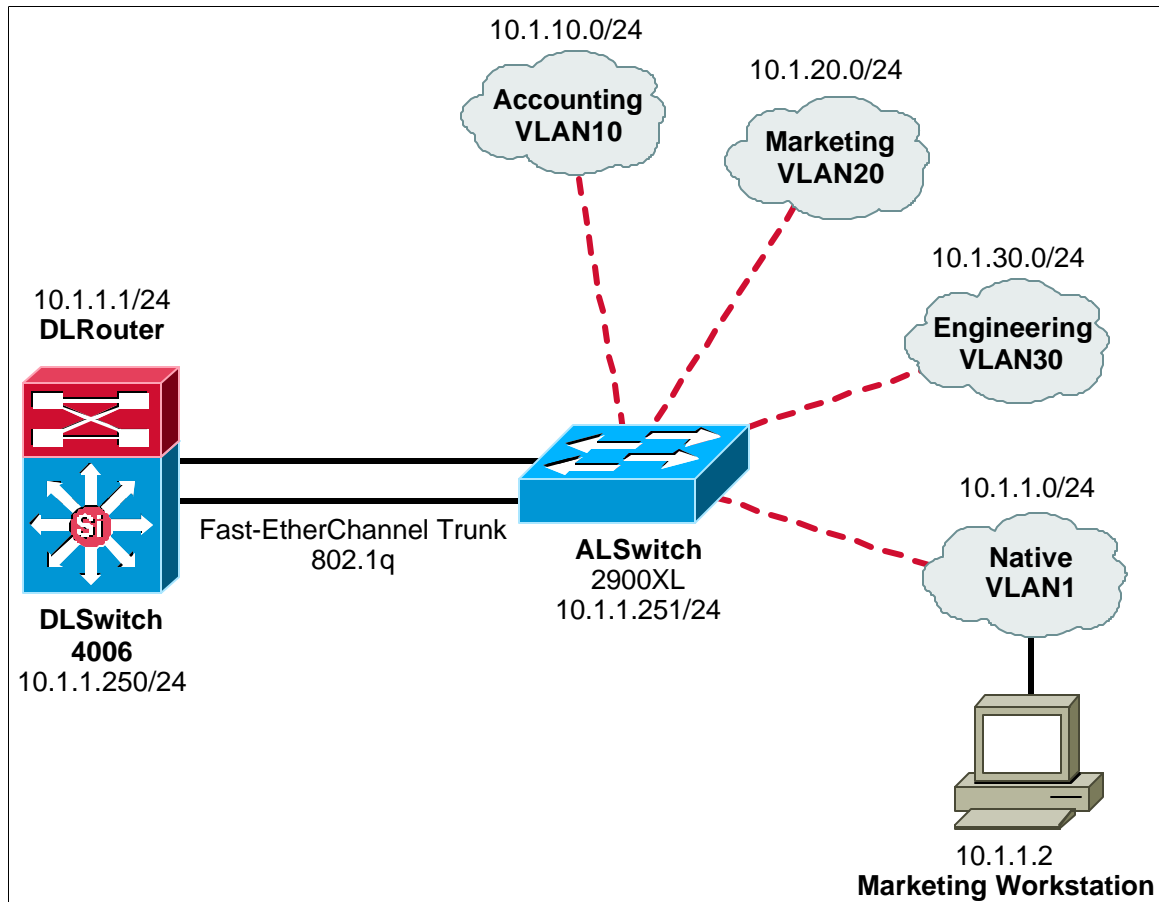


## Lab 6.2.3: Configure RSM (Route Switch Module) on the 4006 L3 Routing Switch



### Objective:

Configure RSM (Route Switch Module) on the 4006 L3 Routing Switch.

