QSC

Application **Guide**

Q-SYS AV-to-USB Bridging Solutions Part 1: PTZ-IP camera introduction

AET Application Engineering Team

THE Q-SYS™ PLATFORM'S INTEGRATED AV BRIDGING SOLUTIONS NOW INCLUDE CAMERAS.

Q-SYS networks can now support high-quality video streams using such integrated QSC accesories as the I/O-USB Bridge, the two PTZ IP conference camera models, and the TSC-7t touchscreen controller. This application guide will discuss the cameras in particular.

1. CAMERA SELECTION

The two camera models are identical except for their optics—i.e., their lens and shroud, which affect the optical zoom and therefore the angle of view. They integrate with the Q-SYS Platform and Q-SYS bridging peripheral devices and have motorized pan and tilt—thanks to a two-axis gimbal system—and motorized zoom.
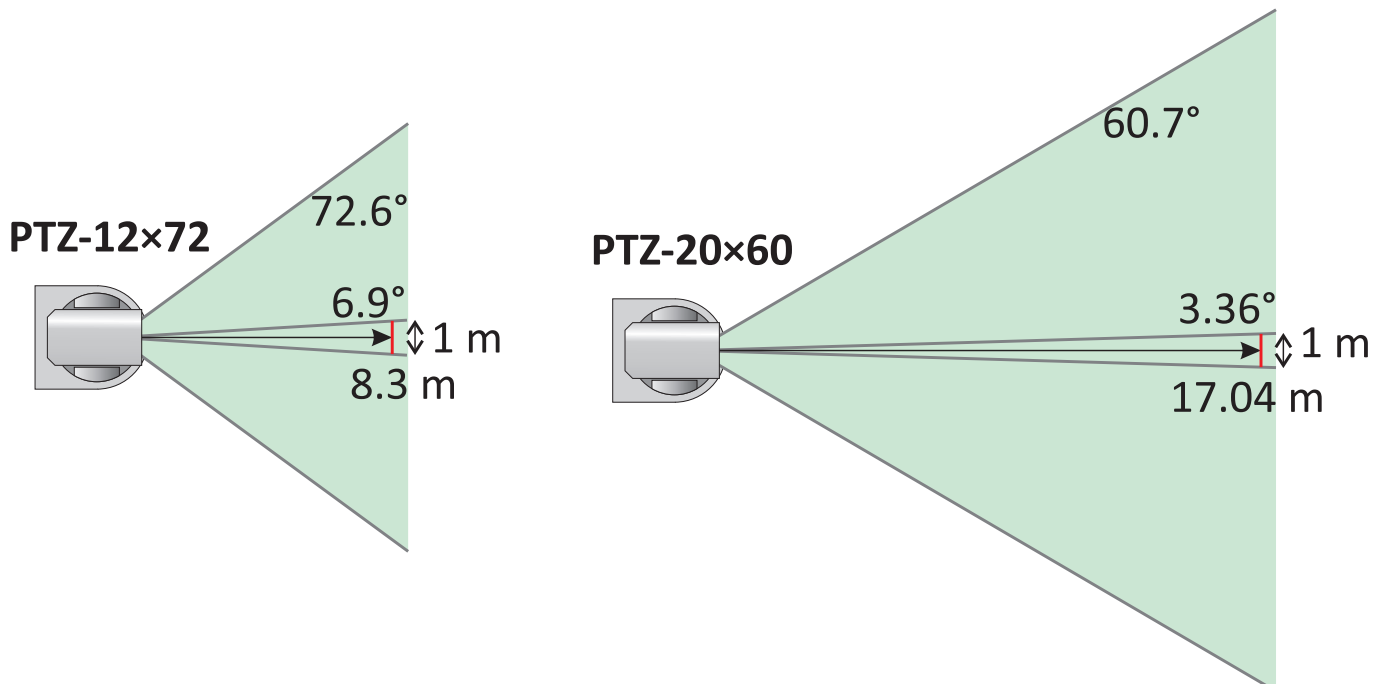

PTZ-12×72 (left)
This model features a 12× zoom range, with a maximum horizontal angle of view of 72.6 degrees.

PTZ-20×60 (right)
This model features a 20× zoom range, with a maximum horizontal angle of view of 60.7 degrees.

Both models have identical structure and connectivity.

PTZ-12×72

72.6°

6.9°
↕1 m
8.3 m

PTZ-20×60

60.7°

3.36°
↕1 m
17.04 m

2. CAMERA OVERVIEW

Physical description

Each camera sits on a base of 5.6 in (142 mm) by 6.5 in (164 mm). Its height, with the camera body parallel to the base, is 6.7 in (169 mm). It can mount on a horizontal surface such as a table, but a bracket for mounting to a wall is included, and a ceiling mounting bracket is available as an accessory.

