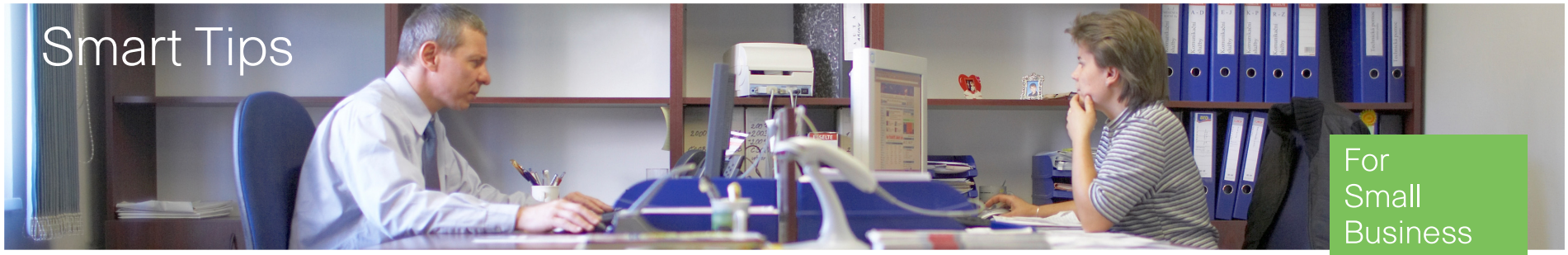


Cisco Small Business ESW500 Series Switch-to-Switch EtherChannel (Link Aggregation)

This Smart Tip document describes interconnecting the Cisco Small Business ESW500 Series Managed Switches using EtherChannel or link aggregation, which combine two or more similar Ethernet links to behave as a single Ethernet link. EtherChannel can also be used to connect to network devices such as Network Attached Storage (NAS), routers, and so on. This Smart Tip focuses on how to configure EtherChannel between two Cisco ESW500 Series switches.

Note Note that this document uses the term EtherChannel instead of link aggregation.

Why EtherChannel?

EtherChannels increase the flexibility of switch port usage by linking a number of ports together to form a single aggregated group. This increases the link bandwidth as needed. In addition, it improves the link reliability because an EtherChannel link can carry traffic even when one or more of its constituent links fail, as long as there is a single working Ethernet link in the EtherChannel.

Featured Products

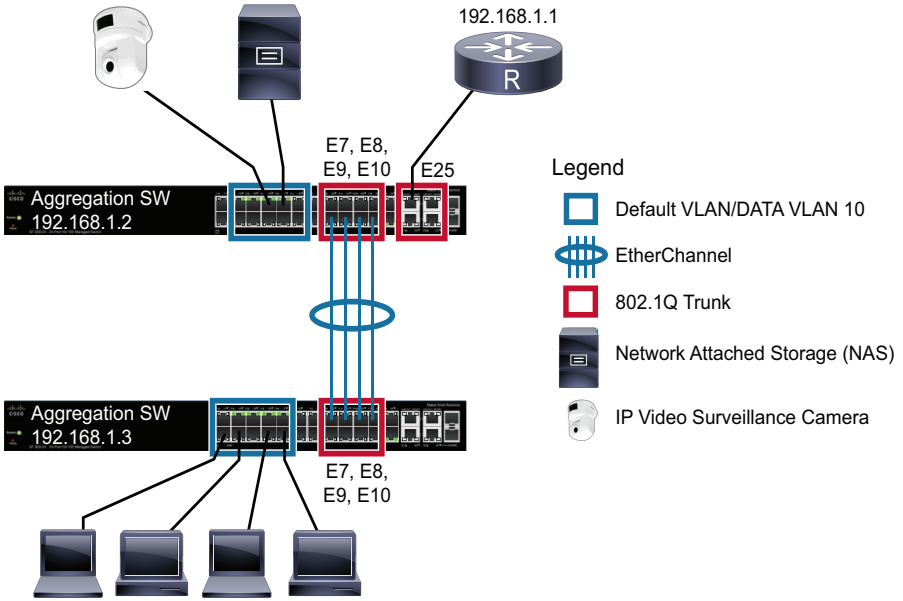
This Smart Tip describes the use of a Cisco Small Business ESW500 Series Managed Switch with various Power over Ethernet (PoE) and non-PoE switch ports. For details about other Cisco Small Business ESW500 Managed Switches, visit: http://www.cisco.com/go/esw500.