### Scenario:

Your network switching equipment currently includes a 4006 Core switch and a 2900XL access switch. Your network is segmented into four functional VLANs for better network management. VLANs include “Accounting”, “Marketing” and “Engineering” for the users and “default” used for the native VLAN network management. After deciding on your subnet ranges and VTP information, illustrated below, your next step is to implement Inter-VLAN routing. Inter-VLAN routing will allow individuals and servers on your Virtual LANs to exchange information. To facilitate this function you choose to install a Layer-3 routing switch module for the 4006 and then establish VLAN-trunking to the 2900XL over a Fast-EtherChannel group. Your VTP and subnetwork information are as follows:

### Design:

Switched Network VTP Configuration Information:

Switch	VTP Domain	VTP Mode
DLSwitch	CORP	Server
ALSwitch	CORP	Client

VLAN Configuration Information:

VLAN ID	VLAN Name	VLAN Subnet	VLAN Gateway
1	Default	10.1.1.0/24	10.1.1.1
10	Accounting	10.1.10.0/24	10.1.10.1
20	Marketing	10.1.20.0/24	10.1.20.1
30	Engineering	10.1.30.0/24	10.1.30.1

Switch VLAN Port Assignments

Switch	VLAN 1	VLAN 10	VLAN 20	VLAN 30	Trunk
DLSwitch	5-18	19-24	25-30	31-34	3,4
ALSwitch	3	4-6	7-9	10-12	1,2

Cisco 4006 DLRouter Interface Configuration Information:

Interface	IP Address	VLAN
PortChannel 1.1	10.1.1.1/24	Native 1
PortChannel 1.10	10.1.10.1/24	10
PortChannel 1.20	10.1.20.1/24	20
PortChannel 1.30	10.1.30.1/24	30

**Notes:**

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## Lab Tasks:

1. Cable the lab as shown in the diagram.
2. The first device to be configured will be the distribution layer switch DLSwitch. Access the switch through the console port and enter privileged mode. Clear your NVRAM and reload.

```
Switch> (enable) clear config all  
Switch> (enable) reset
```

About how long did it take to reboot the switch?

---

3. Configure the **DLSwitch** with the following information:

- a. Configure the prompt DLSwitch on the 4006 switch. Granted this is just good practice. Some people will set the name and or the prompt. Here you can decide.

```
Switch> (enable) set prompt DLSwitch>  
or  
Switch> (enable) set system name DLSwitch>
```

\* Note: Verify using *DLSwitch> (enable) show config*

- b. Establish switch passwords. Always a good idea and required for VTY sessions for management. We will use "cisco" throughout this lab for all passwords.

```
DLSwitch> (enable) set enablepass <enter>
```

\* You will be prompted to enter and confirm the password

```
DLSwitch> (enable) set password <enter>
```

\* You will be prompted to enter and confirm the password

- c. Configure VTP information on the 4006 switch. The core switch should always be set as a VTP server. If anything else you may recall that pruning can only be performed from VTP servers. This issue sometimes leads to individuals setting all network switches to VTP servers, but I would not recommend it as pruning is most needed at the distribution layer and not the access layer.

```
DLSwitch> (enable) set vtp domain CORP  
DLSwitch> (enable) set vtp mode server
```

\* Note: Verify using *DLSwitch> (enable) show vtp domain*

What is VTP version is running?

---

- d. Set switch IP address information and gateway. Again this is for management and is not required for switch functionality. Typically, you want to manage the switch via Telnet.

```
DLSwitch> (enable) set interface sc0 up  
DLSwitch> (enable) set interface sc0 1 10.1.1.11/255.255.255.0  
10.1.1.255  
DLSwitch> (enable) set ip route 0.0.0.0/0.0.0.0 10.1.1.1
```

\* Note: Verify using *DLSwitch> (enable) show config*

- e. Create the port channel groups. We're going to create two channel groups. Fastethernet ports 3-4 will be used to establish a 200Mb link between the 4006 and the 2900XL switches. The other channel will be formed from two internal gigabit interfaces between the RSM and the backplane of the 4006. For the purposes of channeling, these ports are referenced as 2/1-2 but keep in mind that we are not utilizing the two physical gigabit ports on the RSM module. The numbers 156 and 157 are called Admin Group numbers and are arbitrary and for internal use only (If omitted, the switch will assign random group numbers.)

```
DLSwitch> (enable) set port channel 2/1-2 156  
DLSwitch> (enable) set port channel 2/3-4 157
```

\* Note: Verify using *DLSwitch> (enable) show config*

- f. Now we need to prepare these interfaces for trunking. Use the **set trunk** command to establish the trunk mode (nonegotiate, etc.), protocol (801.q, ISL, etc.) and the range of VLANs that they'll accommodate.

```
DLSwitch> (enable) set trunk 2/1 nonegotiate dot1q 1-1005  
DLSwitch> (enable) set trunk 2/2 nonegotiate dot1q 1-1005  
DLSwitch> (enable) set trunk 2/3 nonegotiate dot1q 1-1005  
DLSwitch> (enable) set trunk 2/4 nonegotiate dot1q 1-1005
```

\* Note: Verify using *DLSwitch> (enable) show config*

Note that the **show trunk** command may not display the expected information at this point because the configuration is not yet complete.

