NETWORK GUIDE

VLX Series

Network Switch Recommendations & Configuration

IMPORTANT: This following is presented as informational examples. Switch hardware, software, firmware of these devices may change. Always consult your switch manufacture to verify compatibility before purchase, and contact the manufacturer for setup and troubleshooting assistance.

ALWAYS pre-stage / test your system for proper configuration and operation prior to site installation.

1Gbps Network Switch Configurations

Manual Number: 181201

TABLE OF CONTENTS

CABLING **2**

NETWORK SWITCHES **3**

1.1 Switch Speed 3

1.2 Packets Routing 3

1.3 Ethernet Switch Configuration 3

1.4 PoE (Power over Ethernet) 4

1.5 Ethernet Switch Models 5

1.5 Ethernet Switch Models with Performance Issues 6

1.6 Multicast IP & Ports That Must Not Be Blocked 6

CONFIGURATIONS **7**

Switch Login & Connections 7

Cisco C2960 Series 8

2.2.1 Basic Operation 8

2.2.2 Manual Configuration 15

2.2.3 Importing Configuration 28

Huawei S2700 & S5700 Series 30

2.3.1 Basic Operations 30

2.3.2 Manual Configuration 34

2.3.3 Importing Configuration 40

Netgear GS108PE 43

2.4.1 Basic Operations 43

Luxul AMS-1208P & XMS-2624 44

2.5.1 Basic Operations 44

Dante Audio Device Configuration 46

Netgear M4300 46

3.1.1 IGMP Notes 46

3.1.2 Web Interface Configuration 47

3.1.3 CLI Configuration 49

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CABLING

The VLX Series has the ability to go the distance. While regular CAT 5e will go 100m (330ft), CAT 6 and 6A can go much further. Below we have tested the following cabling from West Penn and the results of the testing with 4K video. Please note if using a different brand cable when exceeding the industry standard 100m (330ft) we highly recommend verifying the results first prior to installation as not all cables perform the same.

Cat 5e UTP (Unshielded): 100m (330ft)
Any brand on the market made to Category 5e or better specification.

Cat 6 UTP (Unshielded): 143m (470ft)
Cable Brand: West Penn Wire
Part Number: 4246. Cat 6 UTP CMR
Part Number: 254246. Cat 6 UTP CMP

Cat 6A UTP (Unshielded): 182m (600ft)
Cable Brand: West Penn Wire
Part Number: 4246A. Cat6 A UTP CMR
Part Number: 254246A. Cat6A UTP CMP

NETWORK SWITCHES

The VLX will work with most non-blocking, IGMP with IGMP Snooping, 8192 or better Jumbo/MTU Packet 1G network switch. Layer 3 will allow more control, however, Layer 2 will work as well. It is highly recommended to communicate with the representative of the desired network switch brand to confirm configuration and capabilities. Below are some models that have been tested with the VLX Series.

1.1 Switch Speed

The VLX Series requires the switch to be a 1GbE.
VLX Series technology is used to transmit visually lossless 8:1 compress video up to 4K along with other AV signals such as audio, USB and control signals. For video alone, it means raw bandwidth of about 850Mbps for 4K and that is just for audio and video. It is therefore easy to understand why the VLX requires 1GbE network switches.

1.2 Packets Routing

To enable the transmission of a source to multiple destinations, VLX devices make use of Multicast. The default behavior of layer 2 Ethernet switch is to broadcast those packets which mean that every packet will be transmitted to all possible destinations. This is why any network switch used with VLX Series has to support IGMP Snooping. VLX end points use IGMP protocol to assign the end points into multicast groups and the router uses IGMP snooping to efficiently route multicast packets only to receivers that want to receive them.

Many switches have the IGMP Snooping feature disabled by default and manual configuration is required. Often, a simple check mark near “Enable IGMP Snooping” is the only thing needed to enable IGMP Snooping.
However, the implementation of IGMP Snooping is vendor specific and additional configuration is often needed.

An Ethernet switch can be informed that a device wants to leave a multicast channel by sending it a IGMP LEAVE GROUP packet. Once received, the time it takes for the switch to apply the new configuration may vary from one switch to the other. Most switches implement and include FASTLEAVE configuration option. When enabled, it takes much less time for a particular port to leave a multicast group to assign the port to a different multicast group. The end results are a noticeably shorter video switching time. Aurora recommends to always enable the FASTLEAVE option when available.

1.3 Ethernet Switch Configuration

The following list includes all network switch configuration options that Aurora Engineers have come across so far. Look for these or similar options when configuring your switch.

1. Enable IGMP Snooping
   a. Must be enabled

2. Enable IGMP Snooping on VLAN 1
   a. Must be enabled when all ports default to VLAN1
3. Filter/Drop unregistered Multicast traffic
   a. If not applied, the behavior of the switch will be to broadcast multicast packets if the switch has no known destination for that packet.
   b. Must be enabled if found
4. Unregistered Multicast Flooding
   a. Must be disabled if found
5. Filter Unregistered Multicast (different wording than number 4 above)
   a. Must be enabled if found
6. Enable IGMP Query
7. Enable IGMP Query on VLAN1
8. Set IGMP Version to IGMP V2
   a. Must be set if found
9. Enable FASTLEAVE on port X
   a. This is optional. Should be enabled, if found
10. Enable FASTLEAVE for VLAN1
    a. This is optional. Should be enabled if found
11. Jumbo Packets should be standard function but if not it must be enabled.
    a. This is must be enabled. Some switches refer to Jumbo packets as MTU size and must be set to 8192 or larger. Others will be a simple check box.

1.4 PoE (Power over Ethernet)

The VLX Series uses around 6 watts of power, however, the PoE is unclassified for up to 12.9 watts (15.4 Watts Total) as the USB on the VLX can supply up to 5 watts. When selecting a PoE switch always make certain the power supply of the PoE switch is proper to the port count (15.4W x qty of ports). For example, a 24 port PoE switch must have at least 369.6 Watts (24 at 15.4W) for it to properly supply all 24 VLX devices. Some switches can only supply a certain amount of ports with PoE. If it is necessary to use a particular switch, then PoE injectors for the remaining ports can be used or the local power supply for the VLX but you may need to disable the detection of the PoE for those ports in the Ethernet switch.

1.5 Ethernet Switch Models

The following is a list of 1G Ethernet switch models that have been verified to date. Check with Aurora to see if any others may have been added at a later time relative to the manual revision date. Please note manufacturers do update firmware and hardware from time to time and can impact overall operation. It is always recommended once you work with a switch to document the firmware revision and hardware revision for future consistent use.

Huawei
S5700-28P-PWR-LI-AC 28 Port 1G PoE Copper Switch 24 RJ-45 and 4 SFP
S5700-48TP-PWR-SI 48 Port 1G PoE Copper Switch 44 RJ-45 and 4 SFP

Netgear
GS108PE 8 Port 1G PoE Copper Switch 4 with PoE and no SFP

Cisco
WS-C2960S-24PS-L 24 Port 1G PoE Copper Switch
WS-C2960S-24PSQ-L 24 Port 1G PoE Copper Switch
WS-C2960X-48FPS-L 48 Port 1G PoE Copper Switch with 4 SFP

Luxul
AMS-1208P 12 Port/8 PoE+ 1G Copper Switch
XMS-2624P 26 Port/24 PoE+ 1G Copper Switch

Pakedge
SX-8-EP 8 Port Managed Gigabit switch with no POE ports
SX-24 24 Port Managed Gigabit switch with no POE ports
SX-24P8 24 Port Managed Gigabit switch with 8 ports of POE
SX-24P16 24 Port Managed Gigabit switch with 16 ports of POE
SX-24P 24 Port Managed Gigabit switch with 24 ports of POE

IMPORTANT: This following is presented as informational examples. Switch hardware, software, firmware of these devices may change. Always consult your switch manufacture to verify compatibility before purchase, and contact the manufacturer for setup and troubleshooting assistance. ***ALWAYS pre-stage / test your system*** for proper configuration and operation prior to site installation.

1.5 Ethernet Switch Models with Performance Issues

To follow are reported or tested network switches with issues. It is always recommended to check with manufacturer in the event firmware has resolved the reported issues.

Cisco SG300

1. The ability to handle multicast request is insufficient. It takes a long time for switches to start forwarding multicast packets to the corresponding ports after receiving IGMP Join messages. The switches that act as extended switches in a cascade network have more obvious problems. If they receive more multicast requests in a short period, some of the requests will be discarded because switches are unable to deal with them in time, resulting in Rx switch failure.

2. Multicast forwarding synchronization is poor. There is an issue when copying and forwarding the same multicast packet to the multiple host ports. The time for each port to receive multicast packets may have a difference of 20ms or more. As a result, the same source on different Rx units may be out of sync.

In summary, SG300 can be used in single switch networking and locations where high multi-screen synchronization is not required. If you require a cascaded network, multi-view or video wall, we would not recommend this model.

1.6 Multicast IP & Ports That Must Not Be Blocked

To discover the device on the network the VLX protocol works as follows. Each VLX device when booted up will listen to port **3333** of multicast IP address **225.0.0.1** If a request is received on this port, the VLX device will send its information as reply. If a VLX device needs to find all other devices in the network, it runs an internal process same as **node_list**. This process will send a request to multicast IP **225.0.0.1**, port **3333**. All the VLX devices will respond to this request and based on that the connected encoders list is shown by each decoder.

Now in case of Multicast switches to forward any request received at port 225.0.0.1 to the VLX device, it needs to join to that particular IP address. For this each VLX device will send the IGMP host membership report packet (type **0x16**) at **5s** interval to the multicast IP address 225.0.0.1.

Similarly, the video data is also send by the encoder as multicast packets to the destination address determined by its host ID. For example, the encoder with host ID 0009 will send the video packet to multicast IP 225.0.100.9. Each decoder who want to connect to encoder 9 will listen to this particular multicast IP. IGMP packets are sent at **5s** interval by the encoders and decoders.

CONFIGURATIONS

Switch Login & Connections

Login

You must first log onto the switch with administrator right. Follow the switch manufacturer manual to do so. It will also give you the default Admin password.

Console Port

Some manufacturers use RS-232 / “Console port” for switch configuration and dedicated console cable which is different from a standard Cat X (RJ45) cable.

Ethernet

Other manufacturers go through standard 1Gbe compatible port for switch configuration. If this is the case, the manufacturer will give you the default “IP Address” of the switch. Make sure your network adaptor has an IP Address in the same network.

Depending on login method above, switch configuration will be done either through a Web Browser or a Telnet Client.

Cisco C2960 Series

For Cisco C2960 series switches, we would recommend that you use models WS-C2960S-24PS-L, WS-C2960X-24PSQ-L and WS-C2960X-48FPS-L. They can be used for both single switch networking and cascading switch networking.

2.2.1 Basic Operation

2.2.1.1 Logging in to the Switches

If you want to configure switches, you need to use special cables and connect them to the switches' dedicated ports.

1. Connect your PC to a switch

Use a matching Console cable to connect between switch's **Console** port and PC's serial port. If your PC has no serial ports, use a USB-to-serial converter and install correct drivers.

2. Configure serial communication parameters

Run terminal emulation software on your PC. Create a session and configure serial communication parameters according to the following table.

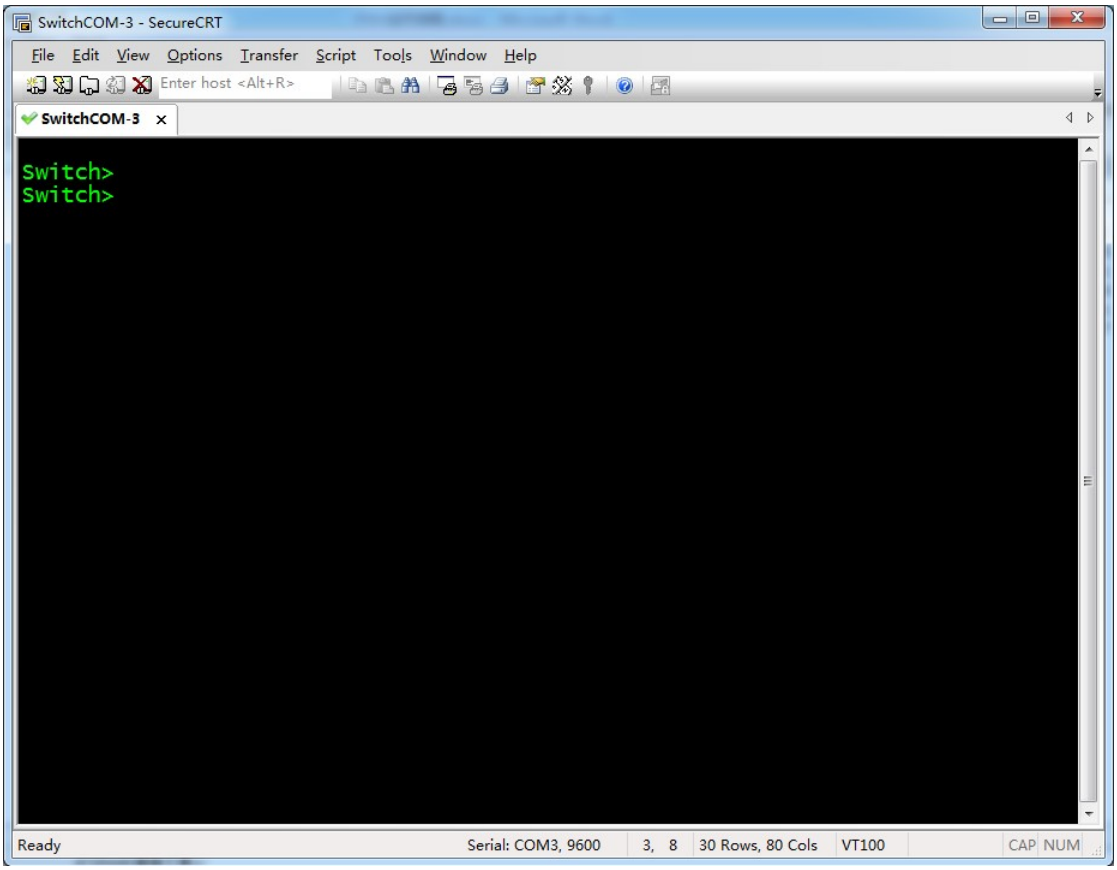
Parameters	Value
Communication Port	If your PC is equipped with serial ports in factory defaults, COM1 port is usually enabled. If your PC's multiple serial ports are configured or PC is connected with a USB-to-serial converter, see the related user guides.
Baud Rate	9600 bps
Flow Control	None
Parity	None
Stop Bits	1
Data Bits	8 bits

3. Create communication connection

In terminal emulation software select the previous created session and start the connection. When connection is successful, switch will not give any prompt. At this moment, press **Enter**. Switch will give the following prompt.

```
Switch>
Switch>
```

The screen capture is as follows. It means that you have successfully logged in to the switch and entered user mode.



2.2.1.2 Switching Operation Mode

The command-line interface of C2960 series switches has many different operation modes.

This section describes several modes mentioned in this manual.

1. User mode is the default mode after logging in to the switch. In this mode, only some query operations can be performed. The prompt is as follows. `Switch>` Enter **enable** to enter privileged mode. Password may be needed.
2. Privileged mode allows you to perform some maintenance operations. The prompt is as follows.

```
Switch#
```

You can perform the following mode switching operations.

- Input **disable** to return user mode.
- Input **config terminal** to enter global configuration mode.

