Switch Configuration Example **for Q-SYS™ Platform**
Cisco Catalyst IE-4000 Industrial Ethernet Series

Important Note

This switch configuration example is intended to serve as a network setup guideline for systems using only Q-LAN audio streaming within your Q-SYS system and should be used alongside the **Q-SYS Q-LAN Networking Overview** tech note for deeper setup insight. Keep in mind that QSC is unable to provide live network configuration support for third-party switch configuration. To learn more about network switch qualification services and the plug-and-play Q-SYS NS Series preconfigured network switches, visit **http://www.qsc.com/switches**.

> This document applies to these Cisco switches:
> **Catalyst IE-4000 Series**

Introduction

As of release 5.3.x, Q-SYS Designer software now supports AES67-standard interoperability. The AES67 standard does not prescribe a method of discovery for devices so manufacturers are free to implement one or more discovery services for their devices. In this configuration document, the process uses Bonjour as the discovery method for AES67 devices.
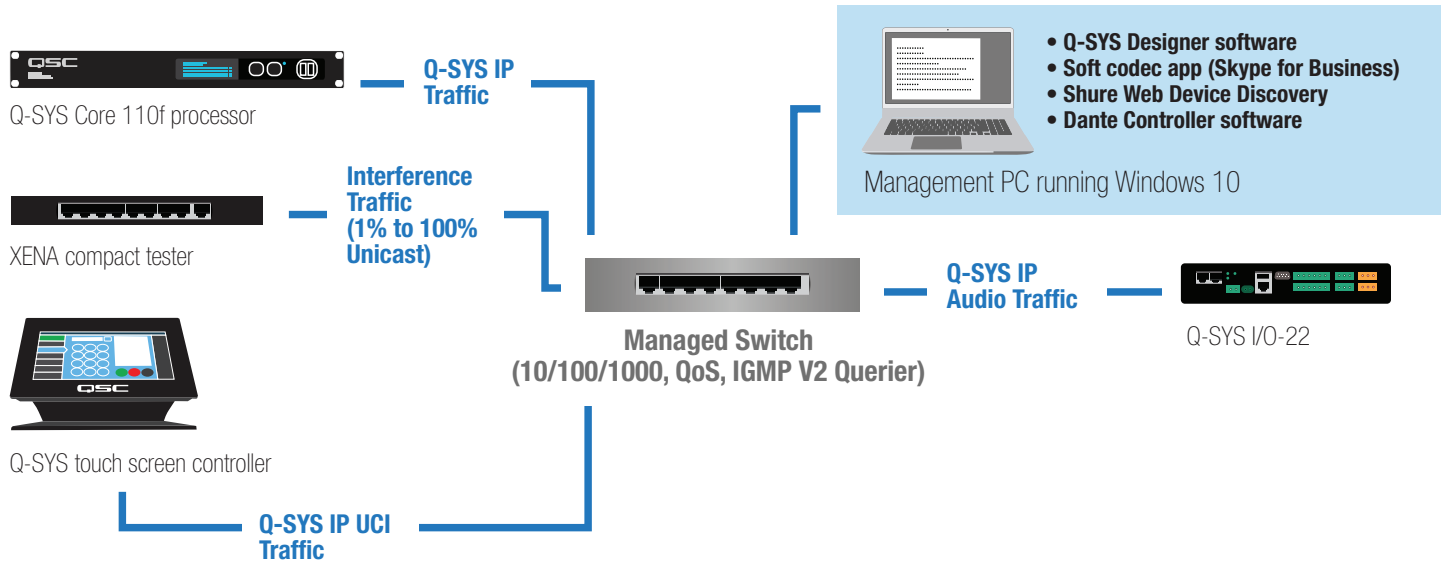
Q-SYS Designer now also offers a selection of Differential Services Code Point (DSCP) setting presets to optimize Quality of Service (QoS) for different types of deployment. DSCP codes are a six-bit value placed in the IP header of data packet, and they instruct a network switch to handle various types of data with defined levels of priority that ensure proper QoS.
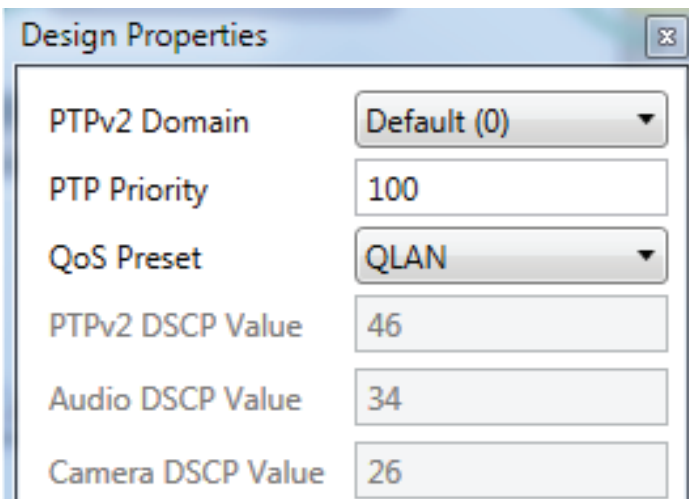
Introduction