- g. Turn EtherChannel on. Recall that ports 2/1-2 refer to internal interfaces between the RSM and the backplane of the switch. Ports 2/3-4 form the channel link to the 2900 switch.

```
DLSwitch> (enable) set port channel 2/1-2 mode on  
DLSwitch> (enable) set port channel 2/3-4 mode on
```

\* Note: Verify using *DLSwitch> (enable) show channel*

- h. Create corporate VLANs. The syntax for creating VLANs on the 4000 series switches is simple. We create and name the VLANs first and then assign ports to them later. When the connection is established to the 2900XL they will synchronize to the 2900XL database so the assigned ports will have access.

```
DLSwitch> (enable) set vlan 1 name default  
DLSwitch> (enable) set vlan 10 name Accounting  
DLSwitch> (enable) set vlan 20 name Marketing  
DLSwitch> (enable) set vlan 30 name Engineering
```

\* Note: Verify using `DLSwitch> (enable) show vlan`

What would account for the additional VLANs beyond 1,10,20,30?

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- i. Assign ports to VLANs. Use the `show vlan` command to display the current port members for each VLAN. Note that all ports are members of VLAN 1 by default. Use the `set vlan` command to reassign ports (or blocks of ports) to a new VLAN. Recall that for the XL series of switches we had to assign ports to VLANs one-by-one.

```
DLSwitch> (enable) set vlan 10    2/19-24
DLSwitch> (enable) set vlan 20    2/25-30
DLSwitch> (enable) set vlan 30    2/31-34
```

\* Note: Verify using `DLSwitch> (enable) show vlan`

What would be the command to delete a VLAN just in case?

---

- j. Verify complete configuration using `DLSwitch> (enable) show config`. Go ahead and compare it to the configuration at the end of the lab. Don't worry about little differences because the switch will place a number of its own configuration commands in.
4. The next device to be configured will be the access layer switch **ALSwitch**. Access the switch through the console port and enter privileged mode. Before we start changing the configuration, take a look at the VLAN and VTP information.

```
Switch#show vlan
Switch#show vtp stat
```

5. Clear your NVRAM and reload.

```
Switch#clear start
Switch#reload
```

Note: If asked to save system information select "N"

6. Now check VLAN and VTP information again.

```
Switch#show vlan
Switch#show vtp stat
```

Note that "clear start" does not clear VLAN information. For that you'll need to issue the `delete flash` command and enter `vlan.dat` when prompted for a file.

7. Configure **ALSwitch** with the following information:
  - a. Configure VTP trunking information.

```
Switch#vlan database
Switch(vlan)#vtp client
Switch(vlan)#vtp domain CORP
Switch(vlan)#exit
```

- b. Verify VTP information. This just allows us to check the information we just entered above. Throughout this lab we'll need to enter and verify simply because we cannot officially test the network until most of the components are configured.

```
Switch#show vtp stat
```

Complete the following:

```
VTP Version : _____
Configuration Revision : _____
Maximum VLANs supported locally : _____
Number of existing VLANs : _____
VTP Operating Mode : _____
VTP Domain Name : _____
VTP Pruning Mode : _____
VTP V2 Mode : _____
VTP Traps Generation : _____
```

- c. Configure the hostname **ALSwitch** on the 2900XL switch. Always a good thing to do first so we know where we are.

```
Switch(config)#hostname ALSwitch
```

\* Note: Verify using *ALSwitch# show run*

- d. Configure the privileged mode password. These passwords are necessary to establish VTY Telnet sessions so why not just put them in. ALL passwords for this lab will be "cisco" lower case.

```
ALSwitch(config)#enable password cisco
```