Connectivity

The camera features an RJ45 connector for connecting to the Q-LAN network; through this Gigabit Ethernet port it can also receive its operating power if a Power over Ethernet (PoE) supply or switch is connected. It also provides video simultaneously on an HDMI output and a BNC jack 3G-SDI output. It has a barrel jack for a 12-volt external power supply in place of or in addition to PoE. Use only a Class 2 / LPS supply.
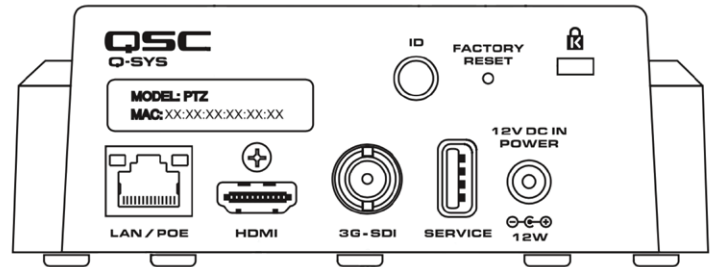
Other rear panel features

The factory reset button is recessed behind a small hole. Press the button and hold it for five seconds to reset all the camera settings to their factory default values. Pressing the ID button puts the camera into ID mode. To discourage theft or tampering, the rear panel also has a Kensington Security Slot.

Indicators

LED 1 in the drawing at right is the status indicator, a green LED that lights when the camera is streaming video over the network. It blinks when the camera is in ID mode. And it stays dark when it is neither streaming nor in ID mode.

LED 2 is the power indicator. This blue LED lights when the camera has DC power.
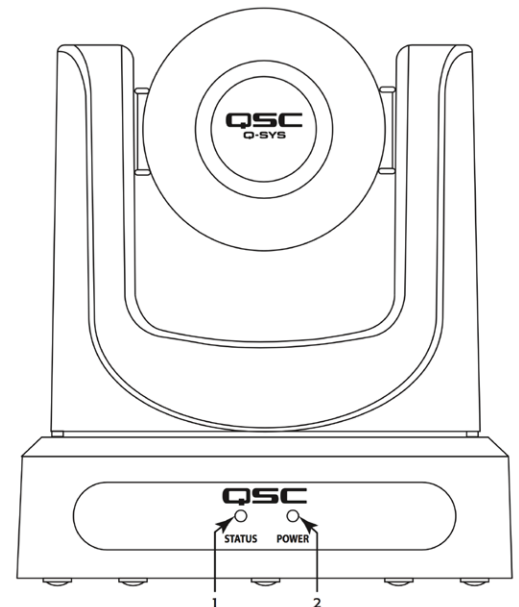
Mounting options

The camera base has a 1/4" - 20 threaded insert, which is the standard thread size for camera tripods worldwide.

Wall mount

An L-shaped wall mount bracket (right) is included with each QSC PTZ camera. Use the 1/4" - 20 screw included to secure the camera to the bracket.

Ceiling mount

A two-piece ceiling mount bracket (below), QSC part number PTZ-CMB1, is available as an accessory. Its mounting holes are arranged to allow easy attachment to most North American and European junction boxes.

3. CAMERA BASICS

Angle of view

The most important consideration about a camera is simply having it cover what it's supposed to. This will determine the camera's position and the angle of view it must have.

Wide-angle vs. telephoto

The focal length of the zoom lens can be varied continuously to widen or narrow the camera's angle of view. The diagrams on page 2 illustrate their ranges from widest to narrowest. For teleconferencing in a meeting room, the widest angle is usually the most useful for capturing an image of everyone at the conference table. A tighter telephoto angle is usually best for viewing a single speaker or presenter by himself or herself.

A 1-meter-wide view can comfortably frame one person in a head-and-shoulders shot. The 3.36-degree angle of the PTZ-20×60 allows a 1 m view at a distance up to 17 m or 56 feet, while with the PTZ-12×72, the distance limit is 8.3 m, or 27.2 feet. This is important because a moderate telephoto shot of a person is generally more flattering than having the camera closer and covering the same view with a wide-angle shot. The PTZ camera product web page features an **interactive distance calculator**.

approx. 1 m

In a teleconferencing application shown at right, the camera will typically need to cover everyone attending the meeting in its field of view. Unless the meeting room is much larger than the conference table, the camera will typically need to be fairly close. Its angle of view will then have to be wide enough to include all attending. Choose the camera by what angle of view you need. In this teleconferencing example, the camera mounts on a wall approximately the widest angle of the PTZ 20×60 is not quite wide enough to include the nearest chairs but the PTZ 12×72 covers it adequately.