3. Global configuration mode allows you to change some global configuration.

   The prompt is as follows.

```
Switch(config)#
```

You can perform the following mode switching operations.

- Input **end** to return privileged mode
- Use **interface** command to enter port configuration mode
- Use **interface range** command to enter port bulk configuration mode

4. Port configuration mode allows you to change the settings of a single port.

   The prompt is as follows.

```
Switch(config-if)#
```

Input **end** to return global configuration mode.

5. Port bulk configuration mode allows bulk changes to multiple ports. The prompt is as follows.

```
Switch(config-if-range)#
```

Input **end** to return global configuration mode.

For more information about operation modes, see the user guides of switches.

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2.2.1.3 Resetting to Factory Defaults

1. In user mode input **enable** to enter privileged mode.

```
Switch>enable
Switch#
```

2. Input **erase startup-config** to remove startup configuration. Switch will give the following prompt.

```
Switch#erase startup-config
Erasing the nvram filesystem will remove all configuration files! Continue? [confirm]
```

Press **Enter** to confirm. Switch will give the following prompt.

```
[OK]
Erase of nvram: complete
Switch#
*Mar  1 02:02:50.549: %SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
```

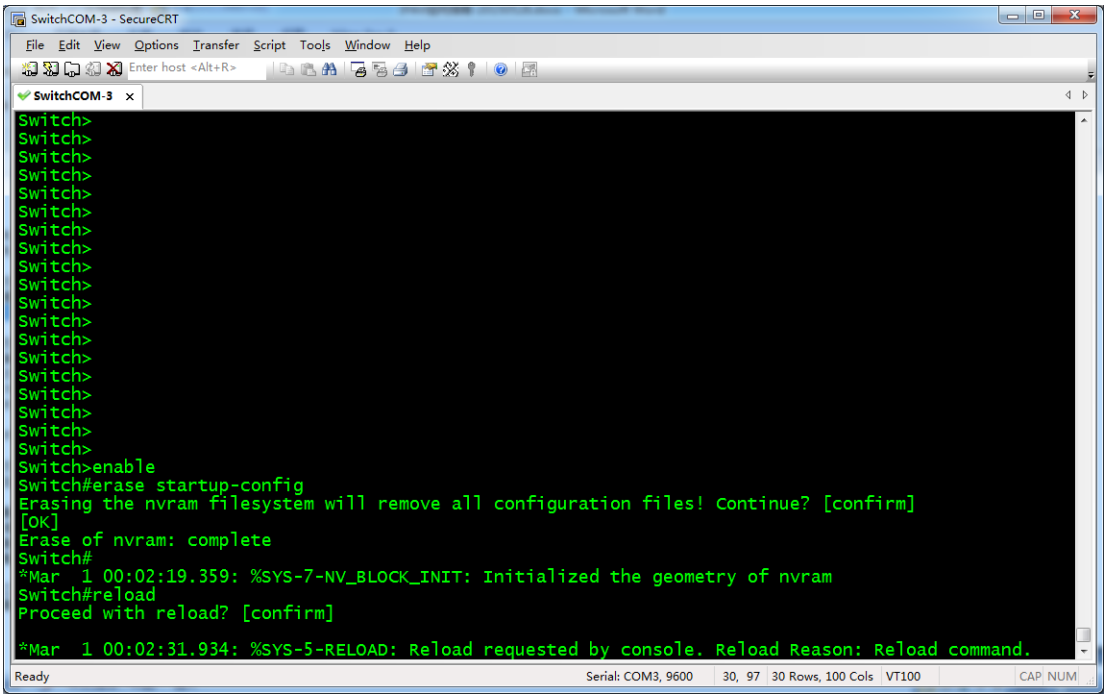
3. Input **reload** to reboot switch. Switch will give the following prompt.

```
Switch#reload
Proceed with reload? [confirm]
```

Press **Enter** to confirm. Switch will give the following prompt.

```
*Mar  1 02:05:18.700: %SYS-5-RELOAD: Reload requested by console. Reload Reason: Reload command.
```

The following screen capture describes the previous steps.



4. Switch reboots. When the following prompt appears,

```
Press RETURN to get started!
```

Press **Enter**. Switch will give the following prompt.

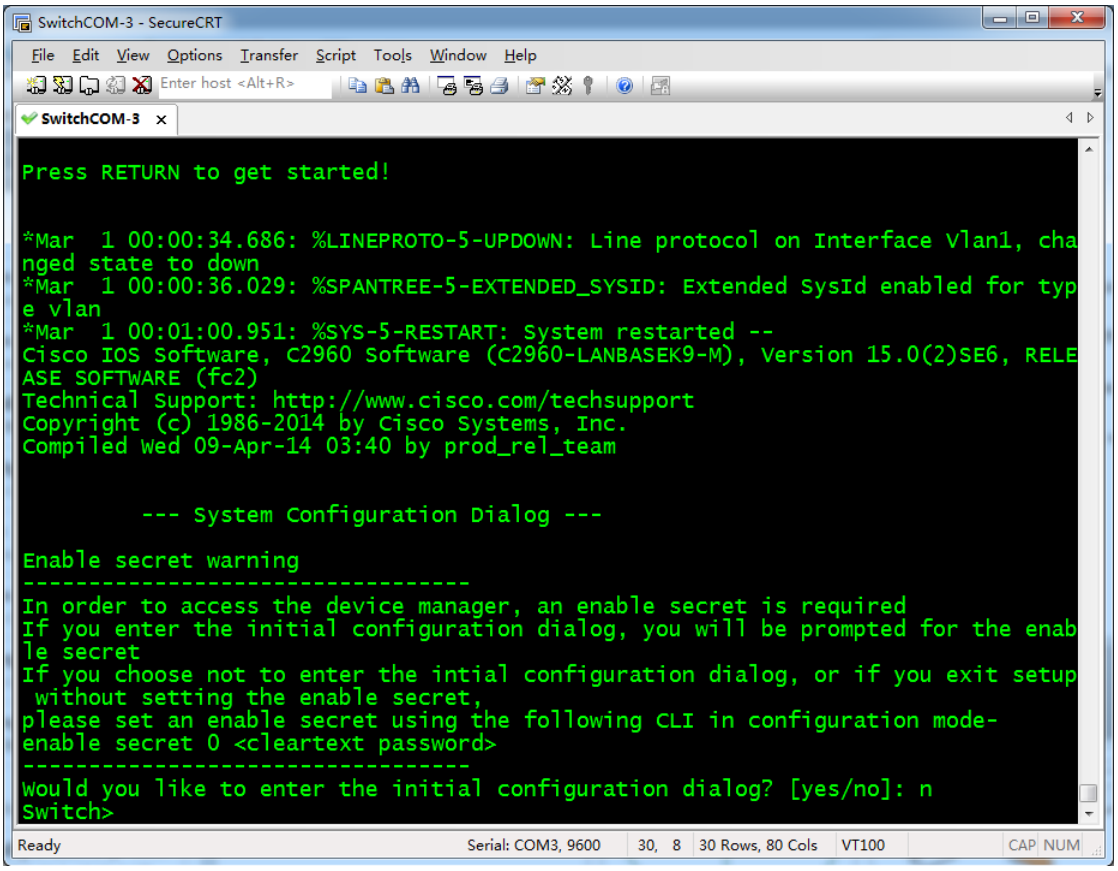
```
                --- System Configuration Dialog ---

Enable secret warning
----------------------------------
In order to access the device manager, an enable secret is required
If you enter the initial configuration dialog, you will be prompted for the enable secret
If you choose not to enter the intial configuration dialog, or if you exit setup without setting the enable secret,
please set an enable secret using the following CLI in configuration mode- enable secret 0 <cleartext
password>
----------------------------------
Would you like to enter the initial configuration dialog? [yes/no]:
```

If entering **Yes** or **Y**, switch will start an initial configuration process where you can manage some basic configuration such as password configuration. If entering **No** or **N**, switch will run in factory defaults. Now, we enter **N** to make switch run in factory defaults. Switch will give the following prompt.

```
Switch>
```

The screen capture is as follows.



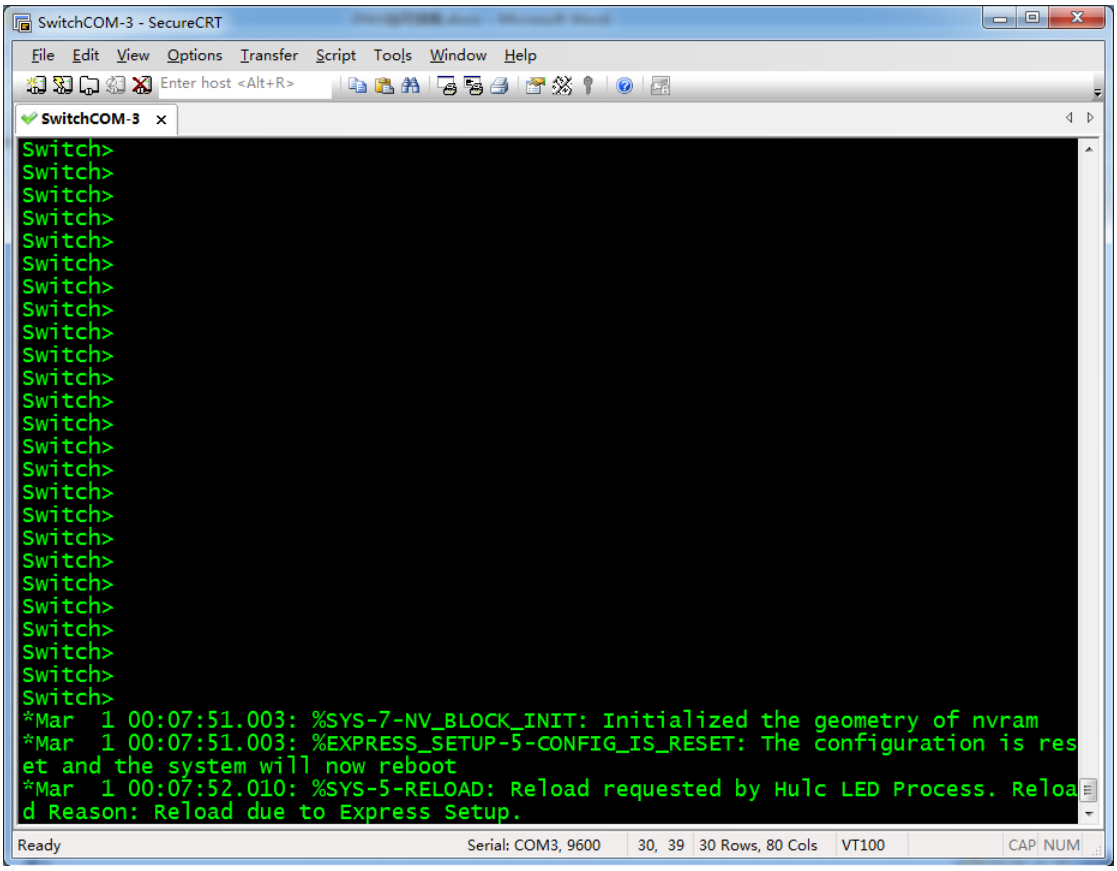
Now, we have successfully reset switch to factory defaults.

If some of switch's Ethernet ports are connected to devices using network cables, switch may display their status information during the previous process. You can ignore it.

If you forgot password and cannot access privileged mode, you can press and hold **MODE** button until screen displays the following prompt.

```
Switch>
*Mar  1 00:02:15.366: %SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
*Mar  1 00:02:15.375: %EXPRESS_SETUP-5-CONFIG_IS_RESET: The configuration is reset and the system will now reboot
*Mar  100:02:16.381:%SYS-5-RELOAD:ReloadrequestedbyHulcLEDProcess.Reload
Reason: Reload due to Express Setup.
```

The screen capture is as follows.



The prompt above means that switch is reset and starts rebooting. Now, you can release **MODE** button. Wait until switch finishes rebooting and follow the instructions in step 4.

2.2.2 Manual Configuration

2.2.2.1 Configuring Single Switch Networking

Based on C2960 series switches' factory defaults, when they are used in single switch networking, IGMP Querier and multicast fast leave functions must be enabled. Perform the following operations after switches are reset.

1. Enter privileged mode

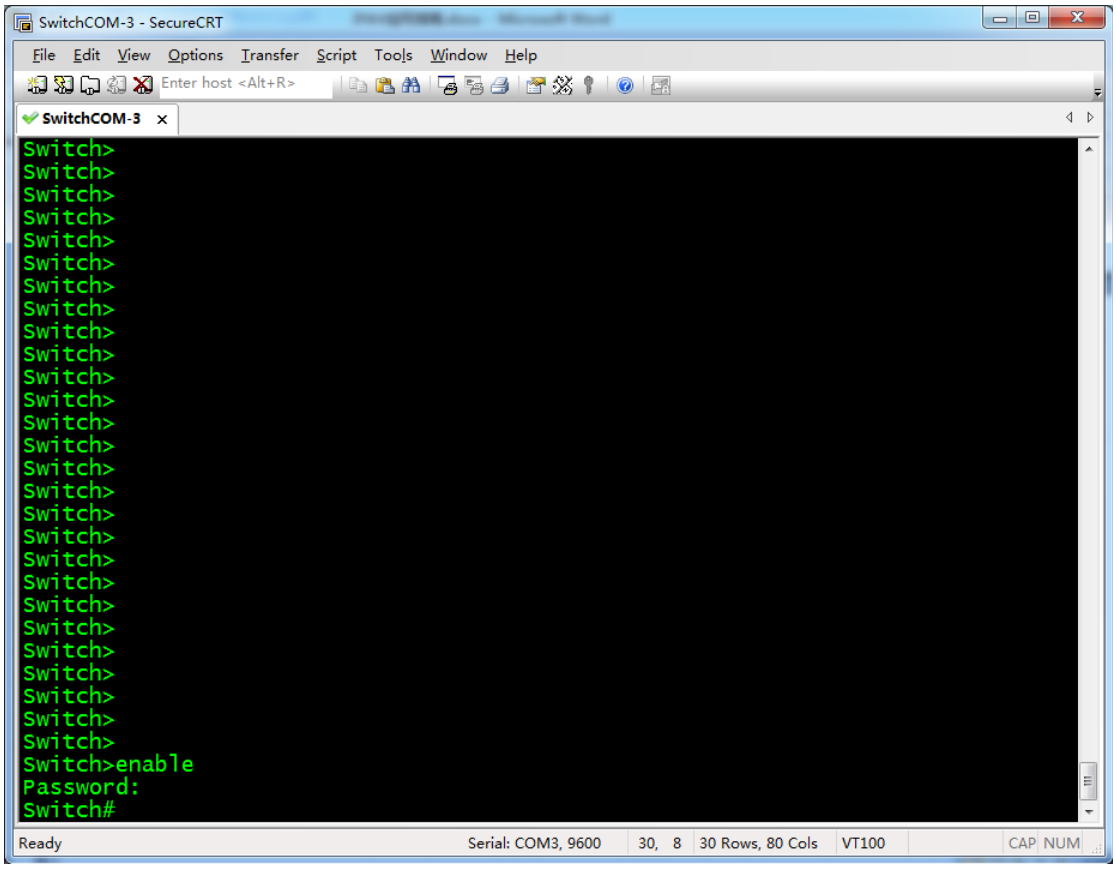
In user mode input **enable**. If password is required, switch will give the following prompt.

```
Switch>enable
Password:
```

After inputting the password, switch will give the following prompt.

```
Switch#
```

It means that you have successfully entered privileged mode. The screen capture is as follows.