\* Note: Verify using *ALSwitch# show run*

- e. Configure Fast EtherChannel port group and trunking. On a 2900XL or 3500XL switch, Fast EtherChannels are called "port groups" instead of channels. The **port group** command identifies an interface as a member of a port group. The **switchport** command allows us to define the trunking mode (trunk, access, etc.) and encapsulation type (802.1, ISL, etc.). Here we are setting the group to encompass two ports and the trunking protocol to 802.1Q (dot1q).

```
ALSwitch(config)#interface FastEthernet0/1
ALSwitch(config-if)#port group 1
ALSwitch(config-if)#switchport mode trunk
ALSwitch(config-if)#switchport trunk encapsulation dot1q
```

```
ALSwitch(config)#interface FastEthernet0/2
ALSwitch(config-if)#port group 1
ALSwitch(config-if)#switchport mode trunk
ALSwitch(config-if)#switchport trunk encapsulation dot1q
```

\* Note: Verify using `ALSwitch#show run`

What is the default encapsulation for trunking if none is entered?

---

- f. Add ports to VLANs and implement spanning-tree PortFast. Here we are configuring the device connection parameters.

```
ALSwitch(config)#interface FastEthernet0/3
ALSwitch(config-if)#switchport access vlan 1
ALSwitch(config-if)#spanning-tree portfast

ALSwitch(config)#interface FastEthernet0/4
ALSwitch(config-if)#switchport access vlan 10
ALSwitch(config-if)#spanning-tree portfast

ALSwitch(config)#interface FastEthernet0/5
ALSwitch(config-if)#switchport access vlan 10
ALSwitch(config-if)#spanning-tree portfast

ALSwitch(config)#interface FastEthernet0/6
ALSwitch(config-if)#switchport access vlan 10
ALSwitch(config-if)#spanning-tree portfast

ALSwitch(config)#interface FastEthernet0/7
ALSwitch(config-if)#switchport access vlan 20
ALSwitch(config-if)#spanning-tree portfast

ALSwitch(config)#interface FastEthernet0/8
ALSwitch(config-if)#switchport access vlan 20
ALSwitch(config-if)#spanning-tree portfast

ALSwitch(config)#interface FastEthernet0/9
ALSwitch(config-if)#switchport access vlan 20
ALSwitch(config-if)#spanning-tree portfast

ALSwitch(config)#interface FastEthernet0/10
ALSwitch(config-if)#switchport access vlan 30
ALSwitch(config-if)#spanning-tree portfast

ALSwitch(config)#interface FastEthernet0/11
ALSwitch(config-if)#switchport access vlan 30
ALSwitch(config-if)#spanning-tree portfast

ALSwitch(config)#interface FastEthernet0/12
ALSwitch(config-if)#switchport access vlan 30
ALSwitch(config-if)#spanning-tree portfast
```

\* Note: Verify using `ALSwitch#show run`

- g. Configure VLAN1 management interface IP address and default gateway for the switch. This is required only for management and will not affect the functionality of the device. This interface is up by default so `no shutdown` should not be necessary

but check anyways. The **show ip interface brief** command will help with that.

```
ALSwitch(config)#ip default-gateway 10.1.1.1
```

```
ALSwitch(config)#interface VLAN1  
ALSwitch(config-if)#ip address 10.1.1.12 255.255.255.0
```

\* Note: Verify using *ALSwitch#show run*

- h. Configure telnet interface password. Of course this is required if one wishes to Telnet to a VTY session.

```
ALSwitch(config)#line vty 0 4  
ALSwitch(config-line)#password cisco  
ALSwitch(config-line)#login
```

\* Note: Verify using *ALSwitch#show run*

- i. Verify complete configuration using *ALSwitch#show run*.

- 8. The next device to be configured will be the distribution layer router **DLRouter**. Access the switch through the console port and enter privileged mode. Clear your NVRAM and reload. This is a trick because you would usually get to the L3 Switch Router via the Switch command interface.

```
DLSwitch> (enable) session 2  
Router#clear start  
Router#reload
```

Note: If asked to save system information select “N”

After the card reset then go back into it:

```
DLSwitch> (enable) session 2
```

How do you return from the Router to the Switch?

