Ports to forward reports on all the ports. Select Router Ports to forward the reports only on the router ports. The default value is Router Ports.
Retry Count	Type the maximum number of group- specific queries sent on a port on reception of an IGMPv2 leave message. When the switch receives leave message on a port, it sends a group-specific query to check if there any other interested receivers for the group. Retry Count defines the maximum number of queries sent by the switch before deleting the port from the group membership information in the forwarding database. If the maximum retry count exceeds the Retry Count, then the port is deleted from the multicast group membership information in the forwarding database. The received leave message is forwarded onto the router ports if no interested receivers are in the group. The value ranges from 1 to 5. The default value is 2.

IGMP snooping timer configuration parameters

The following section describes the parameters for configuration of the IGMP snooping timer located at **Configuration, Multicast, IGMP Snooping, Timer** tab.

Variable definitions

The following table describes the variables and values for configuring IGMP snooping timer.

Variable	Value
Router Port Purge Interval (secs)	Type the time interval for which the learnt router port is purged. For each learnt router port, the timer runs for the configured port purge time interval. When the timer expires, the learnt router port entry is purged. If control messages are received from the router before the timer expiry, then the timer restarts. The value ranges from 60 to 600. The default value is 125 seconds.
Group-Member Port Purge Interval (secs)	Type the time interval after which a port is deleted, if IGMP reports are not received on a port. The timer runs for the configured time for each port on which a report is received. This timer restarts whenever a report message is received from a host on the specific port. If the timer expires, the learnt port entry is purged from the multicast group. The value ranges from 130 to 1225. The default value is 260 seconds.
Report Forward Interval (secs)	Type the time interval within which the next report messages for the same multicast group is not forwarded. This timer is used when proxy reporting is disabled and the switch must suppress multiple IGMPv2 report messages for the same group from being forwarded to the router. The Report Forward Interval is configured for each multicast group. This timer is started as soon as a report message for that group is forwarded. Within this Report Forward Interval, if another report for the same group arrives, the report is not forwarded. The value ranges from 1 to 25. The default value is 5 seconds.
Group Query Interval (secs)	Type the interval within which the switch sends a group-specific query on a port when an IGMPv2 leave message is received. The value ranges from 2 to 5. The default value is 2 seconds.

IGMP snooping interface configuration parameters

The following section describes the parameters for configuration of the IGMP snooping interface located at **Configuration, Multicast, IGMP Snooping, Interface Configuration** tab.

Variable definitions

The following table describes the variables and values for configuring the IGMP snooping interface.

Variable	Value
VLAN ID	Select the VLAN ID on which IGMP snooping is configured.
IGMP Snooping Status	Select the IGMP Snooping Status for the VLAN ID. Select Enabled to enable the switch to watch for IGMP messages from the host connected on the interface and build the software. This ensures that only the ports that require a given multicast stream actually receive it. Select Disabled to disable IGMP Snooping in the interface. The default value is Enabled.
Operating Version	Select the operating version of IGMP for the specified VLAN. Select one of the following options: • Version1 • Version2 • Version3 The default value is Version3.
Fast Leave	Select the fast leave status of IGMP. If you select Disabled, the switch checks if any interested receivers are in the group by sending a group- specific query before removing the port from the forwarding table. If you select Enabled, the switch does not send a group-specific query. It immediately removes the port from the forwarding table. The default value is Disabled.
Querier Status	Select the Querier Status as Enabled or Disabled. If Enabled, general queries are sent by the IGMP snooping switch. The default value is Disabled.
Querier Interval (secs)	Type the time period during which the general queries are sent by the IGMP snooping switch when the switch is configured as querier on a VLAN. The value ranges from 6 to 600. The default value is 125.
Router Port List	Type the router port list for VLAN.
Current Version	Displays the current operating version of IGMP. This field is displayed after a snooping interface is added.
Current Querier Status	Displays the current querier status in the switch. This field is displayed after a snooping interface is added.

IGMP snooping VLAN router ports mapping information

The following section describes the display parameters for the IGMP snooping VLAN router ports mapping information located at **Configuration, Multicast, IGMP Snooping, Router Ports** tab.

Variable definitions

The following table describes the variables and values displayed on the IGS VLAN Router Ports dialog box.

Variable	Value
VLAN ID	Displays the VLAN ID.
Port List	Displays the ports on which routers are connected for the VLAN ID.

IGMP snooping multicast forwarding group information

The following section describes the display parameters for the IGMP snooping multicast forwarding group information located at **Configuration, Multicast, IGMP Snooping, Group Information** tab.

You can view both the MAC-based Multicast Forwarding table and IP-based Multicast Forwarding table.

Variable definitions

The following table describes the variables and values displayed on the MAC Based Multicast Forwarding Table and IP Based Multicast Forwarding Table screens.

Variable	Value
MAC Based Multicast Forwarding	
VLAN ID	Displays the VLAN ID pertaining to the MAC-based multicast forwarding entry.
Group MAC Address	Displays the configured Group MAC Multicast address.
Port List	Displays the port list to which the multicast data packets for the group are forwarded.
IP Based Multicast Forwarding	
VLAN ID	Displays the VLAN ID pertaining to the IP-based multicast forwarding entry.
Source IP Address	Displays the IP address of the source that sends the multicast traffic.
Group IP Address	Displays the IP address of the group that is registered for receiving the multicast traffic.
Port List	Displays the configured port list.

QoS advanced configuration

Quality of Service (QoS) is an architecture for providing different levels of service for network traffic. This section describes the advanced configuration for QoS for Business Service Gateway (BSG).

Prerequisites for QoS advanced configuration

- You must have SYSTEM - READ WRITE permission to access QoS configuration.

QoS advanced configuration navigation

QoS basic settings configuration parameters

The following section describes the parameters for configuration of the QoS basic settings located at **Configuration, QoS, Basic Settings** tab.

Variable definitions

The following table describes the variable and value for configuring QoS basic settings.

Variable	Value
QoS Status	Select the module status of QoS. If you select Enable, the DiffServ module programs the hardware and starts the protocol operation. If you select Disable, the DiffServ module stops the protocol operation by deleting the hardware configuration. The default value is Enable.

Policy map settings configuration parameters

The following section describes the parameters for configuration of the QoS policy map settings located at **Configuration, QoS, Policy Map** tab.

Variable definitions

The following table describes the variables and values for configuring policy map settings.

Variable	Value
Police ID	Type the unique ID of the policer.
PoliceType	Select the supported police type. The only supported police algorithm is TRTCM. TRTCM indicates Two Rates Three Color Marker. This meters an IP packet stream and marks the packets based on two rates: Peak Information Rate (PIR) and Committed Information Rate (CIR). The associated threshold sizes are green, amber, or red. A packet is marked red if it exceeds PIR. It is marked amber if it exceeds CIR. It is marked green if it does not exceed CIR. The marking is based on Committed Information Rate (CIR) and two associated burst sizes - Committed Burst Size (CBS) and Peak Burst Size (PBS). A packet is marked green if it does not exceed CBS and amber if it exceeds CBS but not PBS. Otherwise, it is marked red.
PIR (bytes per second)	Type the PIR key value in bytes per second. The default value is 3250000.
CIR (bytes per second)	Type the CIR key value in bytes per second. The default value is 3000000.
PBS (Peak frame size (bytes))	Type the PBS key value in bytes per second. The default value is 15000.
CBS (Committed frame size (bytes))	Type the CBS key value in bytes per second. The default value is 10000.