EtherChannel in Network Design

Network Topology

The descriptions in this document are based on the network topology shown in Figure 1. It consists of two Cisco Small Business ESW500 Series switches directly connected using four Ethernet links, which have been configured as an EtherChannel group. In addition, the EtherChannel link is also configured as an 802.1Q trunk to carry traffic for multiple VLANs.

Figure 1 Cisco Small Business ESW500 Series EtherChannel Topology



Although Figure 1 shows video cameras, a Network Attached Storage, and laptops/PCs, which are typical devices in a small business network, this document presents only the configuration of EtherChannel on the Cisco Small Business ESW500 Series switches.

Key EtherChannel Configuration Features

EtherChannel

An EtherChannel combines two or more similar Ethernet links to behave as a single Ethernet link. In general, an EtherChannel is treated by the system as a single logical port. In particular, the EtherChannel has port attributes similar to a regular port, such as state and speed.

An EtherChannel can be configured by statically configuring the ports on both ends of the EtherChannel link. You can also automate EtherChannel link configuration to some extent by enabling Link Aggregation Control Protocol (LACP) on both switches. In this case, configuring EtherChannel on one switch is enough, because LACP is used by the other switch to learn the configuration and configure itself accordingly. Ports added to an EtherChannel lose their individual port configuration. When ports are removed from the EtherChannel, the original port configuration is applied to the ports

Link Aggregation Control Protocol (LACP)

In the IEEE specification, LACP provides a method to control the bundling of several physical ports together to form a single logical channel. LACP allows a network device to negotiate an automatic bundling of links by sending LACP packets to the peer (directly connected device that also implements LACP). If the other device ports are also LACP ports, the devices establish an EtherChannel between them.

Note For more technical details on EtherChannel, visit http://www.cisco.com and search for the following key words: Link Aggregation, EtherChannel, PortChannel, and GigaChannel.

The Cisco Small Business ESW500 Series supports both static and LACP EtherChannels. Automatic configuration is not demonstrated in this guide, and should be done by more experienced users.

Smartport and Smartport Roles

A switch port can be configured simply by applying a SmartPort role to it. A SmartPort role indicates the type of device to which the switch port is going to be connected, such as a router, a PC/laptop, an IP phone, and so on. Applying a specific SmartPort to a switch port configures the switch port accordingly. The Cisco ESW500 GUI allows configuring switch ports by simply specifying the port's SmartPort role. This simplifies configuration by eliminating the need to configure multiple parameters for a port.

Saving the Configuration

All changes made in the Cisco ESW500 switch stay in the running configuration, which remains in memory. Therefore, these changes are lost when the ESW500 switch gets rebooted or powered off. Saving the running configuration to the startup configuration prevents the lost of these changes.

EtherChannel Design and Configuration Tips

Consider the following design tips before deploying EtherChannel in a small business network using the Cisco Small Business ESW500 Series switches:

- The ESW500 supports up to eight ports per EtherChannel, and the switch is configurable for up to eight EtherChannels.
- The switchports added to an EtherChannel lose their individual port configuration. When a port is removed from the EtherChannel, its original port configuration is applied back to the port.
- An Etherchannel link is considered by Spanning Tree Protocol (STP) as a single link.
- Rapid Spanning Tree Protocol (RSTP) type is recommended on all switches for faster convergence. STP is the default Spanning Tree type on the ESW500 Series switches.
- When you plan to upgrade an existing network with an EtherChannel link, plan for the time that traffic may be disrupted; making changes to a EtherChannel link disrupts traffic until all the ports have been configured and synchronized for the link, as well as the proper VLANs have been applied.
- Before configuring a set of ports as an EtherChannel on a switch, make sure that the ports are not physically connected to the other switch. Connect the ports only after all EtherChannel configurations have been completed on both switches to avoid causing an STP loop during configuration.
- All ports in the proposed EtherChannel group have the same modes, such as full-duplex mode, port filtering, back pressure and flow controls, the same 802.1p priority, and so on.
- Ports to be added to an EtherChannel group must not have a VLAN assigned to them.
- Ports from one EtherChannel cannot be a member of another EtherChannel at the same time.
- Use the SmartPort role named *Other* to remove any previous pre-existing configuration from the ports before adding a port to an EtherChannel.

- Save the running configuration to the startup configuration to avoid losing changes in case the switch is rebooted or powered off.

Pre-configuration Checklist

This configuration is based on an existing network conforming to topology shown in Figure 1.

- EtherChannel ports—The EtherChannel ports, in this example, consist of four ports E7–E10, and the EtherChannel link is configured as an 802.1Q trunk. All port settings must be configured with the same parameters such as duplex, speed, and so on, before being added to the EtherChannel, as stated in EtherChannel Design and Configuration Tips, page 2.
- RSTP—RSTP is configured on every switch in the network (STP is the default on the ESW500 Series).

Note Details of SmartPorts on the Series Switches are described in the Cisco Small Business ESW Series Switches Administration Guide.

- For procedures to connect to the switch, refer to the Cisco Small Business ESW500 Series Managed Switches Quick Start Guide (QSG).

Configuring EtherChannel between Two ESW500 Switches

The following steps are needed to configure EtherChannel between the two switches for the topology shown in Figure 1:

- Preparing for the Implementation
- Configuring the ESW500 switch
- Configure switch ports with SmartPort role *Other*
- Configuring a new EtherChannel group
- Modifying EtherChannel settings (optional)
- Configuring the EtherChannel
- Assigning VLANs to EtherChannel
- Configuring RSTP (optional)
- Saving the configuration
- Repeat the above steps on the peer switch

Preparing for the Implementation

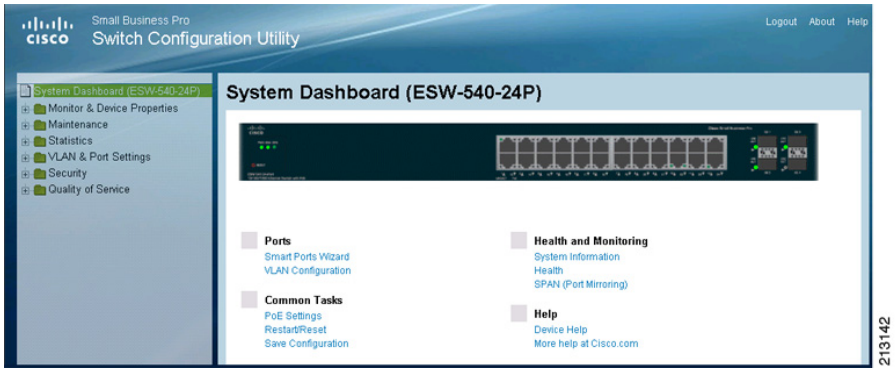
Before actually configuring an EtherChannel between the two switches, do the following:

- Make sure all the ports to be configured as EtherChannel on both the switches have the same properties, such as speed and duplex.
- If not familiar with how to connect to the switch for configuration, refer to the Cisco Small Business ESW500 Series Managed Switches Quick Start Guide (QSG).
- Ensure that all the switches have the latest software. If not, upgrade the switch software (described in the QSG. To find the latest software for the switch, go to the following URL: http://www.cisco.com/go/smallbusiness, click the **Routers and Switches** link, and search for the specific switch name.