If no password is required, switch will not ask you to enter password but will directly enter the privileged mode.

2. Enter global configuration mode

Enter **config terminal**. Switch will give the following prompt.

```
Switch#config terminal
Enter configuration commands, one per line.  End with CNTL/Z. Switch(config)#
```

It means that you have successfully entered global configuration mode.

3. Input **ip igmp snooping vlan 1 immediate-leave** to enable multicast fast leave for VLAN 1.

```
Switch(config)#ip igmp snooping vlan 1 immediate-leave
Switch(config)#
```

4. Enable IGMP Querier

Input **ip igmp snooping querier address 192.168.22.222** to assign an IP

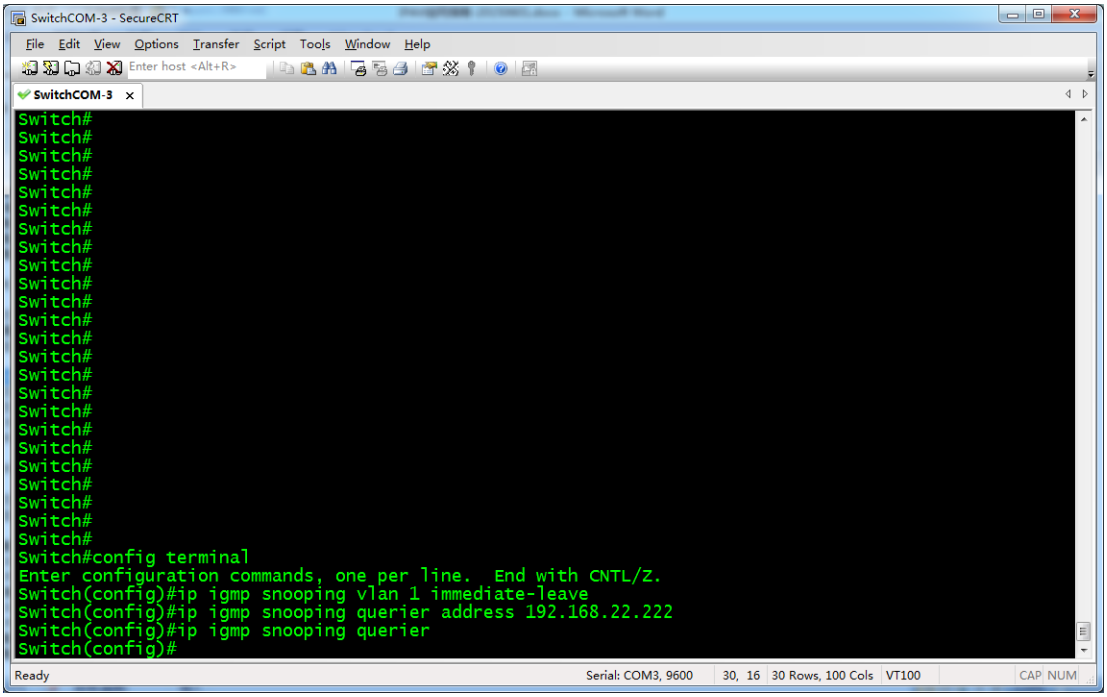
address for IGMP Querier. Switch will give the following prompt.

```
Switch(config)#ip igmp snooping querier address 192.168.22.222
Switch(config)#
```

Enter **ip igmp snooping querier** to enable IGMP Querier. Switch will give the following prompt.

```
Switch(config)#ip igmp snooping querier
Switch(config)#
```

The following screen capture describes steps 2-4.



5. Confirm configuration

Enter **end** to return privileged mode. Switch will give the following prompt.

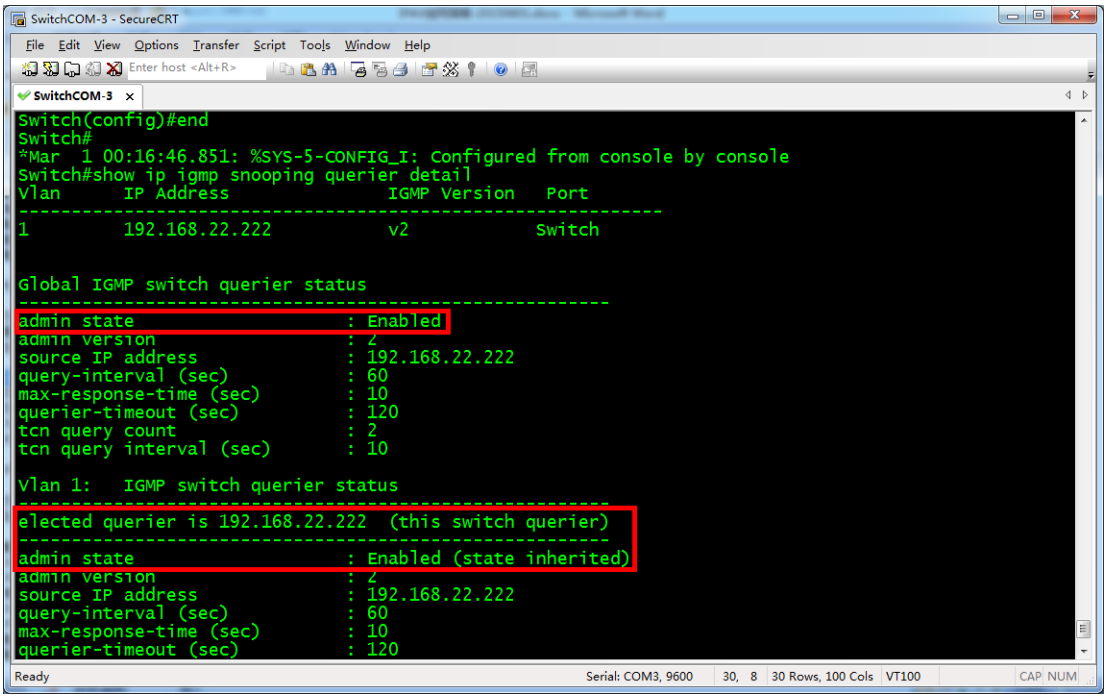
```
Switch(config)#end
Switch#


*Mar  1 00:39:20.646: %SYS-5-CONFIG_I: Configured from console by console
Switch#
```

Input **show ip igmp snooping querier detail**. Switch will give the following prompt.

```
Switch#show ip igmp snooping querier detail
...
Global IGMP switch querier status
------------------------------------------------------- admin state       : Enabled
...
Vlan 1:         IGMP switch querier status
------------------------------------------------------- elected querier is 192.168.22.222 (this
switch querier)
------------------------------------------------------- admin state       : Enabled (state inherited)
...
```

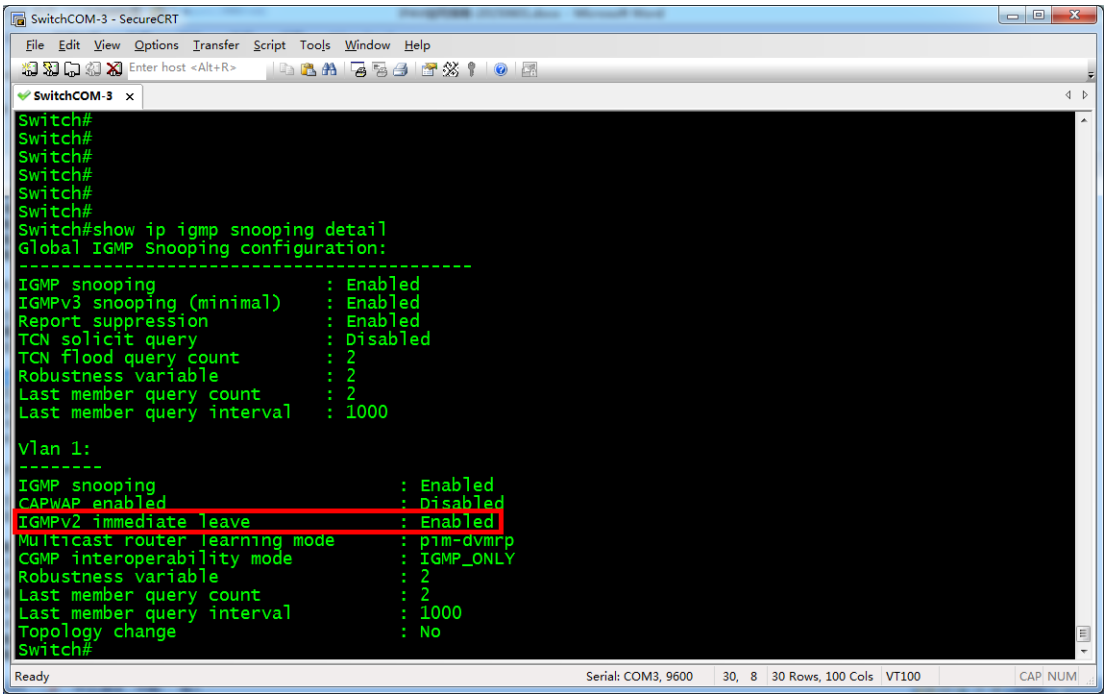
The related screen capture is as follows. The information in red boxes means that IGMP Querier is correctly enabled.



Continue to input **show ip igmp snooping detail** to view IGMP Snooping detail.

```
Switch#show ip igmp snooping detail
Global IGMP Snooping configuration:
---------------------------------------------- IGMP snooping      : Enabled
...
Vlan 1:
--------
IGMP snooping                                  : Enabled
...
IGMPv2 immediate leave                         : Enabled
...
```

The screen capture is as follows. The information in red box means that multicast fast leave is enabled for VLAN 1.

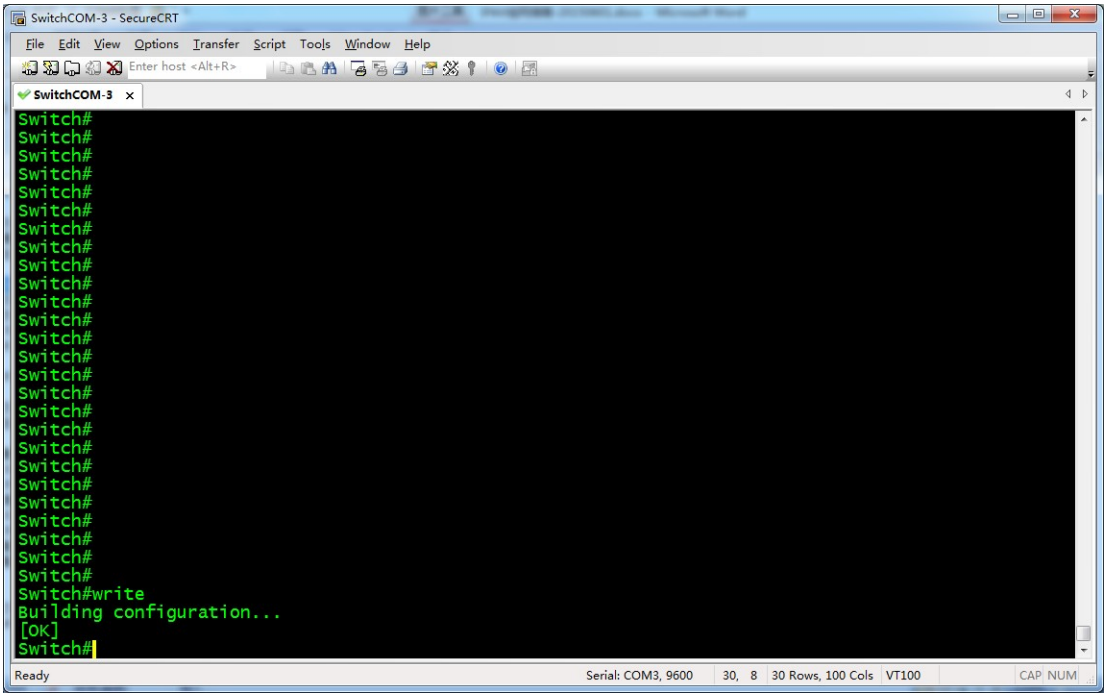


6. Save configuration

After confirming correct configuration, input **write** to save the current configuration. Switch will display the following prompt.

```
Switch#write
Building configuration... [OK]
```

The screen capture is as follows.



Now, it has successfully saved configuration used in single switch networking. Switch will run this configuration for the next startup.

2.2.2.2 Configuring Core Switches

Based on C2960 series switches' factory defaults, when they are used as core switches, only IGMP Querier function needs to be enabled. Perform the following operations after they are reset.

1. Enter privileged mode

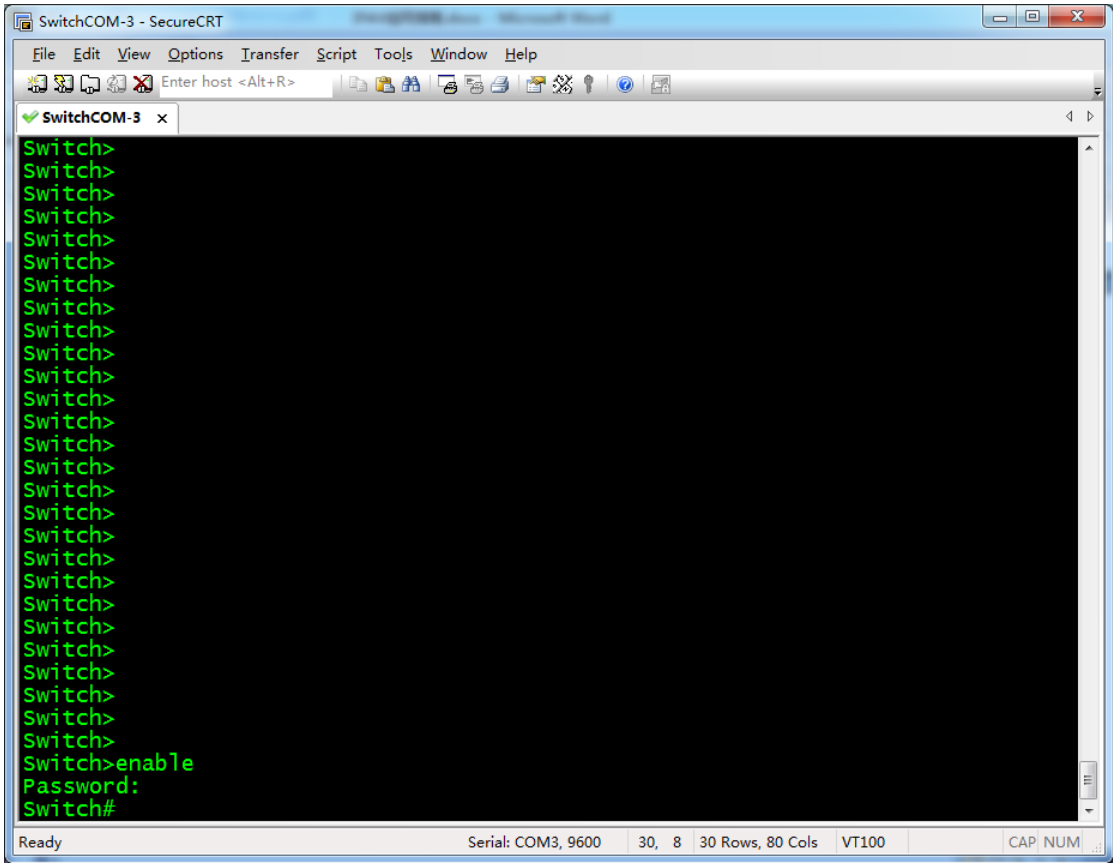
In user mode input **enable**. If password is required, switch will give the following prompt.

```
Switch>enable
Password:
```

After inputting the password, switch will give the following prompt.

```
Switch#
```

It means that you have successfully entered privileged mode. The screen capture is as follows.