Class maps configuration parameters

A Class Map is used to classify stream of traffic.

The following section describes the parameters for configuration of QoS class maps located at **Configuration, QoS, Class Map** tab.

Variable definitions

The following table describes the variables and values for configuring class maps.

Variable	Value
Class Map ID	Type the Class Map identifier. The value ranges from 1 to 2147483647.
Policy Map ID	Type the Policy Map identifier. The value ranges from 1 to 2147483647.
Source IP Address	Type the source IP address that uniquely defines a packet flow.
Source Subnet Mask	Type the subnet mask for the source IP address.
Destination IP Address	Type the destination IP address that uniquely defines a packet flow.

Variable	Value
Destination Subnet Mask	Type the destination subnet mask address for the destination IP address.
Protocol	Select the protocol ID to identify the packet flow. Select one of the following options: • Any – both TCP or UDP packets are classified using the class map. • TCP – only TCP packets are classified using the class map. • UDP – only UDP packets are classified using the class map.
Source Port	Type the source port. The value ranges from 1 to 65535.
Destination Port	Type the destination port. The value ranges from 1 to 65535.
Incoming DSCP	Type the incoming Differentiated Services Code Point (DSCP). The value ranges from 0 to 63.
IP Interface	Select the interface from the list or select Any for any interface to be used for the class map. The default value is Any.

Marking configuration parameters

The following section describes the parameters for configuration of QoS marking located at **Configuration, QoS, Marking** tab.

Variable definitions

The following table describes the variables and values to configure markings.

Variable	Value
Select	Select a class map.
Class Map	Displays a configured class map identifier.
Outgoing Priority	Select the 802.1p priority. The value ranges from 1 to 7. The default value is 7–802.1p.
Outgoing DSCP	Select the outgoing DSCP from the given list.
Value	Type the marking value.
Marking	Select this check box to enable marking.

Port based QoS configuration parameters

You can configure the mapping between 802.1p priority and queue on a per port basis.

The following section describes the parameters for configuration of port based QoS located at **Configuration, QoS, Port-based QoS** tab.

Variable definitions

The following table describes the variables and values for configuring port based QoS.

Variable	Value
Select	Select the port you want to configure.
Port	Displays the port number.
Port Name	Displays the port name.
Priority0	Select the Traffic Class value for priority 0. The value ranges from 0 to 7.
Priority1	Select the Traffic Class value for priority 1. The value ranges from 0 to 7.
Priority2	Select the Traffic Class value for priority 2. The value ranges from 0 to 7.
Priority3	Select the Traffic Class value for priority 3. The value ranges from 0 to 7.
Priority4	Select the Traffic Class value for priority 4. The value ranges from 0 to 7.
Priority5	Select the Traffic Class value for priority 5. The value ranges from 0 to 7.
Priority6	Select the Traffic Class value for priority 6. The value ranges from 0 to 7.
Priority7	Select the Traffic Class value for priority 7. The value ranges from 0 to 7.

QoS queue settings configuration parameters

The following section describes the parameters for configuration of the QoS queue settings located at **Configuration, QoS, Queue Settings** tab.

Queues 0, 1, and 2 are configured as strict priority queues. The weights for these queues default to 0 and cannot be changed. The weights of the remaining queues (queues 3 to 7) can be any value within the range except 0. The remaining queues are configured as weighted round robin (WRR). Packets received in strict priority queues receive immediate service from the scheduler, thereby pre-empting scheduling for WRR queues.

Variable definitions

The following table describes the variables and values for configuring QoS queue settings.

Variable	Value
Port No	Select the port number.
Select	Select the queue you want to configure.

Variable	Value
Queue	Displays the queue number.
Green Threshold Min	Type the minimum Green Threshold value. Green packets start to drop at the configured minimum depth. The default value is 100.
Green Threshold Max	Type the maximum Green Threshold value. All green packets are dropped at the configured maximum depth. The default value is 200.
Amber Threshold Min	Type the minimum Amber Threshold value. Amber packets start to drop at the configured minimum depth. The default value is 50.
Amber Threshold Max	Type the maximum Amber Threshold value. All amber packets are dropped at the configured maximum depth. The default value is 64.
Scheduler Weight	Type the queue weight. The range for queues 3 to 7 is 1 to 65535. The default weights are: • queue 0 - 0 (cannot be changed) • queue 1 - 0 (cannot be changed) • queue 2 - 0 (cannot be changed) • queue 3 - 512 (cannot be set to 0) • queue 4 - 256 (cannot be set to 0) • queue 5 - 128 (cannot be set to 0) • queue 6 - 64 (cannot be set to 0) • queue 7 - 32 (cannot be set to 0)
Queueing Strategy	Displays the queueing strategy. Queues 0 to 2 are strict priority. Queues 3 to 7 are weighted round robin.

VPN advanced configuration

This section describes advanced configuration for the Virtual Private Network (VPN) for the Business Services Gateway (BSG). VPN offers secure, encrypted communication between the local network and the remote network.

Prerequisites for VPN advanced configuration

- You must have VPN - READ WRITE permission to access VPN configuration.

VPN advanced configuration navigation

- VPN settings configuration (page 165)
- Users configuration (page 171)

VPN settings configuration

This section provides configuration of the branch office tunnel.

VPN settings configuration navigation

- VPN global settings configuration parameters (page 165)
- VPN policy configuration parameters (page 166)
- VPN IPsec configuration parameters (page 166)
- IKE pre-shared secret configuration parameters (page 168)

VPN global settings configuration parameters

The following section describes the parameters for configuration of VPN global settings located at **Configuration, VPN, VPN Settings, Global Settings** tab.

Variable definitions

The following table describes the variables and values for configuring VPN global settings.

Variable	Value
Remote Identity Type	The user identity type that uniquely identifies the peer. Select one of the following: • IPV4 - specifies the IP address • FQDN- specifies the fully qualified domain name (an unambiguous domain name that denotes the position of the node in the DNS tree hierarchy) • EMAIL - specifies the email of the peer • KEYID - specifies the string that uniquely identifies the peer
Remote Identity Value	Type the value corresponding to the selected Remote Identity Type.
PreShared Key	Type a string of text which is the key that VPN uses to authenticate before receiving any other credentials.

VPN policy configuration parameters

The following section describes the parameters for configuration of VPN policy located at **Configuration, VPN, VPN Settings, VPN Policy** tab.

Variable definitions

The following table describes the variables and values for viewing the existing VPN policies.

Variable	Value
VPN Status	Select the VPN status. VPN status can be Enabled or Disabled.
Policy Name	Select the name of the policy that you want view or delete.

VPN IPsec configuration parameters

The following section describes the parameters for configuration of VPN IPSec located at **Configuration, VPN, VPN Settings, IPSec** tab.

Note: You cannot modify an active policy. To modify a policy, set the Policy Status to INACTIVE.

Variable definitions

The following table describes the variables and values for configuring VPN IP security.