Configuring the ESW500 Switch

Connect and log in to the ESW500 switch. The ESW500 system dashboard page is displayed (as shown in Figure 2). The system dashboard pages contain links for configuring ports, viewing device health information, common device tasks, and viewing online help.

Figure 2 ESW500 System Dashboard Page



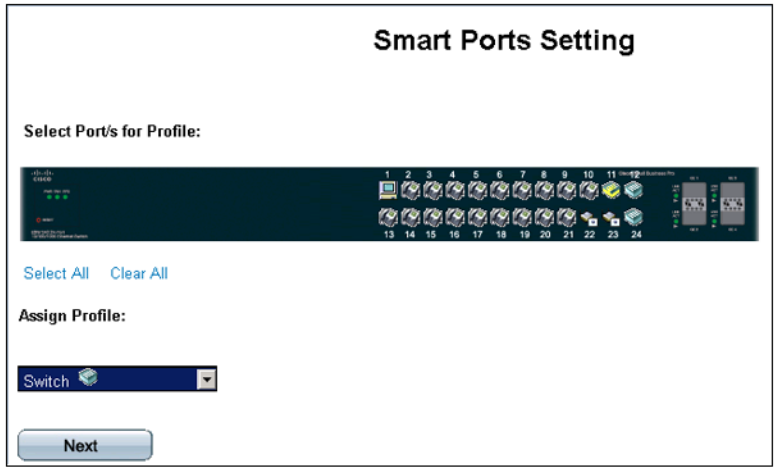
Configuring Switch Ports with SmartPort Role *Other*

To configure the Smart Port role *Other* to remove previous settings from ports E7–E10, perform the following steps:

Step 1 Click the SmartPorts wizard from the system dashboard.

Figure 3 shows the SmartPorts Settings screen after launching the SmartPorts wizard.

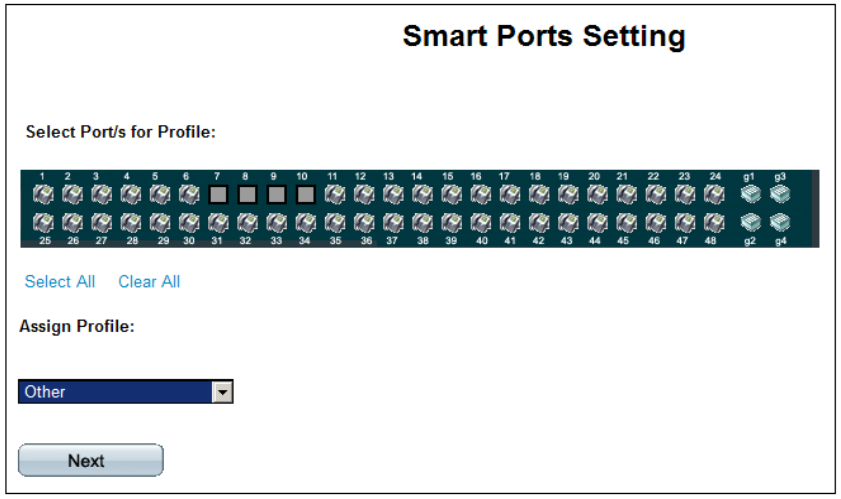
Figure 3 SmartPorts Settings Screen



Step 2 Click **Smart Ports Wizard** under Ports on the System Dashboard Page.

The SmartPorts Setting screen opens, as shown in Figure 4.

Figure 4 SmartPorts Setting Screen



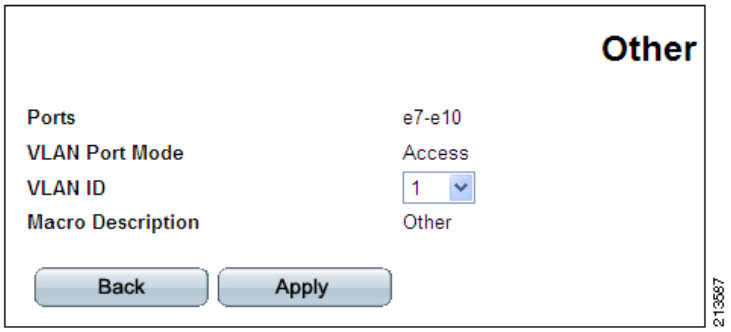
Step 3 Select a port or range of ports (in this case, select E7–E10).