The Cisco Catalyst IE-4000 Series are a range of industrial Ethernet switches.

NOTE: Based on testing of a sample model from the series, the Catalyst IE-4000 Series switches are qualified for Q-LAN audio ony. They have not been qualified for Q-LAN video or AES67 audio.

Switch Qualification Protocol

Q-SYS Core 110f processor

Q-SYS IP Traffic

XENA compact tester

Interference Traffic (1% to 100% Unicast)

Q-SYS touch screen controller

Q-SYS IP UCI Traffic

Managed Switch (10/100/1000, QoS, IGMP V2 Querier)

Q-SYS IP Audio Traffic

Q-SYS I/O-22

• Q-SYS Designer software
• Soft codec app (Skype for Business)
• Shure Web Device Discovery
• Dante Controller software

Management PC running Windows 10

Selecting QoS presets in a Q-SYS design file

1. In Q-SYS Designer, open the design. Make sure it is disconnected from the Core processor (press **F7** or select **File > Disconnect**).

2. Select **File > Design Properties**.

3. Select the **QLAN** QoS preset.

4. Leave the PTPv2 Domain and PTP Priority settings at default. Click **OK**.

5. To save the settings, press **F5** or select **File > Save to Core & Run**.

Configuring the network switch for Q-SYS

NOTE: The specific switch model tested was the Catalyst IE-4000-8GT8GP4G-E. These are its system details:

- Software: Cisco IOS software, IE4000 software (IE4000-UNIVERSALK9-M), Version 15.2(2)EA3, RELEASE SOFTWARE (fc1)
- Bootloader: IE4000 Boot Loader (IE4000-HBOOT-M) Version 15.2(2r)EA, RELEASE SOFTWARE (fc1)
- System image file: **sdflash:/ie4000-universalk9-mz.152-2.EA3/ie4000-universalk9-mz.152-2.EA3.bin**

The Cisco Catalyst IE-4000 Series is a range of network switch models for industrial applications. According to Cisco, all models in the series have the same buffer capacity, so the QoS performance among them should be the same. With Q-SYS, use only switches that have Gigabit Ethernet ports.

Switches in this series have a console port for configuration via command line interface (CLI). The procedure requires these items:
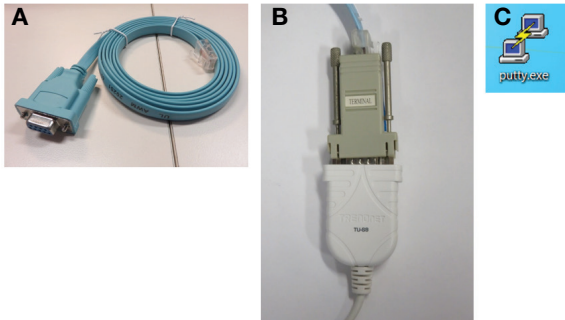
A   Switch console cable, DB9 serial to RJ45 (included with the switch)

B   USB to serial (DB9) adapter (not included with the switch)