If no password is required, switch will not ask you to input password but will directly enter privileged mode.

2. Enter global configuration mode

Input **config terminal**. Switch will give the following prompt.

```
Switch#config terminal
Enter configuration commands, one per line.  End with CNTL/Z. Switch(config)#
```

It means that you have successfully entered global configuration mode.

3. Enable IGMP Querier

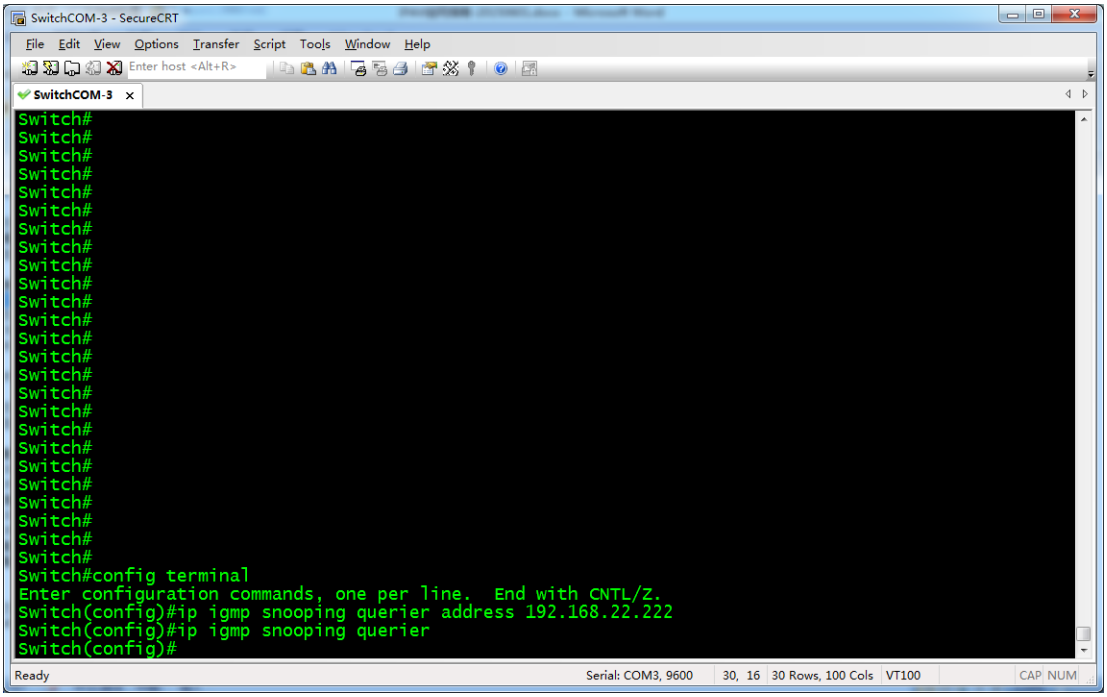
Input **ip igmp snooping querier address 192.168.22.222** to assign an IP address for IGMP Querier. Switch will give the following prompt.

```
Switch(config)#ip igmp snooping querier address 192.168.22.222
Switch(config)#
```

Input **ip igmp snooping querier** to enable IGMP Querier. Switch will give the following prompt.

```
Switch(config)#ip igmp snooping querier
Switch(config)#
```

The following screen capture describes steps 2-3.



4. Confirm configuration

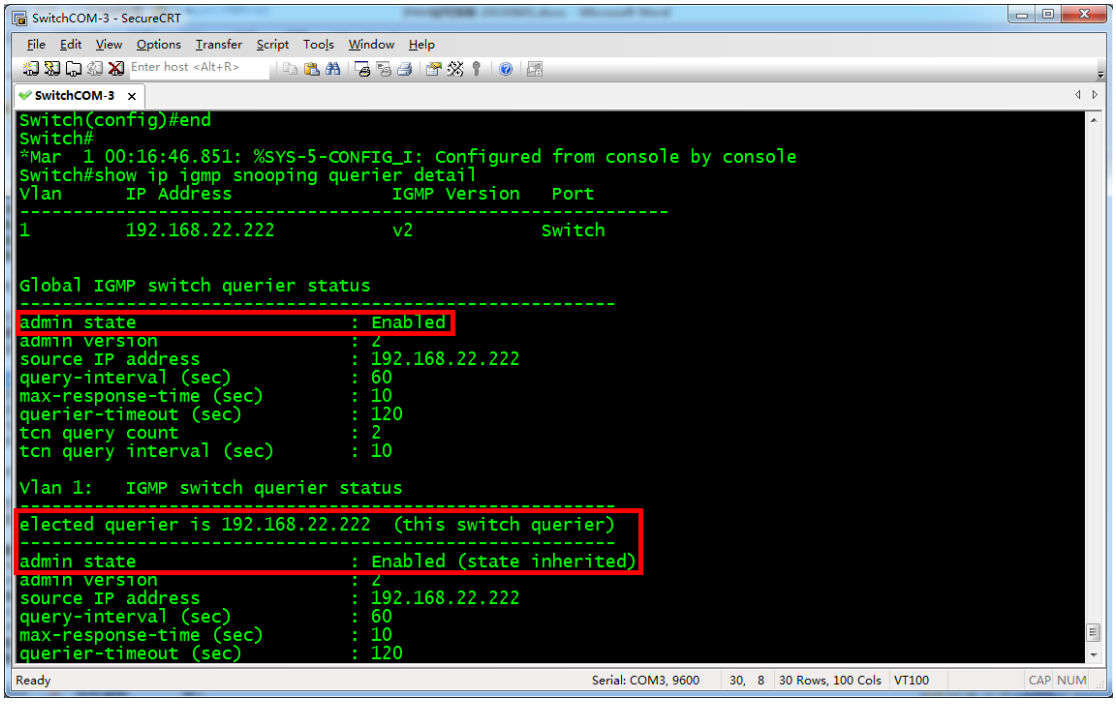
Input **end** to return privileged mode. Switch will give the following prompt.

```
Switch(config)#end
Switch#
*Mar  1 00:39:20.646: %SYS-5-CONFIG_I: Configured from console by console
Switch#
```

Input **show ip igmp snooping querier detail**. Switch will give the following prompt.

```
Switch#show ip igmp snooping querier detail
...
Global IGMP switch querier status
------------------------------------------------------------ admin state       : Enabled
...
Vlan 1:         IGMP switch querier status
------------------------------------------------------------ elected querier is 192.168.22.222 (this
switch querier)
------------------------------------------------------------ admin state       : Enabled (state inherited)
...
```

The related screen capture is as follows. The information in red boxes means that IGMP Querier is enabled correctly.

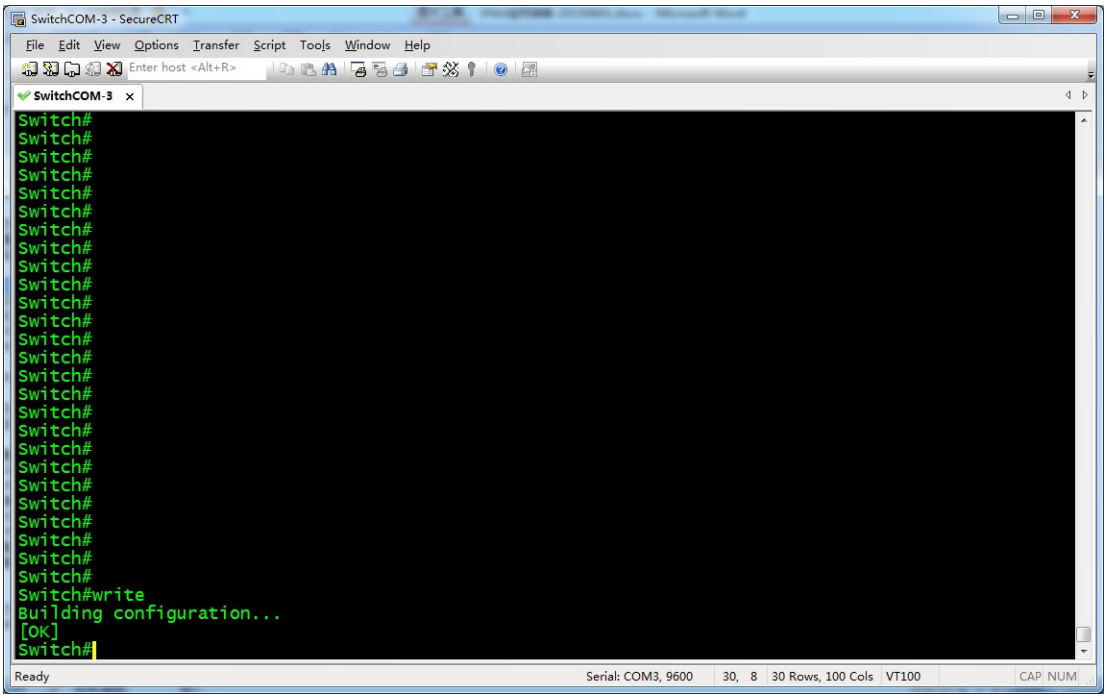


5. Save configuration

After confirming correct configuration, input **write** to save the current configuration. Switch will display the following prompt.

```
Switch#write
Building configuration... [OK]
```

The screen capture is as follows.



Now, it has successfully saved the current configuration. Core switch will run this configuration for the next startup.

2.2.2.3 Configuring Extended Switches

In factory defaults of C2960 series switches, IGMP Snooping is enabled but IGMP Querier is disabled. When they are used as extended switches, only multicast fast leave needs to be enabled.

1. In user mode input **enable** to enter privileged mode.

```
Switch>enable
Switch#
```

2. Input **config terminal** to enter global configuration mode.

```
Switch#config terminal
Enter configuration commands, one per line.  End with CNTL/Z. Switch(config)#
```

3. Input **ip igmp snooping vlan 1 immediate-leave** to enable multicast fast leave for VLAN 1.

```
Switch(config)#ip igmp snooping vlan 1 immediate-leave
Switch(config)#
```

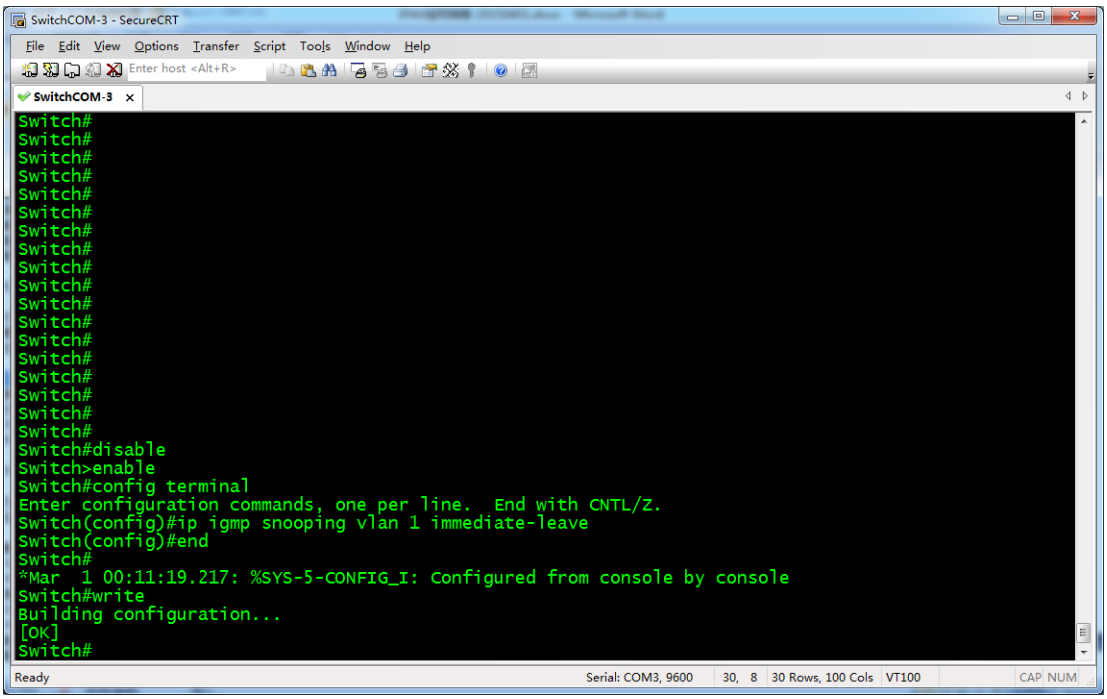
4. Input **end** to return privileged mode.

```
Switch(config)#end
Switch#
```

5. Input **write** to save the current configuration.

```
Switch#write
Building configuration... [OK]
```

The following screen capture describes the previous steps.



Now, C2960 series switches have been successfully configured to be extended switches.

2.2.2.4 Preventing Multicast Flood Caused by TCN

C2960 series switches will forward multicast packets to all the ports when network topology changes. In Cisco's documentation, network topology change is abbreviated as TCN (Topology Change Notification). The most common TCN event is connection or disconnection of network cables. In a network environment with C2960 series switches for networking, if you plug or unplug a network device's network cable, multicast flood may happen. Although this situation rarely happens when the system works properly, we would recommend that you manually disable this function. To do this:

1. Obtain port configuration information

C2960 series switches' each Ethernet port can be set not to be affected by multicast flood caused by TCN. So first you need to obtain the switch's port configuration.

In user mode input **show interface description** to obtain the switch's port configuration.

WS-C2960-24TC-L will give the following prompt.

```
Switch>show interface description
Interface                      Status         Protocol Description
Vl1                            admin down     down
Fa0/1                          down           down
Fa0/2                          down           down
Fa0/3                          up             up
Fa0/4                          down           down
...
Fa0/23                         down           down
Fa0/24                         down           down
Gi0/1                          up             up
Gi0/2                          up             up
```

From the list above, we can see that this switch has 24 100Mbps Ethernet ports ranging from Fa0/1 to Fa0/24. Other models of switches will give different prompt due to different port configuration.

2. Assign host port range

After obtaining port configuration, it needs to assign related Ethernet ports as the next operated objects.

In user mode input **enable** to enter privileged mode. Switch will give the following prompt.

```
Switch>enable
Switch#
```

Input **config terminal** to enter global configuration mode. Switch will give the following prompt.

```
Switch#config terminal
Enter configuration commands, one per line.  End with CNTL/Z. Switch(config)#
```

Use **interface range** command to enter port bulk configuration mode. Switch will give the following prompt.

```
Switch(config)#interface range fa 0/1-24
Switch(config-if-range)#
```

The prompt above is the operation result on WS-C2960-24TC-L. Its argument **Fa0/1-24** is port configuration information from the previous step. For different switches, arguments behind **interface range** may be different. For example port range of WS-C2960S-24PS-L should be assigned like this:

```
Switch(config)#interface range Gi 1/0/1-28
Switch(config-if-range)#
```

Subsequent operations will be performed on these ports.