Step 4 Select **Other** in the Assign Profile drop-down list.

Step 5 Click **Next**.

The Other screen opens, as shown in Figure 5.

Figure 5 Other Screen



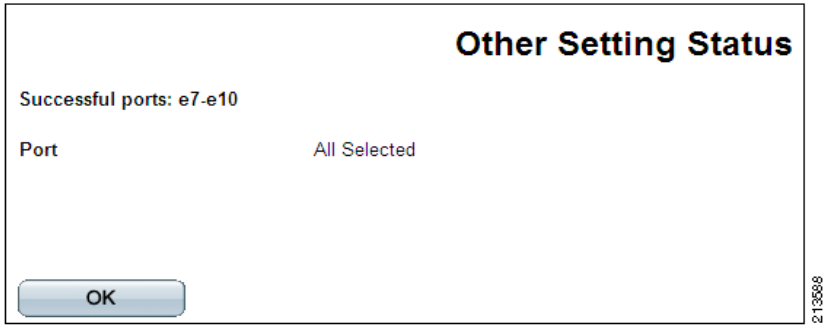
Step 6 Select a VLAN in the VLAN ID drop-down list.

Note The VLAN must be added first in the switch; see the administration guide for details on adding VLANs.

Step 7 Click **Apply**.

The port settings are saved, and the device is updated, as shown in Figure 6.

Figure 6 Other Setting Status Screen



Configuring a New EtherChannel Group

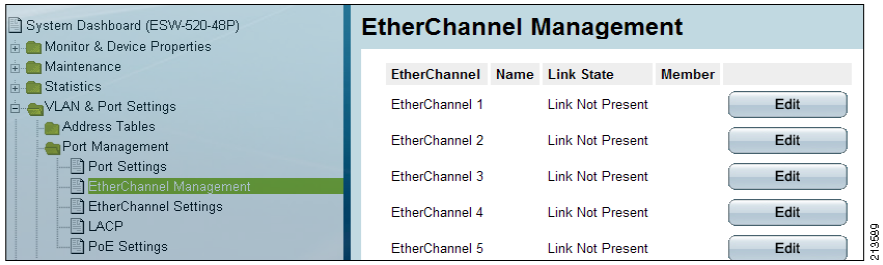
The EtherChannel Settings page contains fields for configuring parameters for configured EtherChannels.

To access the EtherChannel Settings page, perform the following steps.

Step 1 Go to **VLAN & Port Settings >Port Management > EtherChannel Settings**.

The EtherChannel Settings page appears, as shown in Figure 7, showing the list of EtherChannel groups available for configuration (EtherChannel 1 through 8). Choose an EtherChannel that is not configured yet (the description and other fields are blank).

Figure 7 EtherChannel Settings Page



In the example above, EtherChannel 1 is selected.

Step 2 Select EtherChannel 1 and click **Edit**.