Variable	Value
Policy Action	Select this check box to create a policy action.
Policy Name	Type the IPsec policy name. Each policy must have a unique name.
Existing Policies	Select an existing policy for the IPsec policy.
Interface Name	Select the name of the interface for which you want to apply the policy.
Policy Status	Select the status of the IPsec policy. Select one of the following: • INACTIVE - the policy is deleted from the interface. • ACTIVE - the policy is applied on the interface.
IPSec Gateway IP Address	Type the security remote endpoint address. All packets are secure up to this destination.
Traffic Selector table	
Local Address	Type the source IP address of the outbound traffic.
Local Address Mask	Type the Network mask of the outbound traffic.
Remote Address	Type the destination IP address of the outbound traffic.
Remote Address Mask	Type the destination mask of the outbound traffic.
Protocol	Select the required traffic protocol for the source and destination address. Select one of the following options: • Any • TCP • UDP • ICMPv4 • AH • ESP When you select a protocol and apply the IPSec policy, the policy is applied on the selected protocol packets only. For example, if you select ICMPv4, when you ping from one host to another, only ICMP packets are authenticated.
IPSec SA table	
IPSec Mode	Select the IPSec mode. If you select Tunnel, IPSec encrypts the IP header and the payload. If you select Transport, IPSec encrypts only the payload.
Protocol	Select the authentication protocol. If you select ESP, IPSec encrypts and authenticates. If you select AH, IPSec authenticates only.
IPSec Authentication	Select the IPSec authentication method. Select one of the following: • HMAC-MAC5 - the message authentication code is calculated using the MD5 cryptographic hash function. This cryptographic hash function has some additional security properties with a 128-bit hash value, which is commonly used to check the integrity of files. • HMAC-SHA1 - the message authentication code is calculated using the SHA1 algorithm. This cryptographic hash function computes a condensed digital representation to a high degree of probability.

Variable	Value
Authentication Key	Type the IPSec Authentication Key.
IPSec Encryption	Select the IPSec Encryption. Select one of the following options: • Data Encryption Standard (DES) – is a standard for encrypting data that uses a 64 bit key to encrypt data, but only 56 bits are usable. This standard is considered inadequate for data protection as this standard do not match the speed of computer. • Triple Data Encryption Standard (3DES) – processes each block of data using a different key each time resulting in a significantly more secure message. • Advanced Encryption Standard (AES128, AES192, AES256) – has a fixed block size of 128 bits and a key size of 128, 192 or 256 bits. Due to the fixed block size of 128 bits, AES operates on a 4x4 array of bytes.
Encryption Keys 1, 2, and 3	The encryption key settings depend on the selected IPSec Encryption: • DES - specify a key for Encryption Key 1 only, length 16 • 3DES - specify encryption keys 1, 2, and 3 • AES 128 - specify a key for Encryption Key 1 only, length 32 • AES 192 - specify a key for Encryption Key 1 only, length 48 • AES 256 - specify a key for Encryption Key 1 only, length 64
Outgoing SPI	Type the security parameter index for the outgoing traffic.
Incoming SPI	Type the security parameter index for the incoming traffic.
Anti Replay	Specifies the anti-replay functionality of the security protocol. Select one of the following: • ENABLE - activates the anti-replay functionality of the security protocol. • DISABLE - deactivates the anti-replay functionality of the security protocol. The default is ENABLE.

IKE pre-shared secret configuration parameters

The following section describes the parameters for configuration of IKE preshared secret located at **Configuration, VPN, VPN Settings, IKE Pre-shared Secret** tab.

Variable definitions

The following table describes the variables and values for configuring IKE preshared secret.

Variable	Value
Policy Action	Select this check box to create a policy action.
Policy Name	Type a IPsec policy name. Each policy must have a unique name.
Existing Policies	Select an existing policy for the IPsec policy.
Interface Name	Select the name of the interface for which you want to apply the policy.
Policy Status	Type the status of the IPsec policy.

Variable	Value
IPSec Gateway IP Address	Specifies the Security remote endpoint address. All packets are secure up to this destination.
Traffic Selector table	
Local Address	Type the Source IP address of the outbound traffic.
Local Address Mask	Type the Network mask of the outbound traffic.
Remote Address	Type the Destination IP address of the outbound traffic.
Remote Address Mask	Type the Destination mask of the outbound traffic.
Protocol	Select the traffic protocol for the source or destination address. Select one of the following options: • Any • TCP • UDP • ICMPv4 • AH • ESP When you select a protocol and apply the IPSec policy, the policy is applied on the selected protocol packets only. For example, if you select ICMPv4, when you ping from one host to another, only ICMP packets are encrypted or authenticated.
IKE Phase 1 Proposal table	
IPSec Encryption	Select the IPSec Encryption. Select one of the following options: • Data Encryption Standard (DES) – is a standard for encrypting data that uses a 64 bit key to encrypt data, but only 56 bits are usable. This standard is considered inadequate for data protection as this standard do not match the speed of computer. • Triple Data Encryption Standard (3DES) – processes each block of data using a different key each time resulting in a significantly more secure message. • Advanced Encryption Standard (AES128, AES192, AES256) – has a fixed block size of 128 bits and a key size of 128, 192 or 256 bits. Due to the fixed block size of 128 bits, AES operates on a 4x4 array of bytes. Select DES if you prefer Network speed. Select 3-DES if your choice is Network security.
IPSec Authentication	Select the preferred authentication method. Select HMAC-MAC5, the message authentication code is calculated using the MD5 cryptographic hash function. This cryptographic hash function has some additional security properties with a 128-bit hash value, which is commonly used to check the integrity of files. Select HMAC-SHA1, the message authentication code is calculated using the SHA1 algorithm. This cryptographic hash function computes a condensed digital representation to a high degree of probability.

Variable	Value
DH Group	Select the required Diffie-Hellman (DH) group. DH key exchange is used to establish preshared keys. Select Group 1 – IKE uses a 768-bit Diffie- Hellman Prime modules group for performing the new Diffie-Hellman exchange. Select Group 2 – IKE uses a 1024-bit Diffie- Hellman Prime modules group for performing the new Diffie-Hellman exchange. Select Group 5 – IKE uses a 1536-bit Diffie- Hellman Prime modules group for performing the new Diffie-Hellman exchange.
Exchange	Select the exchange mode. Select Main for the highest level of Security. Select Aggressive for speed. The default value is Main.
Life Time	Select the lifetime unit. It can be seconds, minutes, or hours.
Life Time Value	Type the lifetime value.
Peer Identity Type/Value	Select the identity type to access the remote network. Select one of the following: • IPV4 - IP address • FQDN - Fully Qualified Domain Name • EMAIL - email address of the user • KEYID - uniquely identifies the peer Select the associated value from the list. The list contains the Remote Identity values added on VPN Global Settings.
Local Identity Type/Value	Select the identity type to access the local network. Select one of the following: • IPV4 - IP address • FQDN - Fully Qualified Domain Name • EMAIL - email address of the user • KEYID - uniquely identifies the peer Type the associated value.
IP Sec Phase 2 Proposal table	
Protocol	Select the authentication protocol. Select ESP, IPSec encrypts and authenticates. Select AH, IPSec only authenticates.
Encryption	Select the IPSec Encryption. Select one of the following options: • null – indicates no standard is used for IPsec encryption. • Data Encryption Standard (DES) – indicates a standard for encrypting data that uses a 64 bit key to encrypt data, but only 56 bits are usable. This standard is considered inadequate for data protection as this standard do not match the speed of computer. • Triple Data Encryption Standard (3DES) – processes each block of data using a different key each time resulting in a significantly more secure message. • Advanced Encryption Standard (AES-128, AES-192, AES-256) – has a fixed block size of 128 bits and a key size of 128, 192 or 256 bits. Due to the fixed block size of 128 bits, AES operates on a 4x4 array of bytes.

