



How to Choose the Right PrecisionHD Camera for Your Conference Room

A Collaboration Room Endpoint Whitepaper

**Collaboration Technology Group
Technical Marketing Engineering**

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Selecting the right camera for the conference room

Knowing which endpoint/camera combination to use in a conference room is, in part, a function of camera characteristics. In this document, we will discuss which cameras to use and explain each of the pan/tilt/zoom (PTZ) cameras that Cisco offers for collaboration room endpoints.

In any PTZ camera, there is a maximum amount of zoom that can be used. The stated goal here is to be able to zoom in and capture the person that is seated farthest from the camera. To be specific, we are going to use an image width of one meter, at maximum zoom, measured at the location of this person. This results in an image approximately like this:



This is somewhat arbitrary – you could specify an image goal that includes two people, not just one. But by using this one-meter width, we are enabling a best-case scenario, especially when we are trying to provide a close-up view of a person sitting at the far end of the table.

To provide additional flexibility in choosing a camera, we are going to provide two sets of measurements: one for using optical zoom only, and another for using “total zoom,” which is a combination of optical and digital zoom.

It is also important to consider the horizontal field of view (HFOV) of the camera. This specification applies when the camera is not using any zoom at all – the lenses are capturing the maximum field of view. Cisco PTZ cameras range from 70 degrees HFOV to 83 degrees HFOV. The larger value for HFOV means the closer people can sit to the camera and still be within the camera image.

Optical zoom versus digital zoom

The trade-off in all digital zoom technologies is a loss in image quality – as you increase the amount of zoom, there is almost always a visible reduction in image resolution.

The latest-generation Cisco PTZ cameras, however, use oversized image sensors. As a result, even with some certain amount of digital zoom, we are able to retain a true 1080p image. In all cases, we use optical zoom first, and only switch to using digital zoom after the lenses have achieved their maximum optical zoom.

Maximum room sizes for each camera

This section will present the results of calculations for the maximum recommended distance for each camera, from the lens to the center of the farthest chair. In addition, each camera will be explained individually. We will start with the 2.5x camera, and move up the range to the Precision 60 Camera and SpeakerTrack 60 dual camera system.

The calculations were made using two variables: the field of view of the camera and the zoom capability, and one constant – the one-meter specification for the final image. The cotangent function was used for calculation.

1. PrecisionHD Camera – 1080p 2.5x

Part number: CTS-PHD-2.5X=



Description: The PrecisionHD 2.5x camera first shipped in April 2013 as an option for the SX20. With TC7.0 and later software, the camera has 2.5x optical zoom with another 2x digital zoom, for a “total zoom” of 5x. For this reason, you may see it referred to as the 5x camera in newer documents.

It is one of the primary camera platforms for the latest generation of endpoints. The SX10 and MX200 G2 both use an integrated version of this camera. Because it starts with a sensor that is much larger than 1080p (a 3 megapixel sensor), it has superior color resolution and contrast. With an extremely wide-angle lens, it offers an 83 degree HFOV. Photographers know that wide angle lenses produce distortion – the “fish-eye” view – but Cisco designers have accomplished a rock-solid geometry in this camera with virtually no distortion along the edges.

Conference Room Size

Remembering that our target is to be able to capture a one-meter wide image, at maximum zoom, the following table shows the maximum distance from the camera lens to the subject, for a 2.5x camera.

Camera	HFOV	Max Distance	Max Distance
		Optical Zoom only - 2.5x	Total Zoom including Digital - 5x
PrecisionHD 2.5x (5x)	83 degrees	1.7 meters	3.4 meters

Table 1: PrecisionHD 2.5x Camera Distances

From the above table, we can surmise that the SX10, MX200 G2, and SX20 with 2.5x camera are best used in a small conference room, with participants seated no farther than 3.4 meters (11 feet) from the camera.