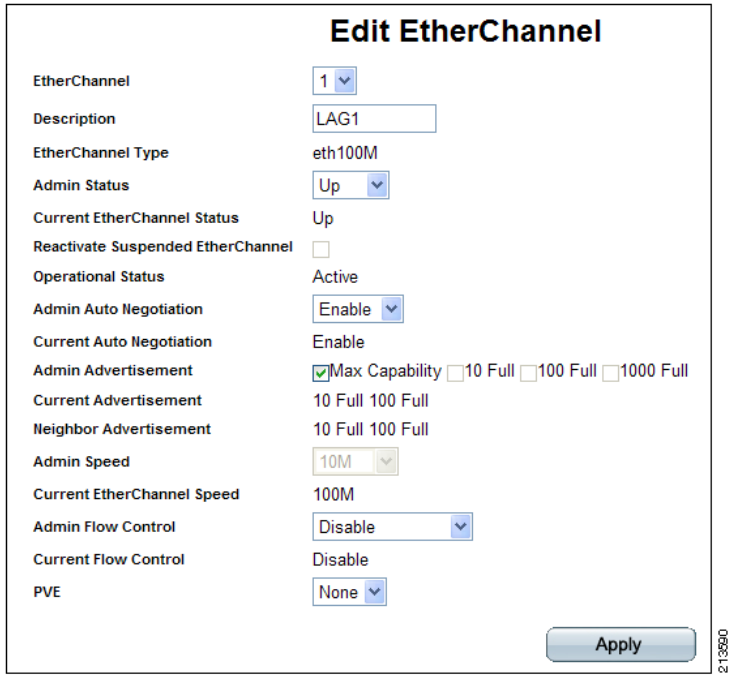
This displays the screen to edit the settings of EtherChannel 1, as shown in Figure 8.

Modifying EtherChannel Settings (Optional)

To modify EtherChannel settings, perform the following steps.

Step 1 In the Edit EtherChannel screen, enter the values for Description, Admin Status, and other fields as needed.

Figure 8 Edit EtherChannel Screen



Step 2 Select the setting to be changed and click **Apply** to save the setting.

Adding Ports to the EtherChannel

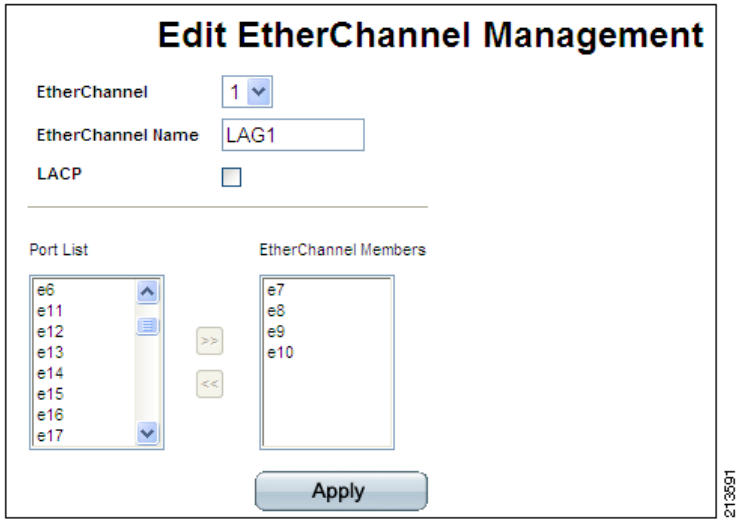
After the parameters of the EtherChannel are set up as described above, switch ports are added to the EtherChannel. To add the ports for EtherChannel, perform the following steps.

Step 1 Go to **VLAN & Port Settings > Port Management >EtherChannel Management**.

Step 2 Select the EtherChannel number by clicking **Edit** next to it.

The Edit EtherChannel Management screen appears, as shown in Figure 9. (EtherChannel 1 was chosen for this example).

Figure 9 Edit EtherChannel Management

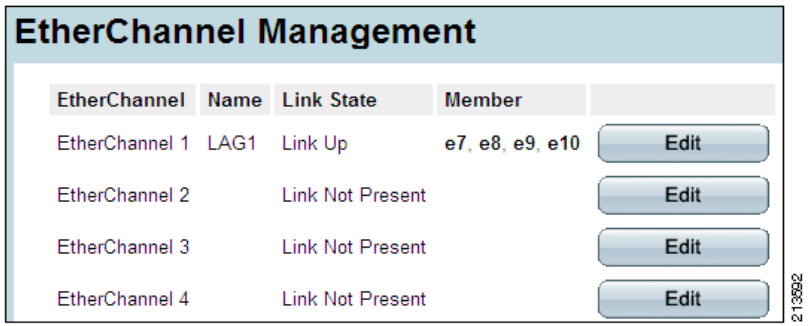


Step 3 Select the ports E7 through E10 in the Port List box, and click **>>** to move them to the EtherChannel Members box.