C   PuTTY terminal software (or equivalent)
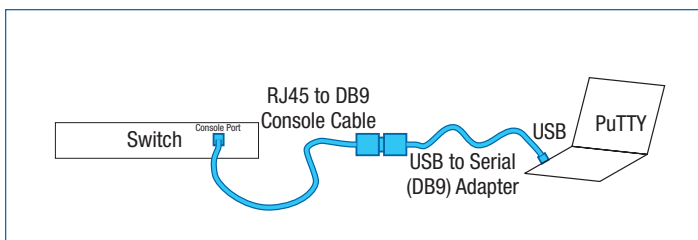
Connect the PC with the PuTTY software to the switch as shown, using the console cable and the USB to serial adapter. The switch's console port is located on its rear panel. Turn the switch on.
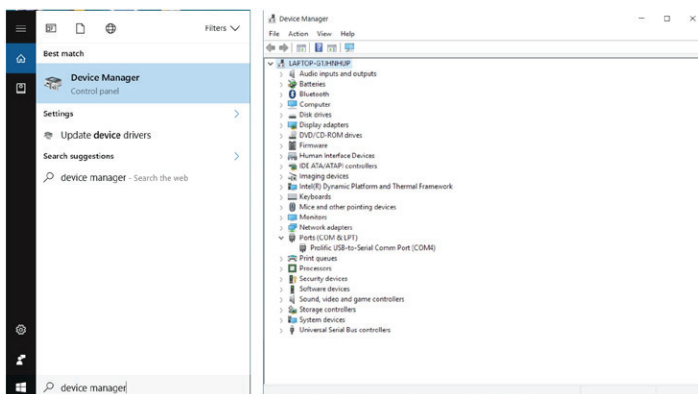
1. Verify that Windows recognizes the USB-to-serial adapter. In Windows, open **Device Manager** (in Windows 10, you can find it by typing `device manager` into the Cortana text box). Expand **Ports (COM & LPT)**; the USB-to-serial comm port adapter should be listed there.

    If the adapter does not appear, try these remedies:

- Plug the USB-to-serial adaper directly into the computer, to bypass any USB hubs.
- Download and install the latest drivers for the USB-to-serial adapter.
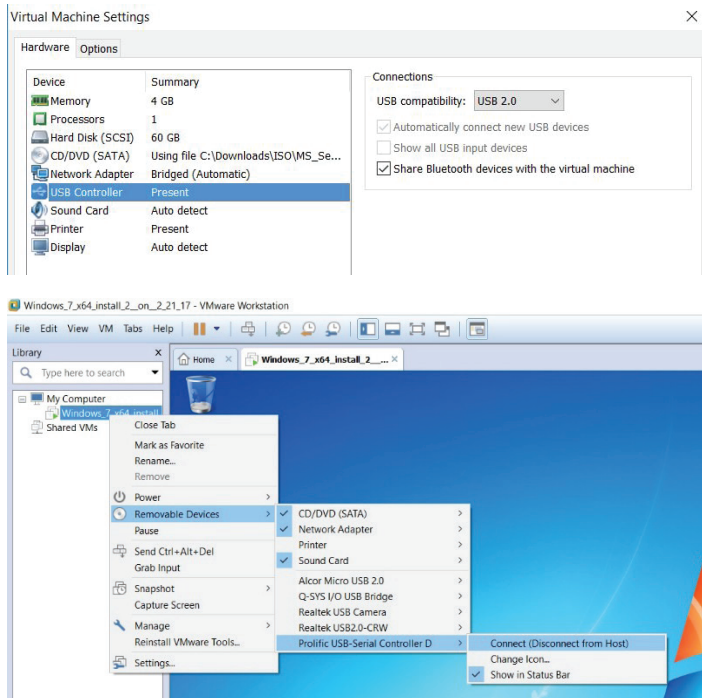
- If you are using virtualization, make sure that the USB devices are configured to connect to the virtual machine (shown at left). If you still have problems with the USB connections, try running the computer without any virtualization (i.e., "bare metal").

- See if any Windows updates are queued. If there are, apply them and reboot the computer.

- Check security settings and any security software for issues that might prevent functioning of the USB devices.
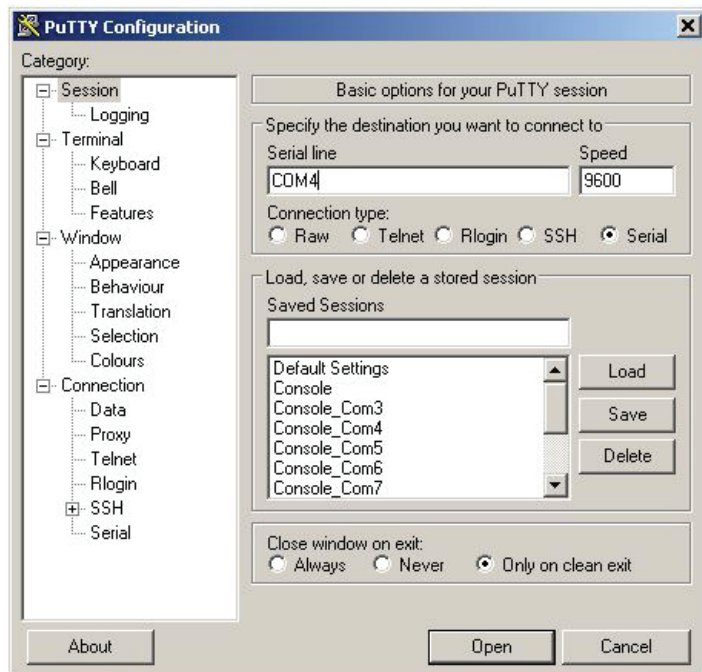
2. When the computer properly recognizes the USB-to-Serial Comm Port, open PuTTY. The PuTTY Configuration window will open first.