2. PrecisionHD Camera - 1080p 4x

Part number: CTS-PHD1080P4XS2=



Description: The PrecisionHD 4x camera has had several different revisions. The latest model – the 4XS2 – ships with the SX20 and SX80, and is also integrated into the MX300 G2. The 4XS2 supports 4x

optical zoom with another 2x digital zoom, for a “total zoom” of 8x. For this reason, you may see it referred to as the 8x camera in newer documents.

The 4XS2 is one of the primary camera platforms for the latest generation of endpoints. Because, like the 2.5x, it starts with a sensor that is much larger than 1080p (a 3 megapixel sensor), it has superior color resolution and contrast. It has a 70 degree HFOV.

A previous model, the 4XS1 with part number CTS-PHD1080P4XS1=, is similar in appearance to the 4XS2. It shipped with the C20 and was integrated into the first-generation MX200 and MX300. It does not support digital zoom. It has the same 70 degree field of view as the 4XS2, so the room size calculations for the 4XS2 below can be used for “Optical Zoom only.”

The original 4X camera, with part number CTS-PHD-1080P4XS=, still ships with the C40 Integrator Pack. It has a 72 degree field of view without digital zoom. In addition, this camera was used with the C20 in the early days of that product. The conference room size calculation will be close to the “Optical Zoom only” figures below.

Conference Room Size

Remembering that our target is to be able to capture a one-meter wide image, at maximum zoom, the following table shows the maximum distance from the camera lens to the subject, for a 4XS2 camera.

Camera	HFOV	Max Distance	Max Distance
		Optical Zoom only - 4x	Total Zoom including Digital - 8x
PrecisionHD 4x (8x)	70 degrees	3.3 meters	6.5 meters

Table 2: PrecisionHD 4x Camera Distances (4XS2)

From the above table, we can surmise that the MX300 G2 and SX20 with 4x are best used in a small to medium conference room, with participants seated no farther than 6.5 meters (21 feet) from the camera.

3. PrecisionHD Camera – 1080p 12x

Part numbers: CTS-PHD1080P12XS2=, CTS-PHD-1080P12XS=, CTS-PHD1080P12XG=



Description: The PrecisionHD 12x camera has had several different revisions. The latest model – the 12XS2 – ships with C Series Integrator Packs. The primary difference from previous versions is improved support for third-party HD-SDI equipment.

The original 12X camera (CTS-PHD-1080P12XS=) is orderable and ships with C Series Profiles. The dark grey model (CTS-PHD1080P12XG=) is a special version of the camera used with Profile 65 endpoints.

All of the 12x cameras support 12x optical zoom. There is no digital zoom. The field of view of the 12X cameras is 72 degrees.

Conference Room Size

Remembering that our target is to be able to capture a one-meter wide image, at maximum zoom, the following table shows the maximum distance from the camera lens to the subject, for any 12x camera.