Step 4 Click **Apply**.

The EtherChannel Management screen appears, as shown in Figure 10, and shows the ports configured for the EtherChannel as members.

Figure 10 EtherChannel Management Screen



In this example, ports E7, E8, E9, and E10 are configured for EtherChannel 1.

Assigning VLANs to an EtherChannel

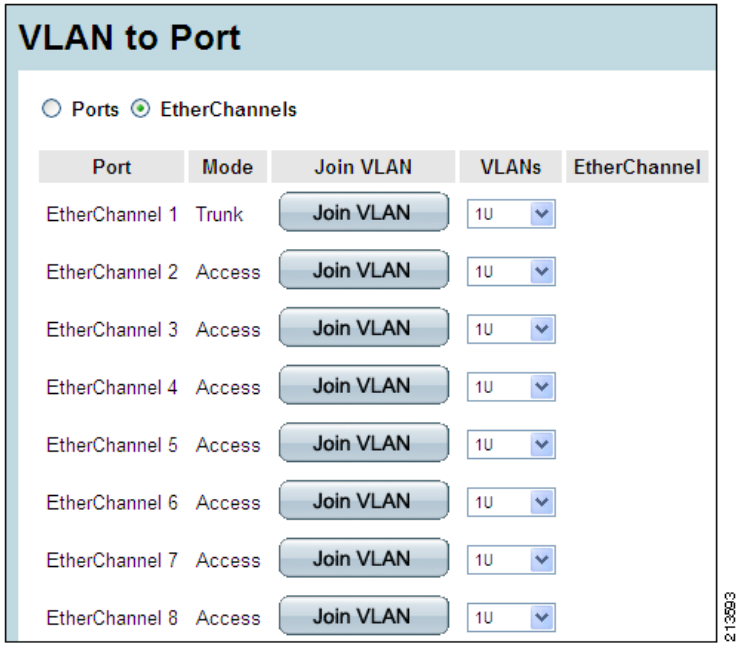
The VLAN To Port Page contains fields for configuring VLANs to ports. To add VLANs to an EtherChannel, complete the following steps.

Step 1 Go to **VLAN & Port Settings > VLAN Management > VLAN to Port**.

This displays the VLAN to Port screen.

Step 2 Select the EtherChannel radio button, as shown in Figure 10.

Figure 11 VLAN to Port Screen



Step 3 Click **Join VLAN** for the EtherChannel to which you want to add the VLAN.

The Join VLAN to EtherChannel screen appears, as shown in Figure 11.

Figure 12 Join VLAN to EtherChannel Screen

Step 4 Select the VLAN(s) you wish to add to the EtherChannel in the Select VLAN box, and click **>>**.

This moves the VLANs from the Select VLAN box to the box showing the list of VLANs assigned to the EtherChannel. You may edit this list by using the **<<** or **>>** buttons.

Step 5 Click **Apply** to make the changes.

Configuring the Peer Switch for EtherChannel

After configuring EtherChannel on a switch, it needs to be configured on the peer switch. To configure the EtherChannel on the peer switch, repeat the same procedure as on the first switch. The EtherChannel numbers on both the switches for the same EtherChannel link can be different.