Variable	Value
Authentication	Select the preferred authentication method. Select None to indicates no authentication method is required. Select HMAC-MAC5, the message authentication code is calculated using the MD5 cryptographic hash function. This cryptographic hash function has some additional security properties with a 128-bit hash value, which is commonly used to check the integrity of files. Select HMAC-SHA1, the message authentication code is calculated using the SHA1 algorithm. This cryptographic hash function computes a condensed digital representation to a high degree of probability.
IPSec Mode	Select the IPSec mode. Select Tunnel, IPSec encrypts the IP header and the Payload. Select Transport, IPSec encrypts only the Payload.
Preferred Forward Secrecy	Select the Preferred Forward Secrecy (PFS). Select one of the following options: • Select None – IKE does not use any PFS. • PFS Group 1 – IKE uses a 768-bit Diffie-Hellman Prime modules group for performing the new Diffie-Hellman exchange. • PFS Group 2 – IKE uses a 1024-bit Diffie-Hellman Prime modules group for performing the new Diffie-Hellman exchange. • PFS Group 5 – IKE uses a 1536-bit Diffie-Hellman Prime modules group for performing the new Diffie-Hellman exchange.
Life Time	Select the lifetime unit. It can be seconds, minutes, or hours. The default value is seconds.
Life Time Value	Type the lifetime value. The default value is 800 seconds.
Anti Replay	Displays the anti-replay status for the IKE pre-shared secret policy. Displays one of the following: • ENABLE - anti-replay functionality is activated. • DISABLE - anti-replay functionality is deactivated. The default value is ENABLE.

Users configuration

This section provides configuration information for the client tunnel.

Users configuration navigation

- User database configuration parameters (page 171)
- IP address pool configuration parameters (page 172)
- VPN client termination configuration parameters (page 172)

User database configuration parameters

The following section describes the parameters for the configuration of users located at **Configuration, VPN, Users, User Database** tab.

Variable definitions

The following table describes the variables and values for configuring the user database.

Variable	Value
User Name	Type the user name. The range is 1 to 31 characters.
Password	Type the password for the user. The range is 1 to 31 characters.

IP address pool configuration parameters

The following section describes the parameters for the configuration of the IP address pool located at **Configuration, VPN, Users, Address Pool** tab.

Prerequisites

- The address pool cannot be in the same subnet as DHCP addresses.

Variable definitions

The following table describes the variables and values for configuring the VPN address pool.

Variable	Value
Pool Name	Type the name of the address pool. Addresses within the pool are allocated to remote users when they make VPN connection requests.
Start IP Address	Type the first IP address of the pool.
End IP Address	Type the last IP address of the pool.

VPN client termination configuration parameters

The following section describes the parameters for the configuration of client termination located at **Configuration, VPN, Users, Client Termination** tab.

Variable definitions

The following table describes the variables and values for configuring client termination.

Variable	Value
Policy Action	Select this check box to create a policy action.
Policy Name	Type a IPsec policy name. Each policy must have a unique name. The range is 1 to 63 characters. Policy name ALL is not allowed.

Variable	Value
Existing Policies	Select an existing policy for the IPsec policy.
Interface Name	Select the WAN interface for which you want to apply the policy.
Policy Status	Select the status of the IPsec policy. Select INACTIVE to disable the policy on the specified interface. Select ACTIVE to enable the policy on the specified interface. The default is INACTIVE.
Policy Type	Select the policy type. Select one of the following: • IKE XAUTH • IKE Pre-Shared
IKE Phase 1 Proposal table	
IPSec Encryption	Select the IPSec Encryption. Select one of the following options: • Data Encryption Standard (DES) – a standard for encrypting data that uses a 64 bit key to encrypt data, but only 56 bits are used. This standard is considered inadequate for data protection. • Triple Data Encryption Standard (3DES) – processes each block of data using a different key each time, resulting in a significantly more secure message. • Advanced Encryption Standard (AES128, AES192, AES256) – has a fixed block size of 128 bits and a key size of 128, 192 or 256 bits. Due to the fixed block size of 128 bits, AES operates on a 4x4 array of bytes. Select DES if you require network speed. Select 3-DES if you require network security.
IPSec Authentication	Select the preferred authentication method. Select one of the following options: • HMAC-MAC5 - the message authentication code is calculated using the MD5 cryptographic hash function. This cryptographic hash function has some additional security properties with a 128-bit hash value, which is commonly used to check the integrity of files. • HMAC-SHA1 - the message authentication code is calculated using the SHA1 algorithm. This cryptographic hash function computes a condensed digital representation to a high degree of probability.
DH Group	Select the required Diffie-Hellman (DH) group. DH key exchange is used to establish preshared keys. Select one of the following: • Group 1 – IKE uses a 768-bit Diffie- Hellman Prime modules group for performing the new Diffie-Hellman exchange. • Group 2 – IKE uses a 1024-bit Diffie- Hellman Prime modules group for performing the new Diffie-Hellman exchange. • Group 5 – IKE uses a 1536-bit Diffie- Hellman Prime modules group for performing the new Diffie-Hellman exchange. Select Group 2 for a compromise between network speed and network security.
Life Time	Select the life time unit. Select one of seconds, minutes, or hours.
Exchange Mode	Displays the IKE Phase 1 Exchange mode.
Life Time Value	Type the life time value. The range is 5 minutes to 8 hours.

Variable	Value
Peer Identity Type/Value	Select the identity type to access the remote network. Select one of the following: • IPV4 - IP address • FQDN - Fully Qualified Domain Name • EMAIL - email address of the user • KEYID - uniquely identifies the peer Select the associated value from the list. The list contains the Remote Identity values added on VPN Global Settings.
Local Identity Type/Value	Select the identity type to access the local network. Select one of the following: • IPV4 - IP address • FQDN - Fully Qualified Domain Name • EMAIL - email address of the user • KEYID - uniquely identifies the peer Type the associated value.
Traffic Selector table	
Local Address	Type the Source IP address of the outbound traffic.
Local Address Mask	Type the Network mask of the outbound traffic.
Remote Address	Type the Destination IP address of the outbound traffic.
Remote Address Mask	Type the Destination mask of the outbound traffic.
Protocol	Select the traffic protocol for the source or destination address. Select one of the following options: • Any • TCP • UDP • ICMPv4 • AH • ESP When you select a protocol and apply the IPSec policy, the policy is applied on the selected protocol packets only. For example, if IPSec is selected, when you ping from one host to another, only ICMP packets are encrypted or authenticated.
IP Sec Phase 2 Proposal table	
Protocol	Select the authentication protocol. Select one of the following: • ESP - IPSec encrypts and authenticates. • AH - IPSec authenticates only.