3. Ban TCN Multicast Flood

Input **no ip igmp snooping tcn flood** to ban these ports from multicast flood

due to TCN. Switch will give the following prompt.

```
Switch(config-if-range)#no ip igmp snooping tcn flood
Switch(config-if-range)#
```

4. Save the current configuration.

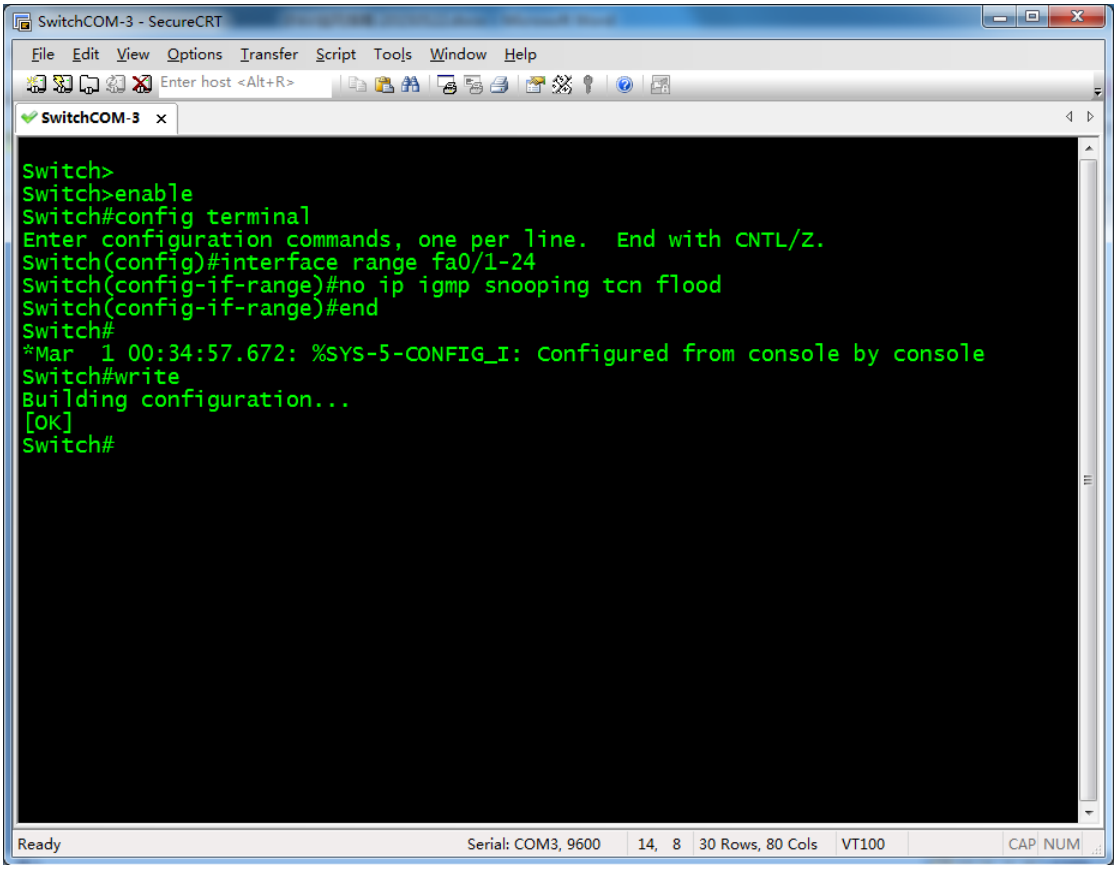
Input **end** to return privileged mode. Switch will give the following prompt.

```
Switch(config-if-range)#end
Switch#
*Mar  1 00:58:18.292: %SYS-5-CONFIG_I: Configured from console by console
Switch#
```

Input **write** to save the configuration so that the settings will take effect for the next startup. Switch will give the following prompt.

```
Switch#write
Building configuration... [OK]
Switch#
```

The following screen capture describes the previous steps 2-4 operated on WS-C2960-24TC-L.



Now, multicast flooding caused by TCN has been successfully prevented from all host ports. Please note that in the previous example we only configure main ports of switches except a few ports such as WS-C2960-24TC-L's two Gi ports. You can configure these undone ports according to the

example above.

2.2.3 Importing Configuration

Before importing configuration for switches, complete related preparations by referring to "Reference Information" section, and then operate based on the following steps.

1. In user mode input **enable** to enter privileged mode. Switch will give the following prompt.

```
Switch>enable
Switch#
```

2. Input **config terminal** to enter global configuration mode. Switch will give the following prompt.

```
Switch#config terminal
Enter configuration commands, one per line.  End with CNTL/Z. Switch(config)#
```

3. Input **interface vlan 1** to enter port configuration mode.

```
Switch(config)#interface vlan 1
Switch(config-if)#
```

4. Input **ip address 192.168.1.39 255.255.255.0** to configure management IP address for VLAN 1.

```
Switch(config-if)#ip address 192.168.1.39 255.255.255.0
Switch(config-if)#
```

5. Input **no shutdown** to ensure that ports are always open. Switches may give some additional prompt.

```
Switch(config-if)#no shutdown
Switch(config-if)#
*Mar  1 00:06:06.506: %LINK-3-UPDOWN: Interface Vlan1, changed state to up
*Mar  1 00:06:06.515: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
Switch(config-if)#
```

6. Input **end** to return privileged mode.

```
Switch(config-if)#end
Switch#
*Mar  1 00:06:19.022: %SYS-5-CONFIG_I: Configured from console by console

Switch#
```

7. Input **copy tftp: startup-config** to download configuration file from PC. Switch will give the following prompt.

```
Switch#copy tftp: startup-config
Address or name of remote host []?
```

Enter PC's IP address such as **192.168.1.73**. Switch will continue to prompt configuration file name.

```
Source filename []?
```

Input configuration file name in TFTP directory such as **C2960-JPX.cfg**.

Switch will continue to give prompt.

```
Destination filename [startup-config]?
```

Press **Enter** to confirm. Switch will download configuration data from PC via

TFTP.

```
Accessing tftp://192.168.1.73/C2960-JPX.cfg...
Loading C2960-JPX.cfg from 192.168.1.73 (via Vlan1): ! [OK - 2365 bytes]
2365 bytes copied in 17.138 secs (138 bytes/sec) Switch#
*Mar  1 00:08:41.989: %SYS-5-CONFIG_NV_I: Nonvolatile storage configured from
tftp://192.168.1.73/C2960-JPX.cfg by console
Switch#
```

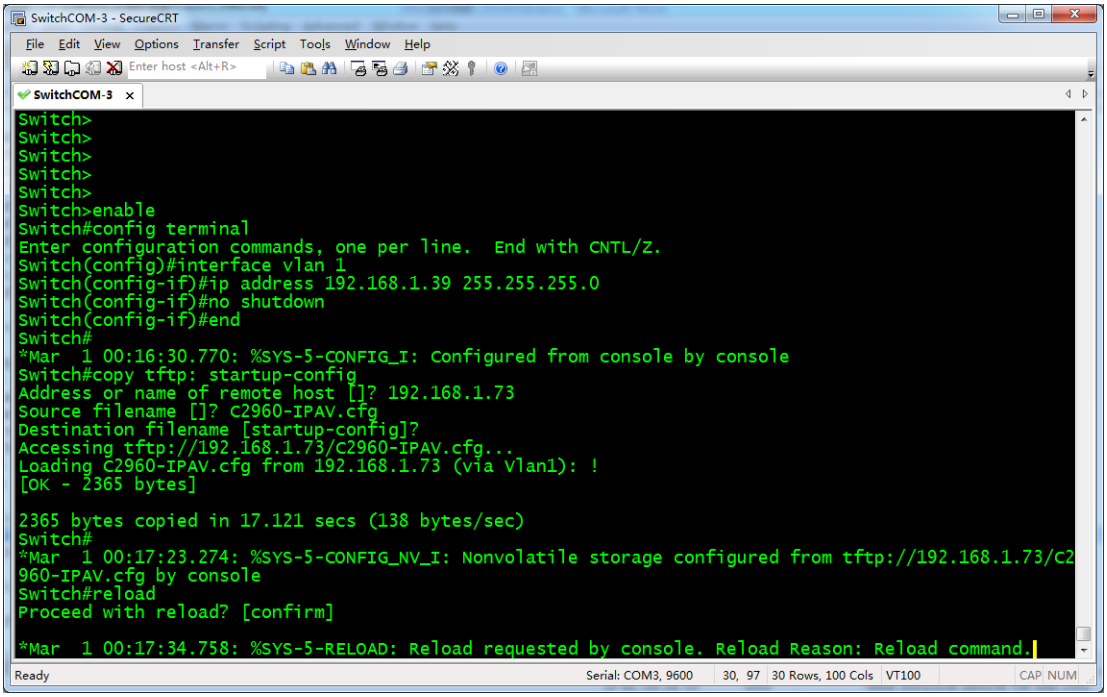
8. Input **reload** to reboot switch. Switch will give the following prompt.

```
Switch#reload
Proceed with reload? [confirm]
```

Press **Enter** to confirm. Switch will give the following prompt.

```
*Mar  1 02:05:18.700: %SYS-5-RELOAD: Reload requested by console. Reload Reason: Reload command.
```

The following screen capture describes the previous steps.



After rebooting, switch will run configuration file **C2960-JPX.cfg**.

Huawei S2700 & S5700 Series

For HUAWEI S2700, S5700 series switches, we would recommend that you use models S2700-26TP-EI-AC, S2700-52P-EI-AC, S5700-28P-PWR-LI-AC and S5700-48TP-PWR-SI. They can be used in single switch networking and have similar configuration methods.

Huawei Support: http://e.huawei.com/en/service-hotline

2.3.1 Basic Operations

2.3.1.1 Logging into the Switches

If you want to configure switches, you need to use special cables and connect them to the switches' dedicated ports.

1. Connect your PC to a switch

Use a matching Console cable to connect between switch's **Console** port and PC's serial port. If your PC has no serial ports, use a USB-to-serial converter and install correct drivers.

2. Configure serial communication parameters

Run terminal emulation software on your PC. Create a session and configure serial communication parameters based on the following table.

Parameters	Value
Communication Port	If your PC is equipped with serial ports in factory defaults, COM1 port is usually enabled. If your PC's multiple serial ports are configured or PC is connected with a USB-to-serial converter, see the related user guides.
Baud Rate	9600 bps
Flow Control	None
Parity	None
Stop Bits	1
Data Bits	8 bits

3. Build communication connection

In terminal emulation software select the previous created session and start the connection.

Switch will give the following prompt.

```
User interface con0 is available
```

```
Please Press ENTER.
```

Press **Enter** (If switch does not give any prompt directly press **Enter**). Switch will give the following feedback.

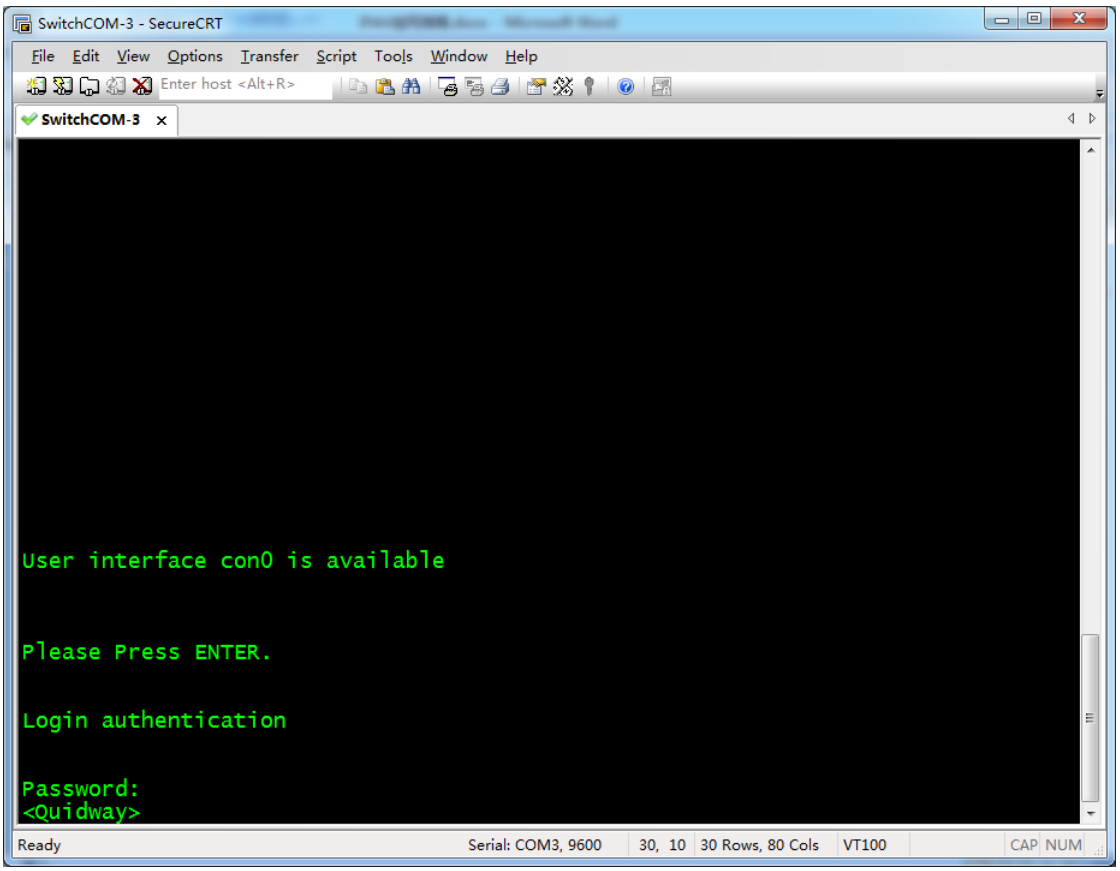
```
Login authentication
Password:
```

After password is input, screen will display the following prompt, indicating that user is in default view.

```
<Quidway>
```

IMPORTANT: This following is presented as informational examples. Switch hardware, software, firmware of these devices may change. Always consult your switch manufacture to verify compatibility before purchase, and contact the manufacturer for setup and troubleshooting assistance. ***ALWAYS pre-stage / test your system*** for proper configuration and operation prior to site installation.

The following screen capture describes the previous steps.



Now, you have successfully logged in to the switches and can perform further operations.

2.3.1.2 Resetting to Factory Defaults

To avoid interface with JPX networking from other settings, we would recommend that you reset switches to factory defaults before starting configuring switches.

1. Log in to switch using terminal emulation software. Input **reset save**.

   Switch will give the following prompt.

```
<Quidway>reset save
The action will delete the saved configuration in the device.
The configuration will be erased to reconfigure. Continue? [Y/N]:
```

Input **Y**. Switch will give the following prompt.

```
Warning: Now clearing the configuration in the device.
Info: Succeeded in clearing the configuration in the device.
```

2. Continue to input **reboot** to make switches stay in factory defaults status.

   Switch will give the following prompt.

```
<Quidway>reboot
Info: The system is now comparing the configuration, please wait.
Warning: All the configuration will be saved to the configuration file for the
```

```
next startup:, Continue?[Y/N]:
```

Input **N**. Switch will give the following prompt.