3. At **Connection type**, select **Serial**.

4. At **Serial line**, select the COM port that the USB-to-serial adapter is connected (as displayed in Device Manager).

   At **Speed**, enter **9600**.

5. Optional: If you wish to save these settings, enter a name for these settings in **Saved Sessions** and then click **Save**.

6. Click **Open**.

Resetting the switch to factory default configuration

It is good practice to start with a switch whose settings are all at their factory default values. A switch that is brand new and has never been used should already be this way, but one that has already been confugred or used will need to be reset.

Resetting the switch uses the PuTTY terminal session you just opened. The Cisco web site may offer other methods for resetting the switch to its factory default configuration.

1. At the prompt, type **`enable`** and then press **Enter**.

2. Type **`delete flash:vlan.dat`** and then press **Enter**. Press **Enter** again to confirm.
    NOTE: An error message will appear if the switch has no **vlan.dat** file in storage. You can safely ignore it.

3. Type **`erase startup-config`** and then press **Enter**. Press **Enter** again to confirm.

4. Type **`reload`** and then press **Enter**. Press **Enter** again to confirm. If the switch prompts you to save the configuration, press **N** for "no."

The switch will take about four to six minutes to fully reboot.

Configuring for Q-SYS

1. At the prompt, type **`enable`** and then press **Enter**.

2. Type **`config t`** and then press **Enter**.

3. Type **`no service config`** and then press **Enter**.

4. Type **`no ip domain-lookup`** and then press **Enter**.

5. Type **`ptp mode forward`** and then press press **Enter**.

Configure the following QoS settings:

6. Type **`class-map match-any IEEE-1588`** and then press **Enter**.

7. Type **`match ip dscp ef`** and then press **Enter**.

8. Type **`exit`** and then press **Enter**.

9. Type **`class-map match-any Q-LAN`** and then press **Enter**.

10. Type **`match ip dscp af41`** and then press **Enter**.

11. Type **`exit`** and then press **Enter**.

12. Type **`policy-map Q-Sys`** and then press **Enter**.

13. Type **`class IEEE-1588`** and then press **Enter**.

14. Type **`priority`** and then press **Enter**.

15. Type **`police 160000`** and then press **Enter**.

16. Type **`exit`** and then press **Enter**.

17. Type **`exit`** again and then press **Enter**.

18. Type **`class Q-LAN`** and then press **Enter**.

19. Type **`bandwidth percent 90`** and then press **Enter**.

20. Type **`exit`** and then press **Enter**.

21. Type **`exit`** again and then press **Enter**.

Configure these interface settings:

22. Type **`interface range g1/1-20`** and then press **Enter**.

23. Type **`spanning-tree portfast`** and then press **Enter**. A warning message will appear about enabling portfast. It is safe to ignore.

24. Type **`service-policy output Q-Sys`** and then press **Enter**.

25. Type **`no shutdown`** and then press **Enter**.

26. Type **`exit`** and then press **Enter**.

Configure the IP address for VLAN 1. If the network will need access from outside the LAN, also add the IP address of the default gateway. Then save the configration to NVRAM.

27. Type **`int vlan 1`** and then press **Enter**.

28. Type **`ip address [IP address] 255.255.255.0`** and then press **Enter**.

29. Type **`no shutdown`** and then press **Enter**.

30. If the network needs a default gateway, type **`ip route 0.0.0.0 0.0.0.0 [IP address of gateway]`** and then press **Enter**.

31. Type **`exit`** and then press **Enter**.

32. Type **`wr mem`** and then press **Enter**. This writes the configuration into memory so it will load whenever the switch reboots.

The switch configuration is complete.

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Application Engineering Team