Variable	Value
Encryption	Select the IPSec Encryption. Select one of the following options: • null - traffic is not encrypted. • Data Encryption Standard (DES) – a standard for encrypting data that uses a 64 bit key to encrypt data, but only 56 bits are used. This standard is considered inadequate for data protection. • Triple Data Encryption Standard (3DES) – processes each block of data using a different key each time, resulting in a significantly more secure message. • Advanced Encryption Standard (AES128, AES192, AES256) – has a fixed block size of 128 bits and a key size of 128, 192 or 256 bits. Due to the fixed block size of 128 bits, AES operates on a 4x4 array of bytes. Select DES if you require network speed. Select 3-DES if you require network security.
Authentication	Select the preferred authentication method. Select one of the following: • None - indicates that no authentication method is required. • HMAC-MAC5 - the message authentication code is calculated using the MD5 cryptographic hash function. This cryptographic hash function has some additional security properties with a 128-bit hash value, which is commonly used to check the integrity of files. • HMAC-SHA1 - the message authentication code is calculated using the SHA1 algorithm. This cryptographic hash function computes a condensed digital representation to a high degree of probability.
Preferred Forward Secrecy	Select the Preferred Forward Secrecy (PFS). Select one of the following options: • None - IKE does not use any PFS. • PFS Group 1 - IKE uses a 768-bit Diffie-Hellman Prime modules group for performing the new Diffie-Hellman exchange. • PFS Group 2 - IKE uses a 1024-bit Diffie-Hellman Prime modules group for performing the new Diffie-Hellman exchange. • PFS Group 5 - IKE uses a 1536-bit Diffie-Hellman Prime modules group for performing the new Diffie-Hellman exchange.
Life Time	Select the life time unit. Select one of seconds, minutes, or hours.
Life Time Value	Type the life time value. The range is 5 minutes to 8 hours.

SIP advanced configuration

This section describes the advanced configuration of the Session Initiation Protocol (SIP) server for Business Service Gateway (BSG). SIP is responsible for routing calls between endpoints and for NAT ALG translation.

Prerequisites to SIP advanced configuration

- You must configure the Wide Area Network (WAN) before you configure SIP.
- You must ensure that the WAN interface can ping the SIP server.
- You must ensure that Network Address Translation (NAT) and firewall are enabled in the WAN interface.
- You must have VOICE - READ WRITE permission to access SIP configuration.

SIP advanced configuration navigation

SIP server management configuration parameters

The following section describes the parameters for configuration of the virtual interface located at **Configuration, SIP, Internal Server** tab.

Variable definitions

The following table describes the variables and values displayed and configured on the SIP Server Management dialog box.

Variable	Value
Status	Displays the status of the SIP server. The default value is Enabled.
Operating Mode	Displays the current operating mode of the SIP Server. One of the following values is displayed: • Normal – Any type of SIP call is possible. • BackupWanUp – The WAN link is up but SSE server is not reachable by WAN. • BackupWanDown – The WAN link is down. SIP calls can be made only inside the LAN. The mode changes dynamically based on the WAN link status and the polling status of central SIP server.
Internal Server	Select the SIP Internal Server status. Select Enable to enable SIP Internal Server. Select Disable to disable SIP Internal Server.

SIP system configuration

This section provides configuration information for SIP server system configuration.

SIP system configuration navigation

Central SIP server configuration parameters

The following section describes the parameters for the configuration of the central SIP server located at **Configuration, SIP, System Configuration, General** tab.

Variable definitions

The following table describes the variables and values for configuring the central SIP server.

Variable	Value
Managed Domain Name	Type the domain name of the SIP server. You can also type the IP address of the SIP server in this field. The default name is mydomain.com.
Central SIP Server Address	Type the IP address of the central SIP server. This field is mandatory.
Transport	Select the required transport protocol for SIP. Select one of the following options: • User Datagram Protocol (UDP) - the transport protocol is UDP. • Transmission Control Protocol (TCP) - the transport protocol is TCP. • Transport Layer Security (TLS) - the transport protocol is TLS. The default value is UDP.
Port	Type the port number for the transport protocol. The value ranges from 1 to 65535. The default value is 5060. This default value appears only after the Central SIP Server is configured.
Poll Interval	Type the SIP poll interval value in seconds. The value ranges from 10 to 600 seconds. The default value is 30 seconds.

Variable	Value
Poll Retries	Type the poll retry value. The value ranges from 1 to 10. The default value is 2.
Central SIP Server via Address(es)	Displays the central SIP server via address or addresses. You can enter aliases for the Central SIP Server address. Separate each address with a comma.

Call admission control (CAC) configuration parameters

The following section describes the parameters for the configuration of CAC located at **Configuration, SIP, System Configuration, CAC** tab.

Note: If the maximum number of simultaneous SIP calls across the WAN is reached, the next SIP call attempt fails and the caller hears fast busy tone.

Variable definitions

The following table describes the variables and values for configuring the SIP CAC settings.

Variable	Value
Select	Select a CAC configuration.
WAN Link	Select the required WAN link.
Maximum Calls Allowed	The maximum simultaneous calls allowed on each WAN link. The range is 1 to 50 for BSG8ew. The range is 1 to 100 for BSG12ew/aw/tw. The default value is 20.
Active Calls	The number of calls currently active on the WAN link. The range is 0 to 50 for BSG8ew. The range is 0 to 100 for BSG12ew/aw/tw.

Call detail recording (CDR) configuration parameters

The following section describes the parameters for the configuration of CDR located at **Configuration, SIP, System Configuration, CDR** tab.

Variable definitions

The following table describes the variables and values for configuring SIP CDR settings.

Variable	Value
CDR Generation	Select the CDR generation status. Select Enable to enable logging of CDR information in the CDR directory. Select Disable to disable logging of CDR information in the CDR directory. The default value is Disable.
TFTP server address	Type the TFTP server address.
Directory Path	Type the directory path.

SIP diagnostics (detailed traces) configuration parameters

The following section describes the parameters for the configuration of diagnostics located at **Configuration, SIP, System Configuration, Diagnostics** tab.

Variable definitions

The following table describes the variables and values for configuring SIP diagnostics.

Variable	Value
Dump SIP Messages	Specifies whether SIP messages are traced. Select Enable to enable traces for all calls. Select Disable to disable traces for all calls. The default value is Disable.
Detailed Traces	Specifies that the traces are logged in detail. Select one of the following options: • All – all components are traced. • None – no components are traced. • Selected – only selected components are traced. If you select this option, you can select any of the components: Call Server, Registrar, ALG-CAC, Routing Engine, and Carrier Monitoring. The default value is All.
Brief Traces	Specifies that the traces are logged in brief. Select one of the following options: • All – all components are traced. • None – no components are traced. • Selected – only selected components are traced. If you select this option, you can select any of the components: Call Server, Registrar, ALG-CAC, Routing Engine, and Carrier Monitoring. The default value is All.

SIP protocol configuration

This section provides configuration information for the SIP protocol.

SIP protocol configuration navigation

Header settings configuration parameters

The following section describes the parameters for the configuration of header settings located at **Configuration, SIP, SIP Protocol, Headers** tab.

Variable definitions

The following table describes the variables and values for configuring header settings.