---

- 9. Configure the **DLRouter** with the following information:

- a. Configure the hostname DLRouter on the 4006 L3 module.

```
Router(config)#hostname DLRouter
```

\* Note: Verify using *DLRouter#show run*

- b. Configure the privileged mode password. Good idea and required for Telnet access.

```
DLRouter(config)#enable password cisco
```

\* Note: Verify using *DLRouter#show run*



- c. Configure the VLAN interface addressing and trunking information. Port-channel 1 (a virtual interface) is inherently configured to communicate with VLAN 1 through an 801.q trunk. Simply setting an IP address on that interface allows access to the Router for management. However, all other VLANs are required to be set up as sub-interfaces of Port-Channel 1, along with the trunking encapsulation, VLAN ID and IP address.

```
DLRouter(config)#interface Port-channel1
DLRouter(config-if)#ip address 10.1.1.1 255.255.255.0
DLRouter(config-if)#no shutdown

DLRouter(config)#interface Port-channel1.10
DLRouter(config-if)#encapsulation dot1Q 10
DLRouter(config-if)#ip address 10.1.10.1 255.255.255.0

DLRouter(config)#interface Port-channel1.20
DLRouter(config-if)#encapsulation dot1Q 20
DLRouter(config-if)#ip address 10.1.20.1 255.255.255.0

DLRouter(config)#interface Port-channel1.30
DLRouter(config-if)#encapsulation dot1Q 30
DLRouter(config-if)#ip address 10.1.30.1 255.255.255.0
```

\* Note: Verify using *DLRouter#show run*

What would happen if you tried to use ISL trunking?

---

- d. Assign the gigabit interfaces to channel group. This links virtual interfaces (port channels) to physical channels. Recall that GigabitEthernet 3 and 4 refer to internal interfaces.

```
DLRouter(config)#interface GigabitEthernet3
DLRouter(config-if)#channel-group 1

DLRouter(config)#interface GigabitEthernet4
DLRouter(config-if)#channel-group 1
```

\* Note: Verify using *DLRouter#show run*

- e. Configure your corporate routing protocol. This is fairly subjective and actually not required in many cases because we have a collapsed backbone. Setting it to eigrp will ensure that only Cisco devices will be able to read the L3 routing table if necessary. Of course here we will place the entire 10.x.x.x network in to cover and read all sub-networks.

```
DLRouter(config)#router eigrp 1
DLRouter(config-router)#network 10.0.0.0
```

\* Note: Verify using *DLRouter#show run*

Can any routing protocol be used here?

---

- f. Configure your telnet virtual terminal password information. Again recommended and necessary.

```
DLRouter(config)#line vty 0 4
DLRouter(config-line)#password cisco
DLRouter(config-line)#login
```

\* Note: Verify using *DLRouter#show run*

- g. Verify complete configuration using *DLRouter#show run*. Go ahead and compare it to the configuration provided by your instructor. Don't worry about little differences because the router will place a number of its own configuration commands in.

10. From the **DLRouter**, verify your connection to the **DLSwitch** through the Port Channels. These may not match exactly but all the information should be represented to ensure proper functionality.

- a. **DLRouter#show cdp neighbors**

What is the name of the neighboring device?

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- b. **DLRouter#show ip interface brief**

Why would the GigabitEthernet 3,4 interfaces be up but yet have unassigned IP addresses?

---

11. From **DLSwitch**, verify neighbors through *CDP* information.

- a. **DLSwitch> (enable) show cdp neighbors**

What are the neighboring devices and platforms? Review the diagram and relate this to the implementation graphic in the lab beginning.

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12. Test your connections from **ALSwitch**:

- a. **ALSwitch#ping 10.1.1.1**

- b. **ALSwitch#ping 10.1.1.11**

- c. **ALSwitch#ping 10.1.1.12**

13. Test your connections from **DLSwitch**:

- a. DLSwitch> (enable) **ping 10.1.1.1**
- b. DLSwitch> (enable) **ping 10.1.1.11**
- c. DLSwitch> (enable) **ping 10.1.1.12**

14. Test your connections from **DLRouter**:

- a. DLRouter#**ping 10.1.1.1**
- b. DLRouter#**ping 10.1.1.11**
- c. DLRouter#**ping 10.1.1.12**

15. From your workstation, test your network management capabilities:

- a. Configure your workstation to IP address 10.1.1.2/24 using gateway 10.1.1.1 and connect it to any port on VLAN 1 on either the 2900 or 4006 switches. When connected you should be able to PING and or TELNET to all of your networking devices including the following:
  - ✓ DLRouter at IP address 10.1.1.1
  - ✓ ALSwitch at IP address 10.1.1.12
  - ✓ DLSwitch at IP address 10.1.1.11

Are you able to communicate to VLANs other than VLAN 1?

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