Verifying EtherChannel Operation

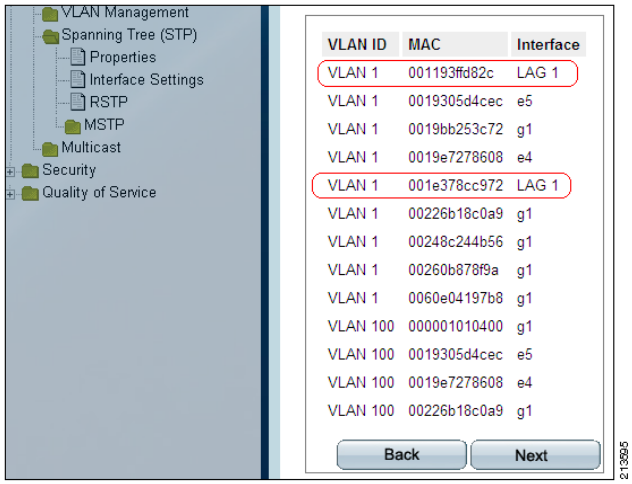
One quick way to verify whether the EtherChannel is passing traffic is by looking at the MAC address table. This shows the dynamic MAC addresses learned by using the EtherChannel. If some MAC addresses are found to be learned through the EtherChannel, you can assume that it is working. To view the MAC addresses associated or learned by the EtherChannel, perform the following steps.

Step 1 On a switch with the EtherChannel configured, go to **VLAN & Port Settings > Address Tables**.

Step 2 Click **Dynamic**.

This displays the screen shown in Figure 13.

Figure 13 MAC Address Tables Screen



Note that in the screen shown in Figure 13, some MAC addresses have been learned through LAG1, so the EtherChannel is working.

Configuring RSTP (Optional)

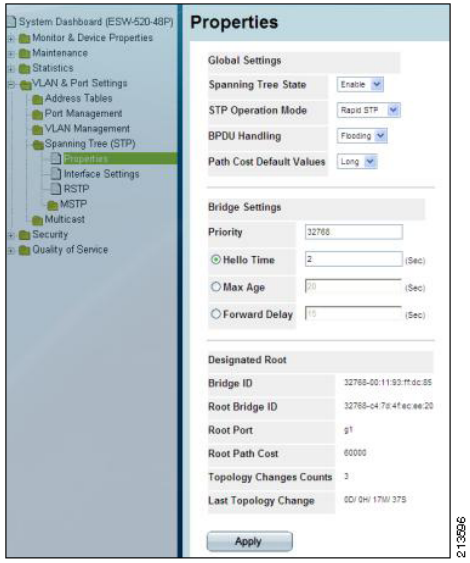
The STP Properties page contains parameters for enabling STP on the device.

To configure RSTP in the ESW500 Series switch, perform the following steps:

Step 1 Go to **VLAN & Port settings> Spanning Tree (STP) > Properties**.

This displays the Properties page, as shown in Figure 14.

Figure 14 STP Properties Page



Step 2 Click the down arrow of the STP Operation Mode option and select **Rapid STP** from the drop-down menu.

Step 3 Click **Apply** to accept the changes.

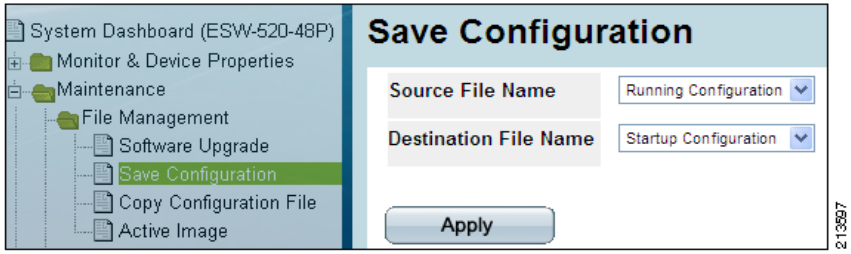
Saving the Configuration

Perform the following steps to save the running configuration to the startup configuration, so that the switch does not discard the configuration changes after a reboot.

Step 1 Go to **Maintenance > File Management > Save Configuration.**

The Save Configuration screen appears, as shown in Figure 15.

Figure 15 Save Configuration Screen



Step 2 Select the source and destination files, as shown in Figure 15.

Step 3 Click **Apply**.

This saves the running configuration to the startup configuration so that the Cisco ESW switch will keep the latest changes.

References

For more information, see the following guides:

- Cisco Small Business ESW Series Switches Administration Guide
- Cisco Small Business ESW500 Series Managed Switches Quick Start Guide (QSG)