Variable	Value
Organization Header	Type the name of the organization header that SIP inserts into the organization headers of SIP messages processed by the system. The maximum number of characters is 199.
Server Header	Specifies the name of the server header used in responses generated by the SIP server. The maximum number of characters is 199.

Transport settings configuration parameters

The following section describes the parameters for the configuration of transport settings located at **Configuration, SIP, SIP Protocol, Transport** tab.

Variable definitions

The following table describes the variables and values for configuring transport settings.

Variable	Value
UDP	Select this check box to configure UDP.
UDP Port	Type the port number used for UDP. The value ranges from 1024 to 65535.
TCP	Select this check box to configure TCP.

Variable	Value
TCP Port	Type the port number used for TCP. The value ranges from 1024 to 65535.
TLS	Select this check box to configure TLS.
TLS Port	Type the port number used for TLS. The value ranges from 1 to 65535.

Registrar settings configuration parameters

A registrar is a server that accepts register requests. A registrar is typically co-located with a proxy or redirect server.

The following section describes the parameters for the configuration of registrar settings located at **Configuration, SIP, SIP Protocol, Registrar** tab.

Variable definitions

The following table describes the variables and values for configuring registrar settings.

Variable	Value
Minimum Registration Period	Type the minimum registration period for the SIP server. The value ranges from 1 to 3600. The default value is 30 seconds.
Maximum Registration Period	Type the maximum registration period for the SIP server for any phone when the BSG is in backup mode. The value ranges from 1 to 4294967295. The default value is 30 seconds.
Default Registration Period	Type the default registration period. The value ranges from 1 to 4294967295. The default is 30 seconds.
Maximum Contacts Per AOR	Type the maximum contacts per AOR. The value ranges from 1 to 4294967295. The default value is 5.

Variable	Value
Allow Dynamic Subscriber Addition	Select the Dynamic Subscriber Addition status. Select one of the following: • Enable – Registration database and the Subscriber database are updated automatically with the subscriber information when a register comes from a SIP endpoint. • Select Disable – When a subscriber makes a call, the subscriber information has to be added to the subscriber database. When a register comes from a SIP endpoint, the Registration database updates automatically if subscriber information is present in the Subscriber database. The default value is Enable.
Remove Dynamic Subscriber On De-registration	Select the Dynamic subscriber De-Registration status. Select one of the following: • Enable – When the SIP call is complete, the subscriber is automatically removed from both the Registration and Subscriber database. • Disable – When the SIP call is complete, the subscriber information must be explicitly deleted from the database. The default value is Disable.

SIP proxy server configuration parameters

The SIP proxy server acts both as a client and a server. It accepts requests from other clients, either responding to them or passing them on to other servers.

The following section describes the parameters for the configuration of the SIP proxy server located at **Configuration, SIP, SIP Protocol, Proxy** tab.

Variable definitions

The following table describes the variables and values for configuring SIP proxy server.

Variable	Value
Forking Policy	Select the forking policy. The SIP server uses the Forking Policy to decide how to forward the SIP INVITE request. Select one of the following options: • first-only – The SIP server forwards the INVITE request only to the first contact. • sequential - The SIP server forwards the request to the first contact. If it times out, the server forwards the request to the subsequent contact. This proceeds in a sequential manner. • parallel - The INVITE request is sent to all the registered contacts of the SIP caller. The default value is sequential.
Time Out For DNS	Specifies the time out value for the Domain Name System (DNS) after which DNS lookup attempts by the proxy time out. The value ranges from 1to 4294967295. The default value is 20000 ms.

Timers configuration parameters

The following section describes the parameters for the configuration of the SIP timers located at **Configuration, SIP, SIP Protocol, Timers** tab.

Variable definitions

The following table describes the variables and values for configuring timer settings.

Variable	Value
Session Timers	
Range Validations	Select the range validation status. Select Enable to enable session timer. Select Disable to disable session timer. The default value is Enable.
Default	Type the default session timer value (in milliseconds). The value ranges from 90 to 4294967295. The default value is 1800 ms.
Minimum	Type the minimum session timer value (in milliseconds). The value ranges from 90 to 4294967295. The default value is 90 ms.
Maximum	Type the maximum session timer value (in milliseconds). The value ranges from 90 to 4294967295. The default value is 3600 ms.
Protocol Timers	
Timer T1	Type the timer T1 value (in milliseconds). This is used for local retransmission. The value ranges from 1 to 2147483647. The default value is 500 ms.
Timer T2	Type the timer T2 value (in milliseconds). This is used for local retransmission. The value ranges from 1 to 2147483647. The default value is 4000 ms.
Timer B	Type the timer B value (in milliseconds). The value ranges from 1 to 2147483647. The default value is 32000 ms.
Timer C	Type the timer C value (in milliseconds). The value ranges from 180000 to 2147483647. The default value is 180000 ms.
Timer D	Type the timer D value (in milliseconds). The value ranges from 32000 to 2147483647. The default value is 32000 for UDP.
Timer F	Type the timer F value (in milliseconds). The value ranges from 1 to 2147483647. The default value is 32000 ms.

Variable	Value
Timer H	Type the timer H value (in milliseconds). The values ranges from 1 to 2147483647. The default value is 32000 ms.
Timer I	Type the timer I value (in milliseconds). The value ranges from 1 to 2147483647. The default value is 5000 for UDP.
Timer J	Type the timer J value (in milliseconds). The value ranges from 1 to 2147483647. The default value is 32000 for UDP.
Timer K	Type the timer K value in (milliseconds). The value ranges from 1 to 2147483647. The default value is 5000 for UDP.

Routing rules configuration

This section provides configuration information for the SIP routing rules.

Routing rules configuration navigation

Viewing rules configuration parameters

The following section describes the Mode of Dialplan parameter on the View Rules panel located at **Configuration, SIP, Routing Rules, View Rules** tab.

The View Rules panel also shows the list of routing rules created using the Add Rule panel.

Variable definitions

The following table describes the variable and value displayed in the Routing Rules dialog box.

Variable	Value
Mode of Dialplan	Select the dial plan mode. Select one of the following option: • Normal Mode Outgoing – creates a Dialplan that is applicable in Normal Mode. • Backup Mode – creates a dial plan that is applicable in Backup Mode.

Adding rules configuration parameters

The following section describes the parameters for the configuration of a routing rule located at **Configuration, SIP, Routing Rules, Add Rules** tab.

Variable definitions

The following table describes the variables and values for adding routing rules.

Variable	Value
Mode of Dialplan	Select the dial plan mode. Select one of the following options: • Normal Mode Outgoing – creates a dial plan that is applicable in Normal Mode. • Backup Mode – creates a dial plan that is applicable in Backup Mode.
Condition	Select the condition. Select one of the following options: • All - All conditions. Only specify All when the routing table is empty. • Non-numeric – condition is non-numeric string. • Number is = – condition is number string with trailing wild characters such as ? and *. • Number Prefix = – condition is number string. • Number In-range = – condition is number string with the start and end numbers given in the range. • Otherwise – must be specified as the condition in the last rule.
Value (for Condition)	Type the value for the specified condition. This option is disabled for some conditions.
Specify Number Transformation	Select this check box to enable number transformations.
Type	Specifies the number transformations applicable to the condition. Select one of the following type: • Insert digits - the transformation is an insertion of digits. • Drop digits - the transformation is a deletion of digits. • Replace - the transformation is a replacement of digits.
Value (for Number Transformation)	Type the value to insert, drop, or replace.
Position	Type the position. This is the position where the insertion, deletion, or replacement starts. If you want to add another number transformation, click the Add button to add the new number transformation to the viewing window.
Specify Routes	Select this check box to enable routes.
Route To	Select the route. The route values are Carrier Server and FXO1.
Priority	Type the route priority. If you want to add another route, click the Add button to add the new route to the viewing window.