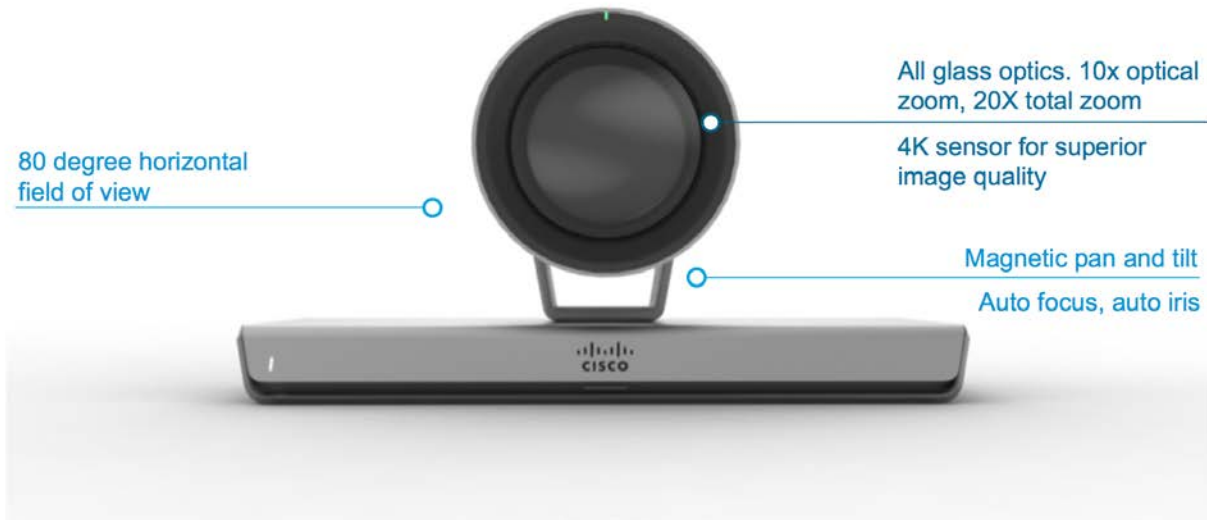
Camera	HFOV	Max Distance	Max Distance
		Optical Zoom only - 12x	Digital Zoom n/a
PrecisionHD 12x	72 degrees	9.6 meters	N/A

Table 3: PrecisionHD12x Camera Distances

From the above table, we can surmise that C Series Profiles, and integrator codecs using the 12X camera, are best used in a medium-to-large conference room, with participants seated up to 9.6 meters (32 feet) from the camera.

4. Precision 60 Camera

Part number: CTS-PHD1080P12XS2=



Description: The Precision 60 Camera is the latest state-of-the-art camera from Cisco.

It ships with the SX80 as part of an integrator kit, and is integrated into the MX700 and MX800; it is also used in the SpeakerTrack 60 dual camera system. It has 10x optical zoom, and with another 2x digital zoom, produces a “total zoom” of 20x. It has an extremely wide angle lens with an 80 degree field of view.

The Precision 60 Camera, along with the 2.5x and 4XS2, make up the primary camera platforms for the latest generation of endpoints. The Precision 60 Camera starts with a 4K sensor – four times the resolution of 1080p – and has superior color resolution and contrast. When using digital zoom, the output is always true 1080p – no loss of resolution.

Conference Room Size

Remembering that our target is to be able to capture a one-meter wide image, at maximum zoom, the following table shows the maximum distance from the camera lens to the subject, for the Precision 60 Camera.



Camera	HFOV	Max Distance	Max Distance
		Optical Zoom only - 10x	Total Zoom including Digital - 20x
Precision 60 10x (20x)	80 degrees	7.2 meters	14.3 meters

Table 4: Precision 60 Camera Distances

From the above table, we can surmise that the SX80 with Precision 60, MX700, and MX800 can be used in very large rooms, with the ability to capture a single participant at a distance of 14.3 meters (47 feet) from the camera.

5. SpeakerTrack 60

Part number: PID: CTS-SPKER-TRACK60



Description: SpeakerTrack 60 automatically tracks active speakers during a meeting. It captures the participants in a close-up view, without the need for anyone to manually move the camera.

It is available for the SX80, C40, C60 and C90, and is integrated into the dual camera version of the MX700 and MX800. SpeakerTrack 60 uses two Precision 60 Cameras as part of the overall assembly.

Conference Room Size

SpeakerTrack 60 works in a room with the following characteristics:

- The specification is for a maximum seating area of 9 meters (30 feet) deep in relation to the cameras, with a width of 5 meters (16 feet).
- The room size can be larger, but the seating area needs to meet those specifications.
- Participants in the front rows must be seated within an 80-degree angle from the center of the camera assembly. The operating HFOV of the assembly is 80 degrees.





For more information

Product sheets and Administrator guides for Cisco TelePresence products can be downloaded from <http://www.cisco.com/c/en/us/products/collaboration-endpoints/index.html>

You can also visit [Project Workplace](#) to see a visual application of Cisco cameras discussed in this paper.