Wide-angle caveats

Very wide angles of view exaggerate distances and make even small rooms look big. Although the far seats are only about 12 feet (3.6 m) further from the camera than the near seats, the people seated there will look much more distant to the viewer. Similarly, don't use a wide angle for a close-up shot of a person; it will exaggerate their nose and other facial features. A moderate telephoto shot at a reasonable distance wil look much better.

Positioning

The angle of view, the desired viewing area, and the position of the camera are all interrelated. For conferencing, a camera position slightly above eye level is ideal. In many rooms, though, that position might be already taken by a video monitor. If that is the case, mount the camera right at the top or bottom of the monitor, whichever is both closer to eye level and higher than the table surface. The meeting participants will then seem to be making eye contact with the camera when they look at the monitor, which is good for communication with the remote participants.

4 ft
1.2 m
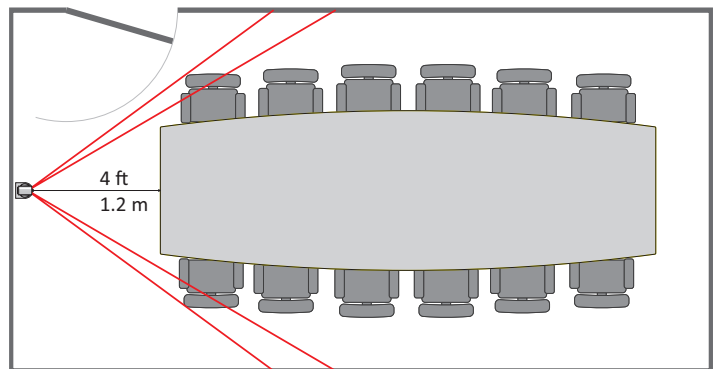
Try to avoid mounting the camera so high that it creates an awkward and uncomfortable viewing angle for both the local and remote participants.

Lighting

You need good lighting to get good pictures. The PTZ cameras have automatic gain control (AGC) and excellent low-light sensitivity, with a minimum illuminance level of only 0.5 lux at widest angle (a full moon on a clear night typically provides about 0.27 to 1.0 lux; typical TV studio lighting is about 1000 lux, and typical office lighting is about 500 lux). For best performance, QSC recommends at least 300 lux.

But even with a high-quality camera that has great low-light performance, picture quality will improve sharply with better lighting. That's because the camera boosts its gain very high to compensate for very low light levels, which can result in more noticeable video noise, or grain. Camera autofocus systems are also less effective in very low light.

In a teleconference, lighting should be even so that no participants seem to be sitting in the dark. The lighting should also be diffuse to minimize harsh or awkward shadowing.

4. Q-SYS AV BRIDGING

Unlike digital audio streams, the digital video streams on a Q-LAN network do not pass through the Q-SYS Core Processor for processing. Instead, each PTZ-IP camera streams over the network directly to one or more bridging devices; therefore, a bridge can only see video streams from cameras that are either on the same subnet or have a gateway connecting the camera's subnet to the bridge's. The bridging device converts video into a USB Video Class (UVC) compatible stream and also appears to the USB host (i.e., a PC) as a common webcam. All PC operating systems natively support UVC, so the Q-SYS bridging system requires no installation of additional drivers or applications.