Advanced dial plan configuration parameters

The following section describes the parameters for the configuration of an advanced dial plan located at **Configuration, SIP, Routing Rules, Advanced** tab.

Variable definitions

The following table describes the variables and values for configuring an advanced dial plan.

Variable	Value
Use Web UI Dial Plan Configuration	Select this option button to enable and use the Web UI Dial Plan Configuration. If you select this check box, Custom Dial Plan Scripts is disabled. This is selected by default.
Use Custom Dial Plan Scripts	Select this option button to enable and use the Custom Dial Plan Scripts. If you select this check box, Use Web UI Dial Plan Configuration is disabled.
New Dial Plan Name	Type the new dial plan name, if you enabled Use Custom Dial Plan Scripts.
NTML File Path	Type the National Traffic Management Log (NTML) file path, if you enabled Use custom Dial Plan Scripts.
Dial Plan Mode	Select the dialplan mode, if you enabled Use custom Dial Plan Scripts. Select one of the following options: • Normal Mode Outgoing – creates a dial plan that is applicable in Normal Mode. • Backup Mode – creates a dial plan that is applicable in Backup Mode.

Provisioning users configuration parameters

The following section describes the parameters for the configuration of SIP users located at **Configuration, SIP, User Provisioning** tab.

Variable definitions

The following table describes the variables and values for configuring subscriber information.

Variable	Value
User Name	Type the subscriber name. The maximum number of characters is 100.
Domain	Type the domain name of the subscriber. The maximum number of characters is 32.
Alias	Type the alias name of the subscriber. The maximum number of characters is 100. You can configure the alias only when Allow Dynamic Subscriber Addition is enabled. You can set Allow Dynamic Subscriber Addition in Registrar Configuration under SIP Protocol. In backup mode, SIP alias works for static subscribers only.
Display Name	Type the display name for the subscriber. The maximum number of characters is 100.
Identity	Displays the SIP identity of the subscriber. This field appears after you add a user.
Contacts	Displays the contact information of the subscriber. This fields appears after you add a user.

FXO/FXS configuration

This section provides configuration information for Foreign Exchange Office (FXO)/Foreign Exchange Subscriber (FXS) for BSG.

FXO/FXS configuration navigation

Global information configuration parameters

The following section describes the parameters for the configuration of the FXO/FXS global information located at **Configuration, SIP, FXO/FXS, Global** tab.

Variable definitions

The following table describes the variables and values for global configuration of codec, FXO, and FXS.

Variable	Value
VoIP Status	Displays the VoIP current status. Displays Running if VoIP is running. Displays Not Available if VOIP is not running.
VoIP Firmware version	Displays the version of the VoIP firmware.
Country Code	The country code. The default value is Canada/US.
GMT Offset	The GMT Offset time. The default value is (GMT 00:00) London - Lisbonne.
DTMF Relay	Select the required DTMF Relay for VOIP. Select one of the following options: • Disabled – the DTMF relay is disabled. • RTP – the DTMF relay is set as Real-Time Transport Protocol. • INFO - the DTMF relay is set as Info. The default value is Disabled.
DTMF RTP Payload Type	Type the DTMF payload type. The value ranges from 96 to 127. The default value is 101.

Variable	Value
Digital Dial Timeout	Type the digital dial timeout for VoIP when the pound (#) key is not pressed. The value ranges from 500 to 10000. The default value is 5000 milliseconds.
NAT Traversal	The default value is Disabled.
STUN Server IP	Type the Simple Traversal of UDP through NATs (STUN) server IP address. You can configure this IP address only when the NAT Traversal status is enabled.
Voice Mail configuration	
Mail box Enable	Select this check box to enable voice mail in VoIP. The default value is unchecked.
Server IP	Type the IP address of the mail server. You can configure this field only when Mail box Enable is selected.
Server Port	Type the mail server port. The value ranges from 1024 to 65535. The default value is 5060. You can configure this field only when Mail box Enable is selected.
IP Type of Service Configuration	
Precedence	Select the IP Terms of Service (ToS) precedence value in the packets. The value ranges from 0 to 7. The default value is 0.
Throughput	Select this check box to configure IP ToS throughput in VoIP. The default value is disabled.
Reliability	Select this check box to configure IP ToS reliability in VoIP. The default value is disabled.
Delay	Select this check box to configure IP ToS delay in VoIP. The default value is enabled.

Codec information configuration parameters

The following section describes the parameters for the configuration of the FXO/FXS codec information located at **Configuration, SIP, FXO/FXS, Codec** tab.

Variable definitions

The following table describes the variables and values for configuring codec information.

Variable	Value
Select	Select the codec you want to configure.

Codec	Displays the default codec used by all the channels in the system. One of the following value is displayed: • G.711u • G.711a • G.723 • G.726 • G.729
Preference	Select the preference for the corresponding codec entry. Options are 1, 2, 3, 4, and 5. The following are the default values for the various indices: • G.711u - 1 • G.711a - 2 • G.723 - 3 • G.726 - 4 • G.729 - 5
Frame Size	The Frame Size for the corresponding Codec Entry. For code G.723, the range is 30 to 120, in increments of 30. Possible values are 30, 60, 90, 120. For all other codecs, the range is 10 to 100, in increments of 10. Possible values are 10, 20, 30, ... , 90, 100. The default frame size value for G.723 is 30. For all other codecs, the default value is 20.
Silence Compression Status	Select this check box to enable silence compression for the corresponding codec entry. When enabled, no unnecessary noise consumes the bandwidth of the line when the user is not speaking. This is currently applicable for G.711a, G.7.26, and G729.
RTP Payload Type	Type the RTP payload type when the codec does not have built-in silence compression support. The value ranges from 96 to 127. This is currently applicable only for G726.
Encoding Rate (kbps)	Type the encoding rate for the corresponding codec entry (in kilobytes/second). This is currently applicable only for G723. For other codecs, the value is fixed.

FXS information configuration parameters

The following section describes the parameters for the configuration of the FXS information located at **Configuration, SIP, FXO/FXS, FXS** tab.

Variable definitions

The following table describes the variables and values for configuring FXS information.