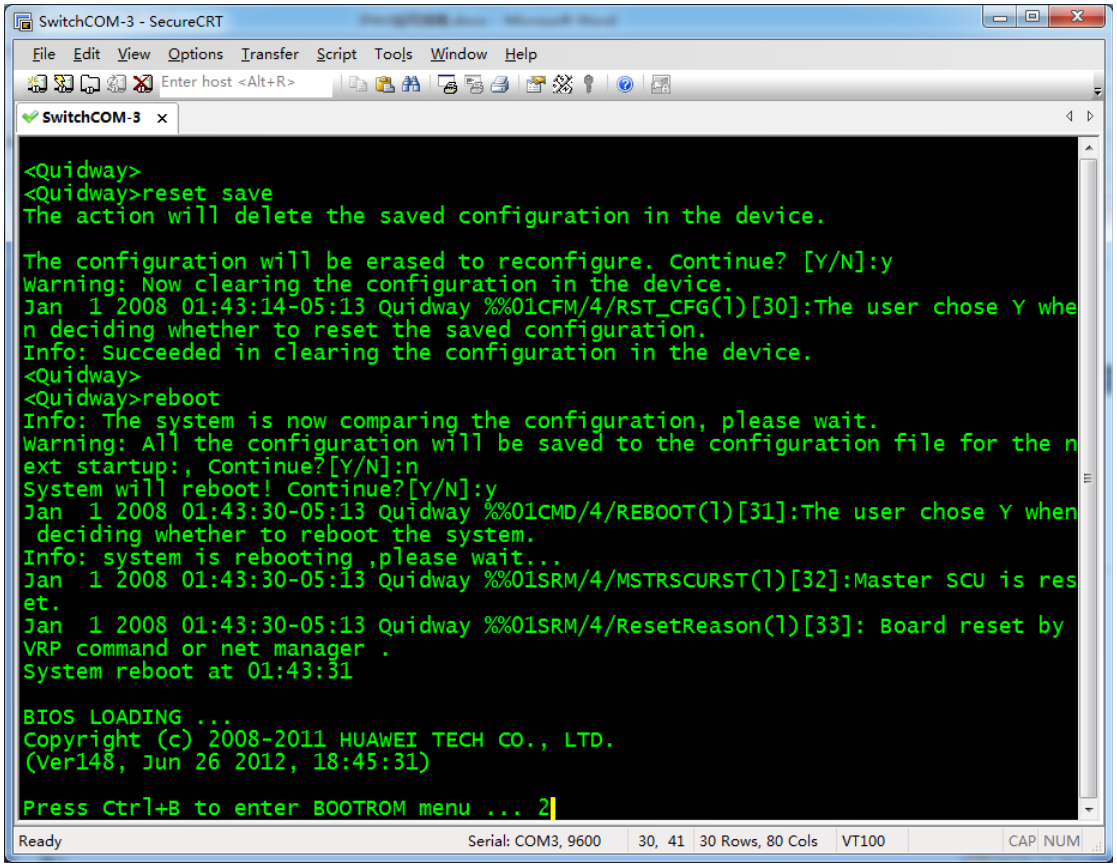
```
System will reboot! Continue?[Y/N]:
```

Input **Y**. Switch will give the following prompt after printing some information.

```
System reboot at 01:37:56

BIOS LOADING ...
```

The following screen capture describes the previous steps 1-2.



3. After switch is reset to factory defaults and reboots, it will give the following prompt.

```
Recover configuration...OK! Press ENTER to
get started. done
```

After pressing **Enter**, switch will ask you to configure the login password.

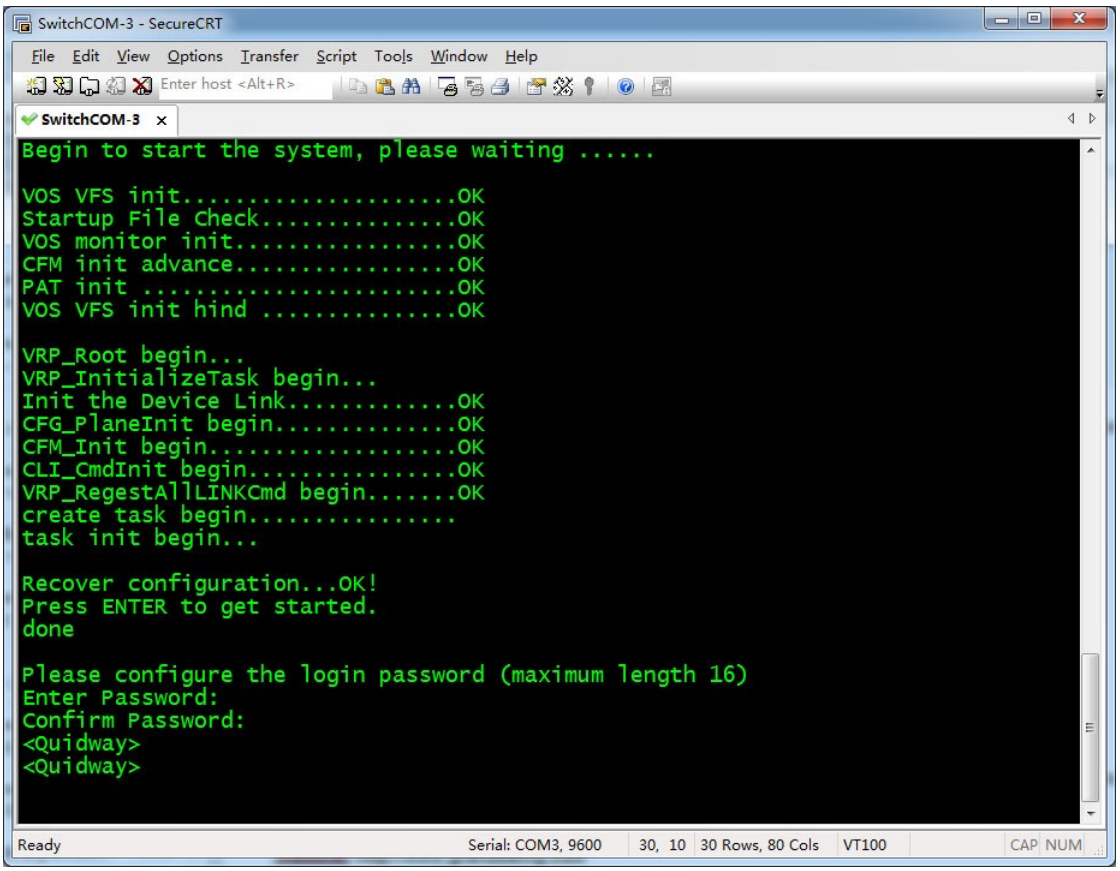
```
Please configure the login password (maximum length 16) Enter Password:
```

After inputting the password, switch will ask you to input password again for confirmation.

```
Confirm Password:
```

After inputting the same password twice, you can now configure switches.

The following screen capture describes this step.



2.3.2 Manual Configuration

The following introduces operation process of manual configuration via commands. During the process, switch will give the similar prompt like below now and then.

```
Jan  5 2008 01:41:40-05:13 Quidway DS/4/DATASYNC_CFGCHANGE:OID
1.3.6.1.4.1.2011.5.25.191.3.1 configurations have been changed. The current change number is 1, the change loop
count is 5, and the maximum number of records is 1.
```

You can directly press **Enter** to ignore it.

2.3.2.1 Changing the Configuration

A little difference exists in configuration process of S2700 and S5700 series switches. Configuration methods of dropping unknown multicast messages are the main difference. They will be described separately.

2.3.2.1.1 S2700 Series Switches

1. After logging in to the switches input **system-view** in default view to enter system view.

```
<Quidway>system-view
Enter system view, return user view with Ctrl+Z. [Quidway]
```

2. Input **igmp-snooping enable** to enable global IGMP Snooping.

```
[Quidway]igmp-snooping enable
[Quidway]
```

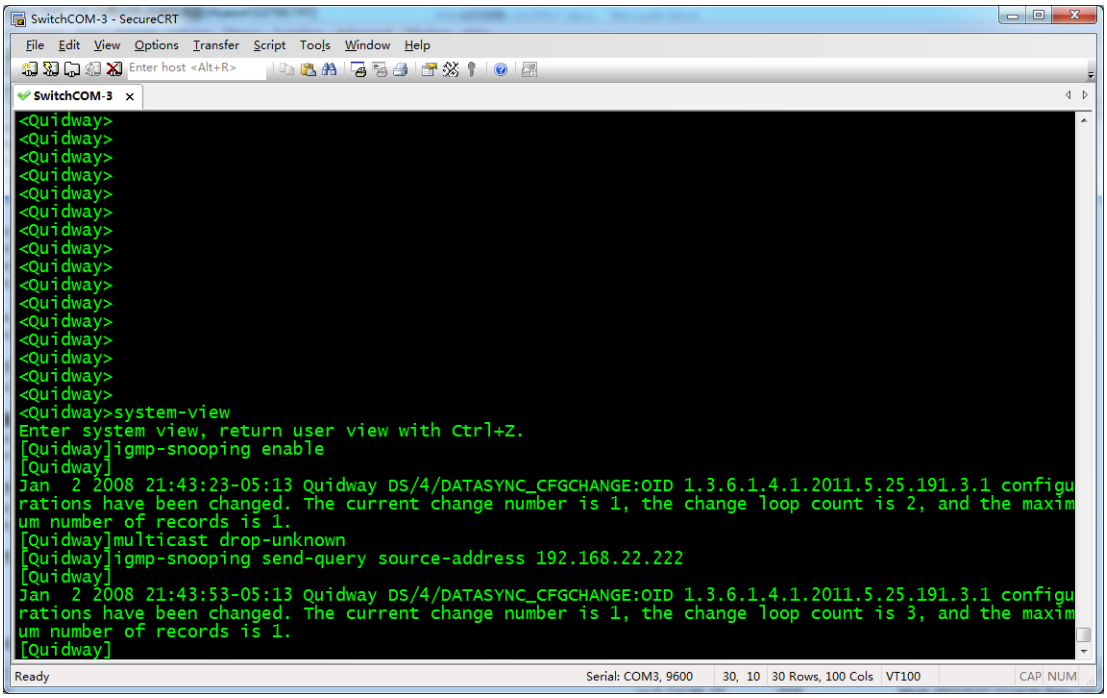
3. Input **multicast drop-unknown** to control switches to drop unknown multicast messages.

```
[Quidway]multicast drop-unknown
[Quidway]
```

4. Input **igmp-snooping send-query source-address 192.168.22.222** to assign IP address for IGMP Querier.

```
[Quidway]igmp-snooping send-query source-address 192.168.22.222 [Quidway]
```

The following screen capture describes the previous steps 1-4.



5. In system view input **vlan 1** to enter the view of VLAN 1.

```
[Quidway]vlan 1
[Quidway-vlan1]
```

6. Input **igmp-snooping enable** to enable IGMP Snooping for VLAN 1.

```
[Quidway-vlan1]igmp-snooping enable
[Quidway-vlan1]
```

7. Input **igmp-snooping querier enable** to enable IGMP Querier for VLAN 1.

```
[Quidway-vlan1]igmp-snooping querier enable
[Quidway-vlan1]
```

8. Input **igmp-snooping prompt-leave** to enable multicast fast leave for VLAN 1.

```
[Quidway-vlan1]igmp-snooping prompt-leave
```

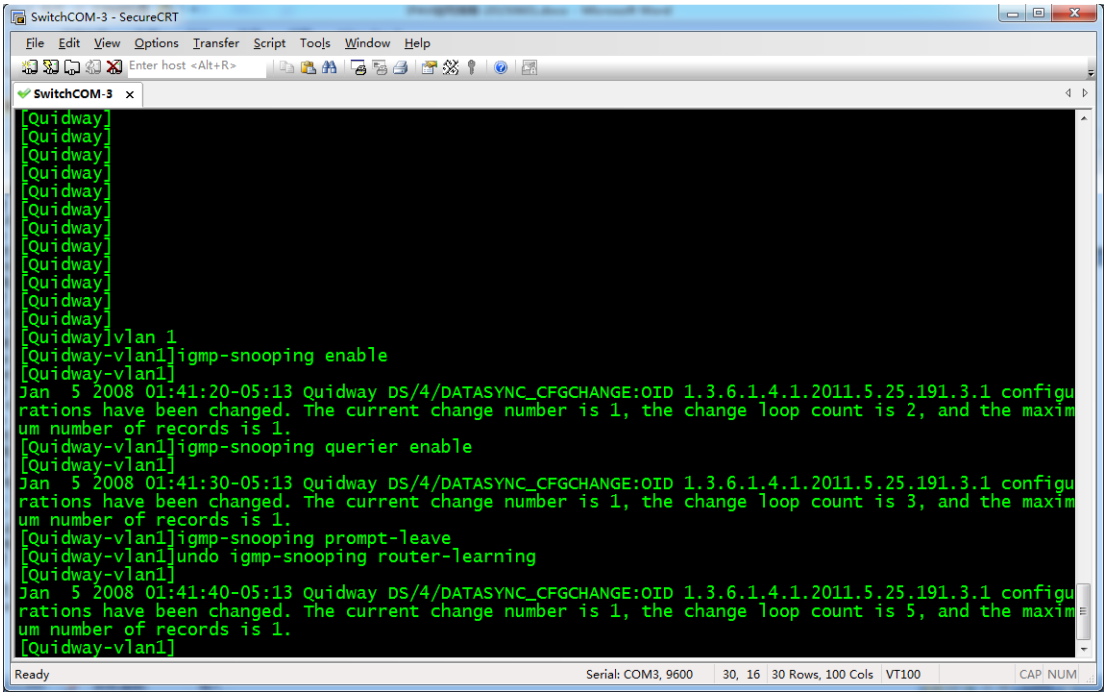
IMPORTANT: This following is presented as informational examples. Switch hardware, software, firmware of these devices may change. Always consult your switch manufacture to verify compatibility before purchase and contact the manufacturer for setup and troubleshooting assistance. ***ALWAYS pre-stage / test your system*** for proper configuration and operation prior to site installation.

[Quidway-vlan1]

9. Input **undo igmp-snooping router-learning** to disable dynamic multicast router port for VLAN 1.

```
[Quidway-vlan1]undo igmp-snooping router-learning
[Quidway-vlan1]
```

The following screen capture describes the previous steps 5-9.