In the system depicted below, the TSC-7t would be able to control all four cameras, but it (or an IO-USB Bridge) would be able to select video streams from Cameras A, B, or C, but not Camera D. The PC connected directly to the Core 110f, however, can see video from all four cameras.
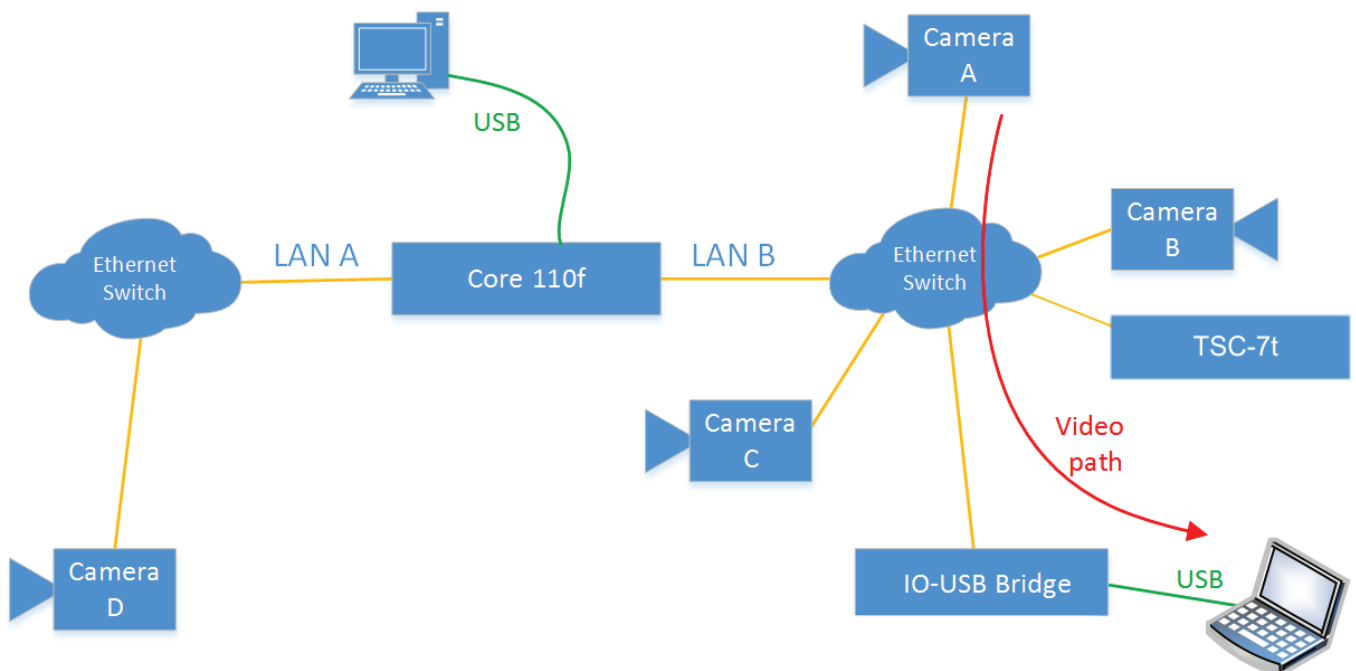
Q-LAN video streaming

A QSC PTZ-IP camera produces both an MJPEG stream (Stream 1) and an H.264 stream (Stream 2) simultaneously. The camera can send them as either unicast or multicast RTSP/RTP streams; this is set in Q-SYS Administrator (see configuration at right), as are IP stream resolutions and frame rates. Each IP stream's video quality (and the bandwidth it will require) is configured seperately in the camera's control panel in Q-SYS Designer.

The default Differentiated Services Code Point (DSCP) value of the camera video data is 26 (the DSCP values for camera, audio, and PTP data are configurable in Q-SYS Designer). To configure the network switches' Quality of Service (QoS) properly for Q-LAN audio and video traffic, the PTP clock data must be assigned highest priority, then audio data with next highest, followed by video data, and then all other traffic.
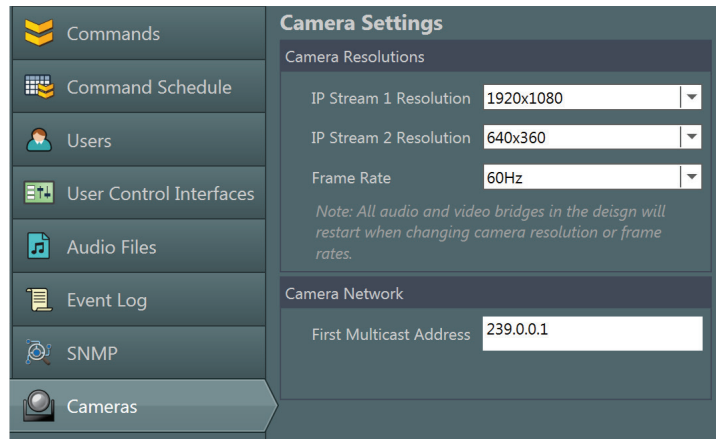
UVC Video

The QSC I/O USB Bridge (front and back at right) is a bridging device that converts Stream 1 directly to USB and decompresses Stream 2 to send uncompressed YUY2 video to the USB Host PC.

PC applications such as Skype for Business determine which video format to use and tell the bridge which stream to send. Some applications request high-resolution streams regardless of the format, and others want only uncompressed streams. Video teleconferencing applications transcode the camera's video to their own preferred codec, bitrate, and frame rate.

Video stream security

The cameras have a factory default password for their RTSP streams and control protocols that is configured to not need any user intervention to work with Q-SYS. The user can elevate the camera's security by changing its password using Q-SYS Configurator or the camera's web interface; the matching password must then be entered when the camera is set up in Q-SYS Administrator.

Camera previews

Camera and bridge control panels, camera router selection buttons, and touchscreen UCIs feature a camera preview pane to help guide the user in selecting a camera in a system that has more than one.

The preview panes are fed from the core processor, which retrieves a low-resolution still image from each camera once every second.

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