Variable	Value
FXS Channel	Select the required FXS channel. Select one of the following options: • Line1 • Line2
Channel Enable	Select this check box to enable the administrative status of the FXS channel. The default value is disabled.
Channel Number	Type the FXS channel number. The maximum length of the channel number is 31 digits.
Display Name	Type the display name for the FXS Channel.
Password	Type the password to access the FXS Channel.
MailBox Number	Type the mailbox number of the FXS Channel. The maximum length of the mail box number is 31 digits.
Fax Option	Specifies the Fax option. Select one of the following options: • Disabled – Fax is disabled. • Transparent – Fax is set as transparent. • FAX over IP With Voice – voice and fax are transmitted over IP. The default value is Disabled.
Mail Password	Type the mailbox password of the FXS channel. This password is used when the Voice Mail Configuration is enabled (see Global information configuration parameters (page 191)).
Call Forwarding	
Forward Number	Type the number to which the call is forwarded.
Ring type	Select the ring type for the FXS channel. Select one of the following options: • 0 • 1 • 2
ForwardOn NoAnswer	Select this check box to forward the incoming calls to the specified number when there is no answer on the FXS Channel.
ForwardOn Busy	Select this check box to forward the incoming calls to the specified number when the FXS Channel is busy.
Forward Unconditional	Select this check box to unconditionally forward the incoming calls to the specified number.
Codec Settings	
Codec Settings Enable	Select this check box to configure codec settings.
G.711u Frame Size	Select the G.711u Frame Size.
G.711u Preference	Select the G.711u Preference.
G.711a Frame Size	Select the G.711a Frame Size.
G.711a Preference	Select the G.711a Preference.
G.723 Frame Size	Select the G.723 Frame Size.

G.723 Preference	Select the G.723 Preference.
G.726 Frame Size	Select the G.726 Frame Size.
G.726 Preference	Select the G.726 Preference.
G.729 Frame Size	Select the G.729 Frame Size.
G.729 Preference	Select the G.729 Preference.

FXO information configuration parameters

The following section describes the parameters for the configuration of the FXO information located at **Configuration, SIP, FXO/FXS, FXO** tab.

Note: This table contains an entry for the emergency number. You should configure the emergency number before you enable the SIP server. This ensures that an emergency call originating on your system reaches its destination if the SIP server becomes unavailable.

Variable definitions

The following table describes the variables and values for configuring FXO information.

Variable	Value
FXO Channel	Select the required FXO channel.
Channel Enable	Select this check box to enable the administrative status of the FXO channel. The channel is available for use only when it is enabled.
Channel Number	Type the FXO channel number. This is the FXO number which identifies the FXO line for an incoming call.
Password	Type the password for accessing the FXO channel.
Forward Number	Type the forward number. This number is used when an incoming call on the FXO channel requires forwarding.
Ring Count	Type the ring count. This is the maximum number of rings within which FXO must get an answer from the remote number. The minimum value is 1 and maximum value is 6. The default value is 2. This default appears after you configure the channel number.
Emergency Number	Type the emergency number.
On Hook Detection Time	Type the on-hook detection time. The value ranges from 100 to10000 milliseconds. The default value is 2000 milliseconds. This default appears after you configure the channel number.

Rebooting VoIP

Complete this procedure to reboot VoIP.

Procedure steps

Step	Action
1	From the BSG navigation pane, select **Configuration, SIP, FXO/FXS, Reboot VoIP** tab. The VoIP Reboot dialog box appears.
2	Click **Reboot VoIP** to reboot VoIP.

NAT ALG display parameters

The following section describes the display parameters on the NAT ALG panel located at **Configuration, SIP, NAT ALG** tab.

Variable definitions

The following table describes the variables and values for configuring NAT ALG information.

Variable	Value
Private SIP Via Host	Displays the private IP on which SIP is running.
Private SIP Via UDP Port	Displays the private UDP via port for SIP application.
Private SIP Via TLS Port	Displays the private secured transport via port for SIP application.
Private SIP Record Route	Displays the private record-route IP for further SIP requests.
Private SIPS Record Route	Displays the private secured SIP record-route IP for further SIPS requests.
Timer for Cleaning NAT Binding	Displays the NAT binding cleaning time (in minutes) after call tear-down.
Public SIP Via Host	Displays the public SIP through IP for WAN (Normal Mode) calls.
Public SIP Via UDP Port	Displays the public SIP via UDP port.
Public SIP Via TLS Port	Displays the public SIP secured transport via port.
Public SIP Record Route	Displays the BSG-SIP server's WAN link IP for Normal Mode calls.
Public SIPS Record Route	Displays the BSG-SIPS server's WAN link IP for Normal Mode calls.

Port management advanced configuration

This section describes the configuration for Ethernet ports for Business Service Gateway (BSG).

- The following table describes the variables and values for configuring Ethernet port control. (page 198)

Prerequisites for port management advanced configuration

- You must have SYSTEM - READ WRITE permission to access port management configuration.

Ethernet ports configuration

The following section describes configuration of Ethernet ports.

Ethernet ports configuration navigation

- Basic port settings configuration parameters (page 197)
- Port control configuration parameters (page 198)

Basic port settings configuration parameters

The following section describes the parameters for the configuration of basic port settings located at **Configuration, Port Management, Ethernet, Basic Settings** tab.

Variable definitions

The following table describes the variables and values for configuring Ethernet basic port settings.

Variable	Value
Select	Select the Ethernet port you want to configure.
Port	Displays the Ethernet port number.
Port Status	Select the administrative status of the Ethernet port. Select Up to enable the administrative status of the port. Select Down to disable the administrative status of the port.
Link Status	Displays the link status of the Ethernet port. One of the following is displayed: • Up – indicates the physical link is connected. • Down – indicates the physical link is disconnected.
Port Type	This field is available only when Port Status is Down. Select the port type. Select Switch Port or Router Port.

Variable	Value
Network Type	This field is available only when Port Status is Down and Port Type is Router Port. Select the network type. Select LAN or WAN.
Default User Priority	Select the default user priority. The value ranges from 0 to 7. The default value is 0.
Jumbo Frame Support	This field is available only when Port Status is Down. The Maximum Transmittable Unit (MTU) of a FE Port is limited to 9000. The MTU must be increased if you want bigger packets without fragmentation. Enabling Jumbo Frame Support increases the MTU of the port. Select Enabled to enable Jumbo Frame Support. Select Disabled to disable Jumbo Frame Support. The default value is Disabled.

Port control configuration parameters

The following section describes the parameters for the configuration of port control located at **Configuration, Port Management, Ethernet, Port Control** tab.

Variable definitions

The following table describes the variables and values for configuring Ethernet port control.

Variable	Value
Select	Select the Ethernet port you want to configure.
Port	Displays the Ethernet port number.
Port Name	Displays the Ethernet port name.
Auto-Negotiation	Select the auto-negotiation status of the Ethernet port. Select one of the following: • Enabled - enables auto-negotiation on the interface. • Disabled - disables auto-negotiation on the interface. If you select Disabled, you can configure Duplex, Speed, and Flow Control. The default value for ports 1 to 6, and port 9, is Enabled. Auto-negotiation is disabled for ports 7 and 8.
Duplex	Select the duplex operation on the port. Select one of the following: • Full - the port operates in full-duplex mode. • Half - the port operates in half-duplex mode.

Variable	Value
Speed	Select the speed of the port. Select one of the following options: • 10 Mbps - port speed is 10Mb/s • 100 Mbps - port speed is 100Mb/s • 1Gbps - port speed is 1Gb/s.
Flow Control	Select the flow control status. Select one of the following options: • Disabled – flow control is turned off. • Transmit – flow control is sent to a remote device. • Receive – flow control is received from a remote device. • Both – flow control is sent and received from a remote device.