2.3.2.1.2 S5700 Series Switches

1. After logging in to the switches input **system-view** in default view to enter system view.

```
<Quidway>system-view
Enter system view, return user view with Ctrl+Z. [Quidway]
```

2. Input **igmp-snooping enable** to enable global IGMP Snooping.

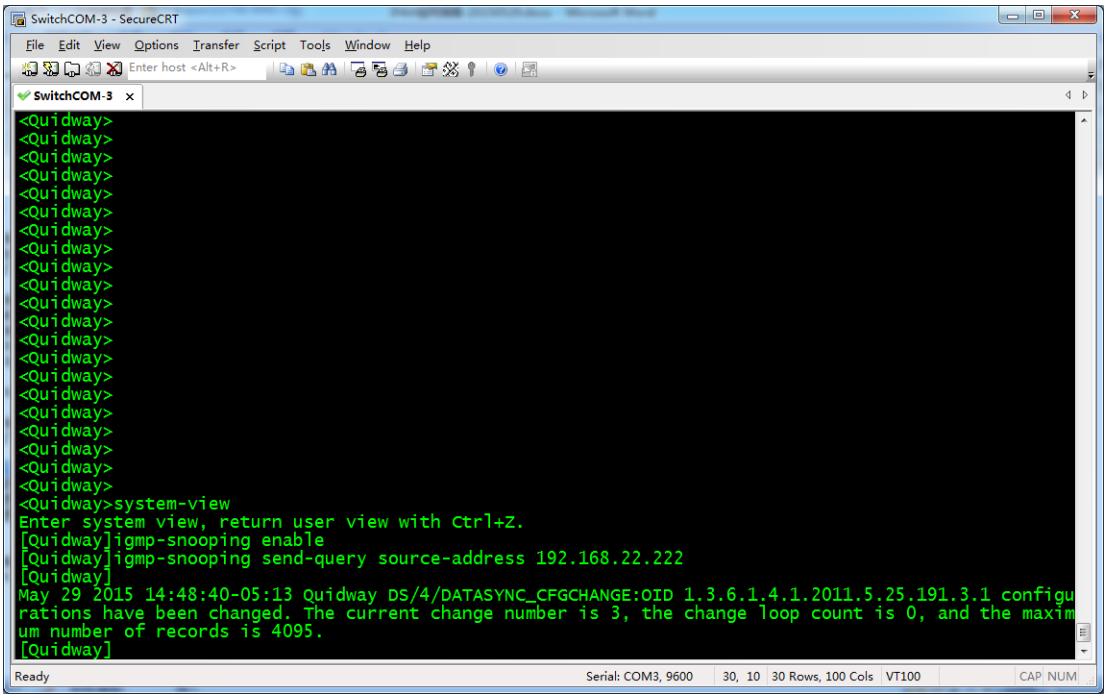
```
[Quidway]igmp-snooping enable
[Quidway]
```

3. Input **igmp-snooping send-query source-address 192.168.22.222** to assign IP address for IGMP Querier.

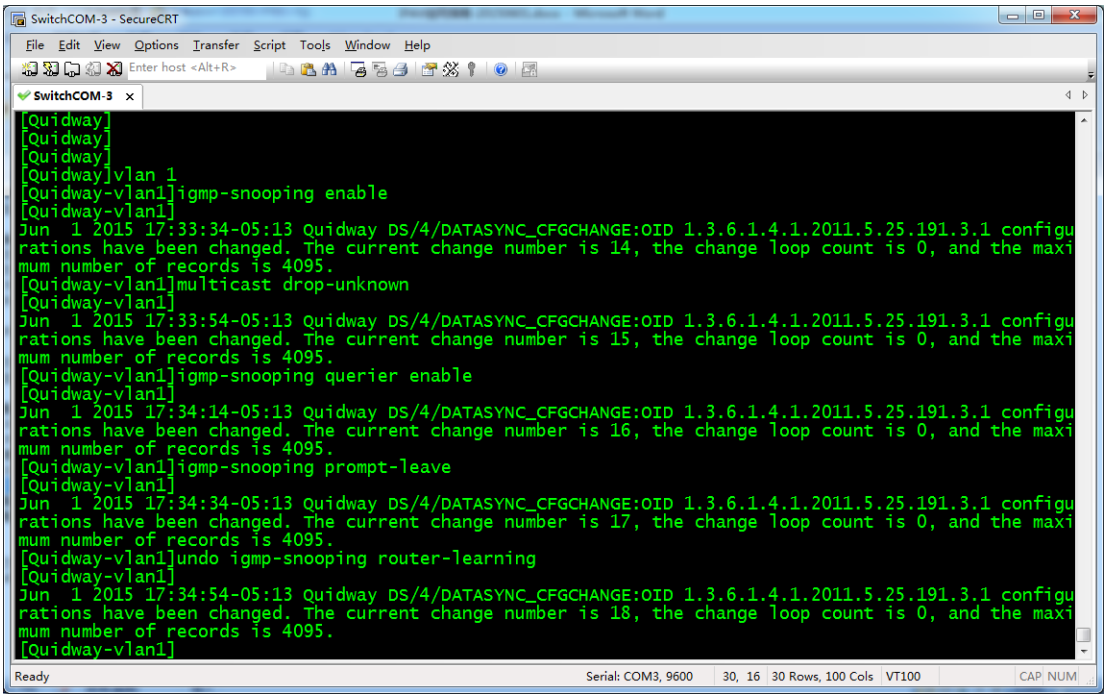
```
[Quidway]igmp-snooping send-query source-address 192.168.22.222 [Quidway]
```

IMPORTANT: This following is presented as informational examples. Switch hardware, software, firmware of these devices may change. Always consult your switch manufacture to verify compatibility before purchase and contact the manufacturer for setup and troubleshooting assistance. ***ALWAYS pre-stage / test your system*** for proper configuration and operation prior to site installation.

The following screen capture describes the previous steps 1-3.


SwitchCOM-3 - SecureCRT
File Edit View Options Transfer Script Tools Window Help
Enter host <Alt+R>
SwitchCOM-3
<Quidway>
<Quidway>
<Quidway>

The following screen capture describes the previous steps 4-9.



2.3.2.2 Confirming Configuration

1. In the view of VLAN 1 input **quit** to return system view.

```
[Quidway-vlan1]quit
[Quidway]
```

2. Input **quit** to return default view.

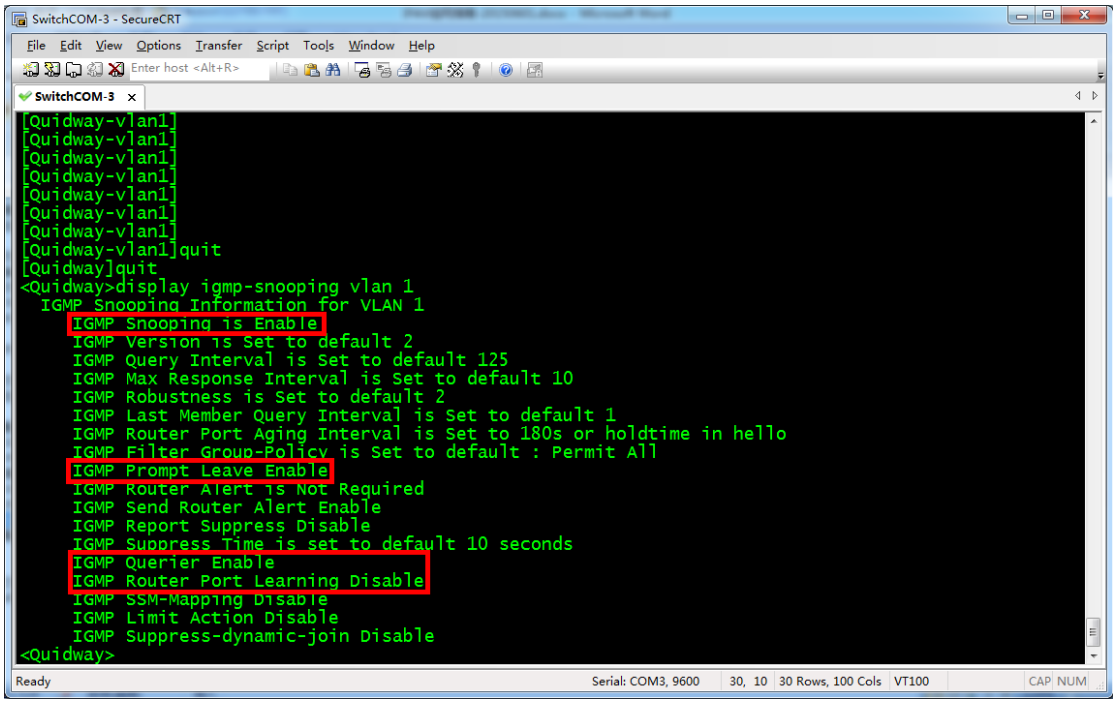
```
[Quidway]quit
<Quidway>
```

3. Input **display igmp-snooping vlan 1** to view the configuration of VLAN 1.

   Switch will give the following prompt.

```
<Quidway>display igmp-snooping vlan 1
        IGMP Snooping Information for VLAN 1
    IGMP Snooping is Enable
    ...
    IGMP Prompt Leave Enable
    ...
    IGMP Querier Enable
    IGMP Router Port Learning Disable
    ...
```

The following screen capture describes the steps above. The information in red boxes means that switches have been configured correctly.



2.3.2.3 Saving Configuration

After confirming correct configuration, save the configuration to make switches run the specific configuration after rebooting.

1. In default view input **save**. Switch will give the following feedback.

```
<Quidway>save
The current configuration will be written to the device. Are you sure to continue? [Y/N]:
```

2. Input **Y**. Switch will ask you to confirm configuration file name.

```
Info: Please input the file name(*.cfg,*.zip)[vrpcfg.zip]:
Jan  1 2008 03:05:30-05:13 Quidway %%01CFM/4/SAVE(l)[30]:The user chose Y when deciding whether to save the configuration to the device.
```

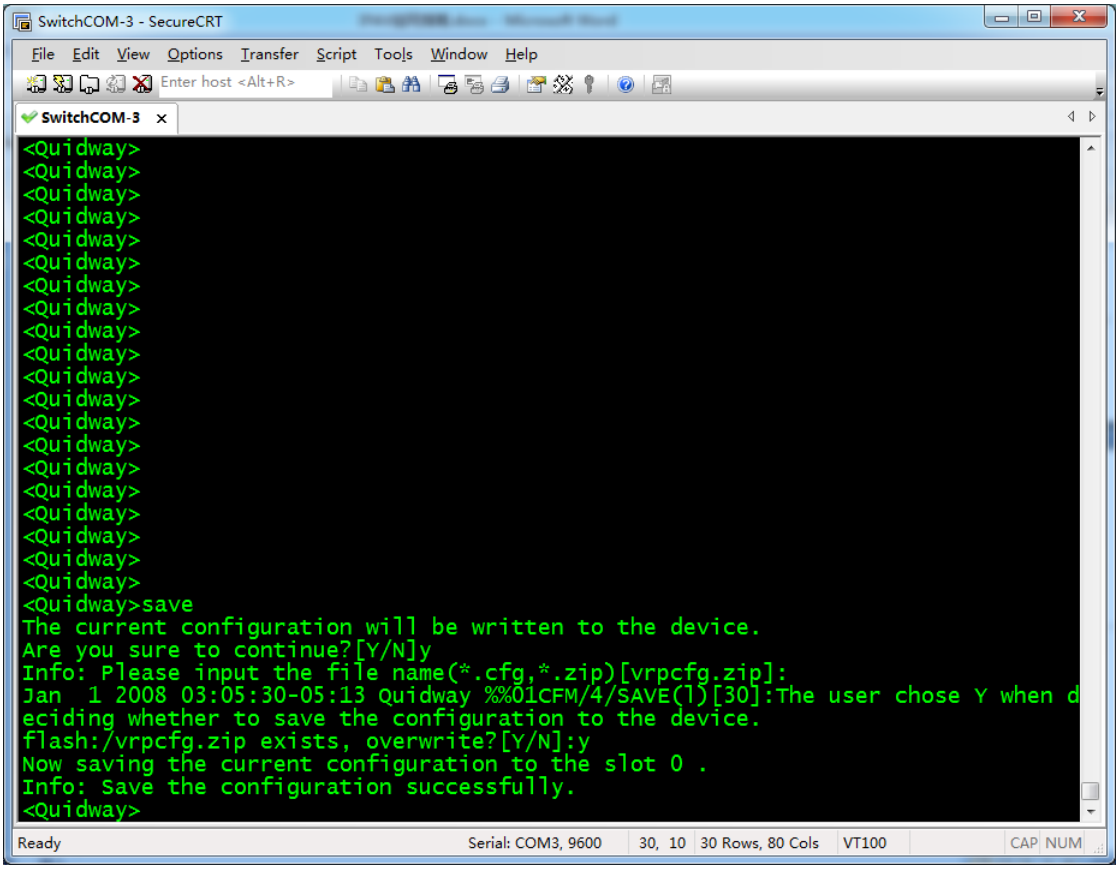
Press **Enter**. Switch will ask if you want to overwrite the original configuration file.

```
flash:/vrpcfg.zip exists, overwrite? [Y/N]:
```

3. Input **Y**. Switch will start saving the configuration. Switch will give the following feedback.

```
Now saving the current configuration to the slot 0. Info: Save the configuration successfully.
<Quidway>
```

The following screen capture describes the previous steps. According to the different time of saving configuration, switches may not give prompt of confirming configuration file name and overwriting original configuration file in step 3. It's fine only if switches give prompt of saving configuration successfully.



2.3.3 Importing Configuration

Before importing configuration for switches, complete related preparations by referring to "Reference Information" section, and then operate based on the following steps.

1. After logging in to switches, input **system-view** in default view to enter system view.

```
<Quidway>system-view
Enter system view, return user view with Ctrl+Z. [Quidway]
```

2. Input **interface vlan 1** to enter the interface view of VLAN 1.

```
[Quidway]interface vlan 1
[Quidway-Vlanif1]
```

3. Input **ip address 192.168.1.39 255.255.255.0** to configure

IMPORTANT: This following is presented as informational examples. Switch hardware, software, firmware of these devices may change. Always consult your switch manufacture to verify compatibility before purchase and contact the manufacturer for setup and troubleshooting assistance. ***ALWAYS pre-stage / test your system*** for proper configuration and operation prior to site installation.

management IP address for VLAN 1.

```
[Quidway-Vlanif1]ip address 192.168.1.39 255.255.255.0 [Quidway-Vlanif1]
```

4. Input **quit** twice to return default mode.

```
[Quidway-Vlanif1]quit
```

```
[Quidway]quit
<Quidway>
```

5. Input **tftp 192.168.1.73 get S2700-JPX.cfg** to obtain configuration file **S2700-JPX.cfg** from a PC whose IP address is 192.168.1.73. Switch will give the following prompt.

```
<Quidway>tftp 192.168.1.73 get S2700-JPX.cfg
Info: Transfer file in binary mode.
Downloading the file from the remote TFTP server. Please wait.../ TFTP: Downloading the file
successfully.
    1482 bytes received in 1 second.
<Quidway>
```

6. Input **startup saved-configuration S2700-JPX.cfg** to for switches to run using the downloaded configuration file for the next start-up.

```
<Quidway>startup saved-configuration S2700-JPX.cfg
Info: Succeeded in setting the configuration for booting system.
<Quidway>
```

7. Enter **reboot** to reboot switch.

```
<Quidway>reboot
Info: The system is now comparing the configuration, please wait.
Warning: All the configuration will be saved to the configuration file for the
next startup: Continue? [Y/N]:
```

Input **N**. Switch will give the following prompt.

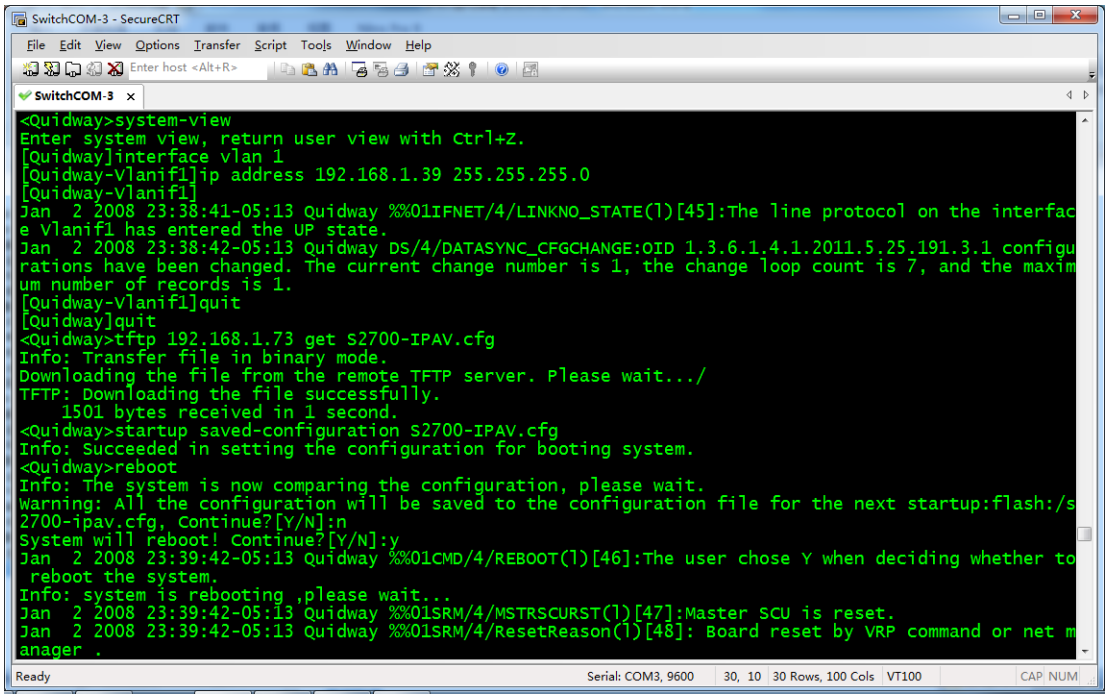
```
System will reboot! Continue? [Y/N]:
```

Now input **Y**. Switch starts rebooting.

```
Jan  2 2008 22:32:39-05:13 Quidway %%01CMD/4/REBOOT(l)[2]: The user chose Y when deciding whether to
reboot the system.
Info: system is rebooting, please wait...
```

IMPORTANT: This following is presented as informational examples. Switch hardware, software, firmware of these devices may change. Always consult your switch manufacture to verify compatibility before purchase and contact the manufacturer for setup and troubleshooting assistance. ***ALWAYS pre-stage / test your system*** for proper configuration and operation prior to site installation.

The following screen capture describes the steps above.



After rebooting, switch will run the configuration of S2700-JPX.cfg.

Netgear GS108PE

Good low cost switch for simple room installations. Note even though it is 8 ports only 4 have PoE. Great for testing and proving out issues on other switches as it works out of the box.

2.4.1 Basic Operations

Netgear GS108PE manual can be found on the Netgear website. Details for setting up the switch can be found there. Note while the IPMP snooping is defaulted on the unit the VLAN is not setup so it will need some changes based on requirements for installation.

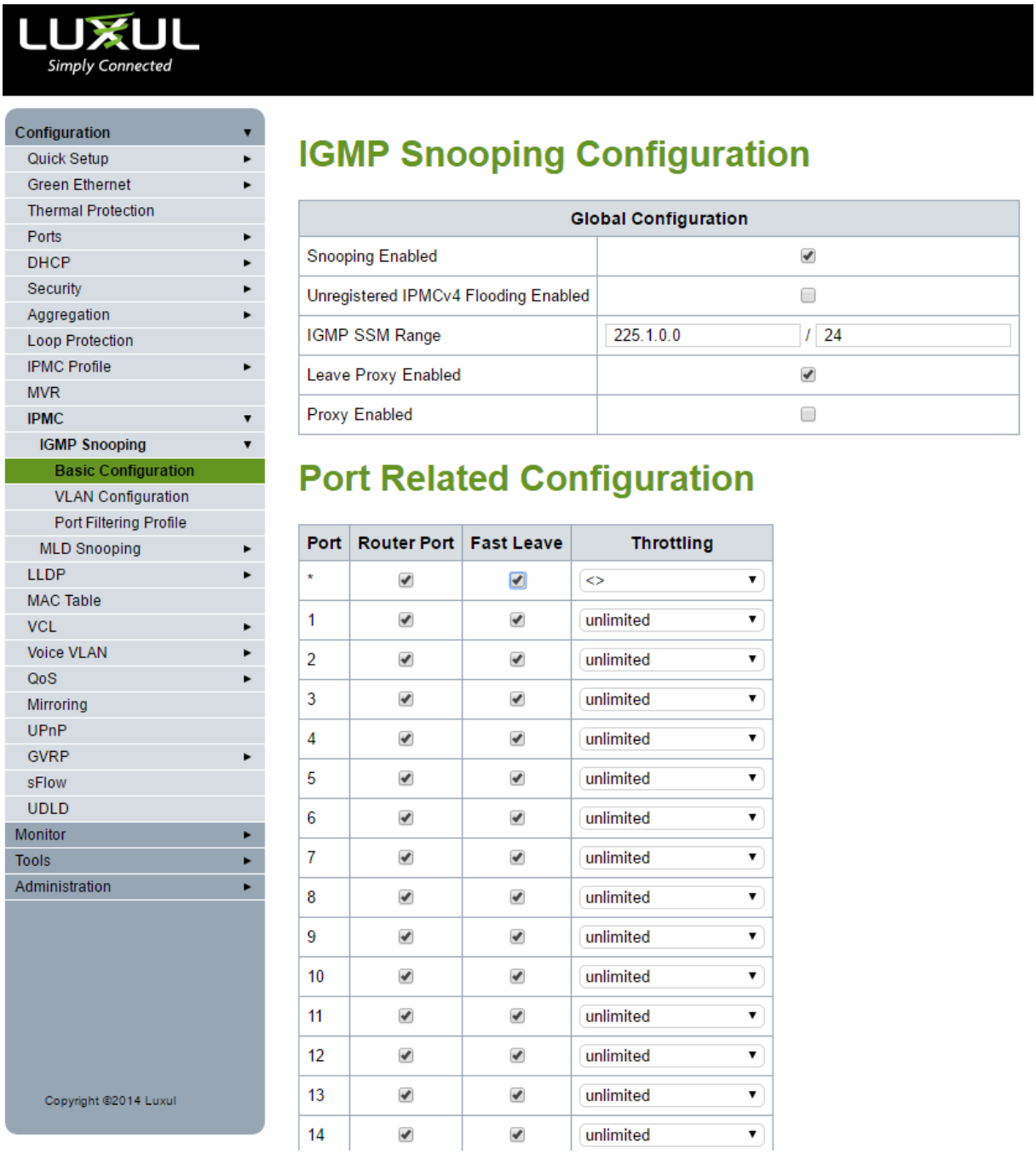
2.4.1.1 Logging into the Switch

If you want to configure switches, you need to use the Prosafe Plus Switch Utility. This utility will allow the setup of all the required functions.

Luxul AMS-1208P & XMS-2624

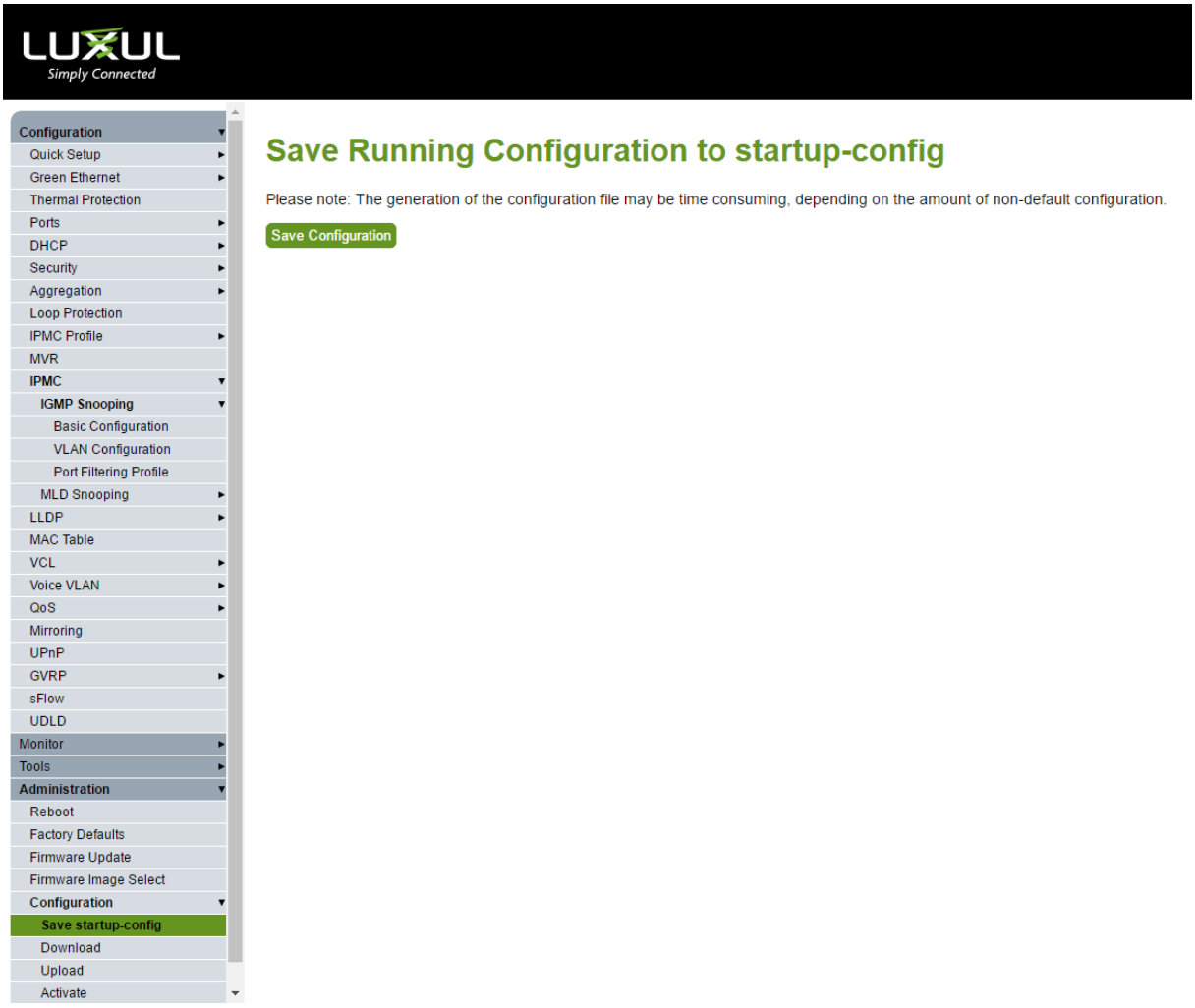
Good switch with PoE+. Geared towards AV Installers. ***Note we have seen issues with certain models and firmware. Highly recommend testing completely first before deploying.***

2.5.1 Basic Operations



IMPORTANT: This following is presented as informational examples. Switch hardware, software, firmware of these devices may change. Always consult your switch manufacture to verify compatibility before purchase and contact the manufacturer for setup and troubleshooting assistance. ***ALWAYS pre-stage / test your system*** for proper configuration and operation prior to site installation.

Remember to save running configuration to startup-config.



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Dante Audio Device Configuration

The functions of Dante devices rely on three key network technologies: Discovery and control (mDNS and known multicast group), QoS (IP DSCP to transmit critical packet, PTP), and Multicast Registration (IGMP for audio streams to join and leave a broadcast). If your Dante audio device is using multicast service, you'll need to have IGMP snooping enabled on the switch.

Netgear M4300

3.1.1 IGMP Notes

1. NETGEAR M4300 has IGMP snooping enabled by default in VLAN 1, so it is not necessary to enable it if the Dante device is using VLAN 1.
2. The M4300 blocks all unregistered multicast packets by default on VLAN 1, including those used by Dante devices. Any end node that wants to receive any of the multicast packets must issue an IGMP report to add itself to the multicast group of interest before it can receive those packets. Since Dante devices already issue the IGMP report, it should work as is (except with mDNS as configured; see **Disable Bonjour on M4300**)
3. The NETGEAR IGMP querier sends IGMP queries once every 125 seconds by default. Audinat strongly recommends that short query intervals be set (e.g. 15-30 seconds), as this ensures system responsiveness and reduces audio gap periods when temporary network issues occur.
4. The M4300 honors 802.1Q VLAN Header Priority setting by default. Dante devices use IP DSCP values for discovery and PTP Master Clock packets.
5. The M4300 has Bonjour enabled by default for switch discovery. Dante devices use mDNS multicast packets for discovering their devices.

You can configure for proper Dante Audio settings using the Web Interface and/or using CLI (Command Line Interface).

3.1.2 Web Interface Configuration

If you're using the default VLAN (1) with your Dante device, skip to **Change the Query Interval to 30**.

3.1.2.1 Configure VLAN 200

1. Navigate to **Switching > VLAN > VLAN Configuration.**
2. Enter **200** in VLAN ID.
3. Enter Dante in VLAN Name.
4. Click the blue **Add** button.

3.1.2.2 Add Port Participation

1. Navigate to **Switching > VLAN > VLAN Membership.**
2. Untag/participate the Dante ports in VLAN ID 200.
3. Click the blue **Apply** button.

3.1.2.3 Set Port PVID

1. Navigate to **Switching > VLAN > Port PVID Configuration.**
2. From the Dante ports used in VLAN Membership, set those ports PVID to 200.
3. Click the blue **Apply** button.

3.1.2.4 Turn on VLAN 200 IGMP Snooping

1. Navigate to **Switching > Multicast > IGMP Snooping > IGMP VLAN Configuration**.
2. For VLAN ID 200, set **Admin Mode** to **Enable**.
3. Keep all other fields unchanged.
4. Click the blue **Apply** button.

3.1.2.5 Set the Querier VLAN Address for VLAN 200

1. Navigate to S**witching > Multicast > IGMP Snooping > Querier VLAN Configuration.**
2. Enter **200** in the VLAN ID textbox.
3. Set **Querier Election Participation Mode** to **Enable.**
4. Enter the IP address of the querier to use in the **Querier VLAN Address** textbox; for example: 10.10.10.1

5. Click the blue **Apply** button.

3.1.2.6 Add VLAN 200 to MLD Snooping

1. Navigate to **Switching > Multicast > MLD Snooping > MLD VLAN Configuration.**
2. **E**nter **200** in the VLAN ID box.
3. Click the blue **Add** button.

3.1.2.7 Change the Query Interval to 30

1. Navigate to **Switching > Multicast > IGMP Snooping > Querier Configuration.**
2. Set **Query Interval** to 30 seconds.
3. Click the blue **Apply** button.

3.1.2.8 Set the Global Trust mode to trust-ip-dscp

1. Navigate to **QoS > CoS Configuration.**
2. Set the **Global Trust Mode** to **trust-ip-dscp**.
3. Click the blue **Apply** button.

3.1.2.9 Change IP DSCP 56 to Queue 6

1. Navigate to **QoS > CoS > IP DSCP Queue Mapping.**
2. Change IP DSCP 56 to **Queue 6**.
3. Click the blue **Apply** button.

3.1.2.10 Disable Bonjour on M4300

1. Navigate to **System > Management > Bonjour > Bonjour Configuration.**
2. Set **Admin Mode** to **Disable.**
3. Click the blue **Apply** button.

3.1.3 CLI Configuration

3.1.3.1 CLI Configuration using VLAN 200 as an example

Remember to set VLAN membership and participation per interface.

```
! VLAN setup:
!
vlan database
vlan 200
set igmp 200
set igmp querier 200
no set igmp fast-leave 200
set mld 200
exit
!
! Global setup
!
configure
set igmp querier address 10.10.10.1
set igmp querier query-interval 30
classofservice trust ip-dscp
classofservice ip-dscp-mapping 56 6
no bonjour run
exit
```

3.1.3.2 CLI Configuration when using VLAN 1

```
! VLAN setup:
!
vlan database
no set igmp fast-leave 1
exit
!
configure
set igmp querier address 10.10.10.1
set igmp querier query-interval 30
classofservice trust ip-dscp
classofservice ip-dscp-mapping 56 6
no bonjour run
exit
```

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