# How do I select the right camera for my conferencing needs?

## How we got here:

Web cams that clip on top of your PC monitor have instigated a revolution in desktop video conferencing made up of a whole array of great web based video conferencing tools, like Skype, Oovoo, Google Hangouts, WebEx, Cisco Jabber, Microsoft Lync, ClearOne Spontania, Zoom.US, Polycom RealPresence, GoToMeeting and many others.  These software solutions originated in the consumer market but were quickly adopted by the commercial and professional markets, when their ample benefits were recognized.

With this wide ranging adoption of desktop video, the next thought was "Why can't we use these great solutions in our meeting spaces as well?"  And the answer was "You can."  Early adopters of this trend ran into a few issues however.  The web cams and audio pods designed for the laptop and desktop were not quite up to the task of capturing the action in a larger meeting space.

## Where we are today:

Today we have an answer to the webcam dilemma with an array of USB connected PTZ (Pan-Tilt-Zoom) cameras, allowing you to effectively use web and cloud based videoconferencing in meeting spaces of all sizes.  This abundance creates a new problem for the user.  "Which camera is right for my needs?"

## Making Camera Selections based upon the Specific Needs of Your Meeting Space:

### Resolution:

This one is easy as "more is always better", as long as you can use it effectively.  While 720p cams were the norm in the recent past, advances in web conferencing software, video compression, imaging chip cost reductions and network bandwidth improvements have placed the benchmark squarely on **1080p-30** (1920x1080 @ 30Hz).  This means that you should make sure that your camera is able to natively capture this resolution.  This is the resolution typically used today by high cost hardware solutions, like Cisco, Polycom and Lifesize, so the images you capture for web conferencing will be right on par with these high-end solutions.

### Zoom Range:

Cameras typically offer 2 types of zoom, with some offering both.  Optical zoom is the only one that matters, as digital zoom basically robs you of resolution by simply cropping the image to show the "zoomed" pixels only.  True PTZ cameras will have optical zoom with a motorized lens that adjust for wide and telephoto shots.  The amount of zoom, typically specified, for example as "3x" indicates the variation available as the lens distance from the imaging chip is adjusted.  While this gives you a rough idea of the amount of zoom available, a better and practically useful specification is the **Horizontal Field of View Angle** (HFOV) range.  This is typically specified, for example as "5 degrees to 45 degrees".  This range, (if accurately specified by the mfg/marketer!) should allow you to figure out exactly what any camera will capture throughout its zoom range.

**Small Rooms**

Where attendees are close to the camera, will need a wide angle HFOV. For instance a camera with a wide angle of **90 degrees** will capture anything within a field twice as wide as the distance from the camera. This would effectively capture people seated at the front of the table. A camera with a wide angle of 45 degrees will only capture within a field that is 82% as wide as the distance from the camera. This is only 41% of the wider camera image and would not capture people seated at the front of the table. See the graphic below for examples:



Horizontal Field of View - Wide Angle vs Distance from Camera
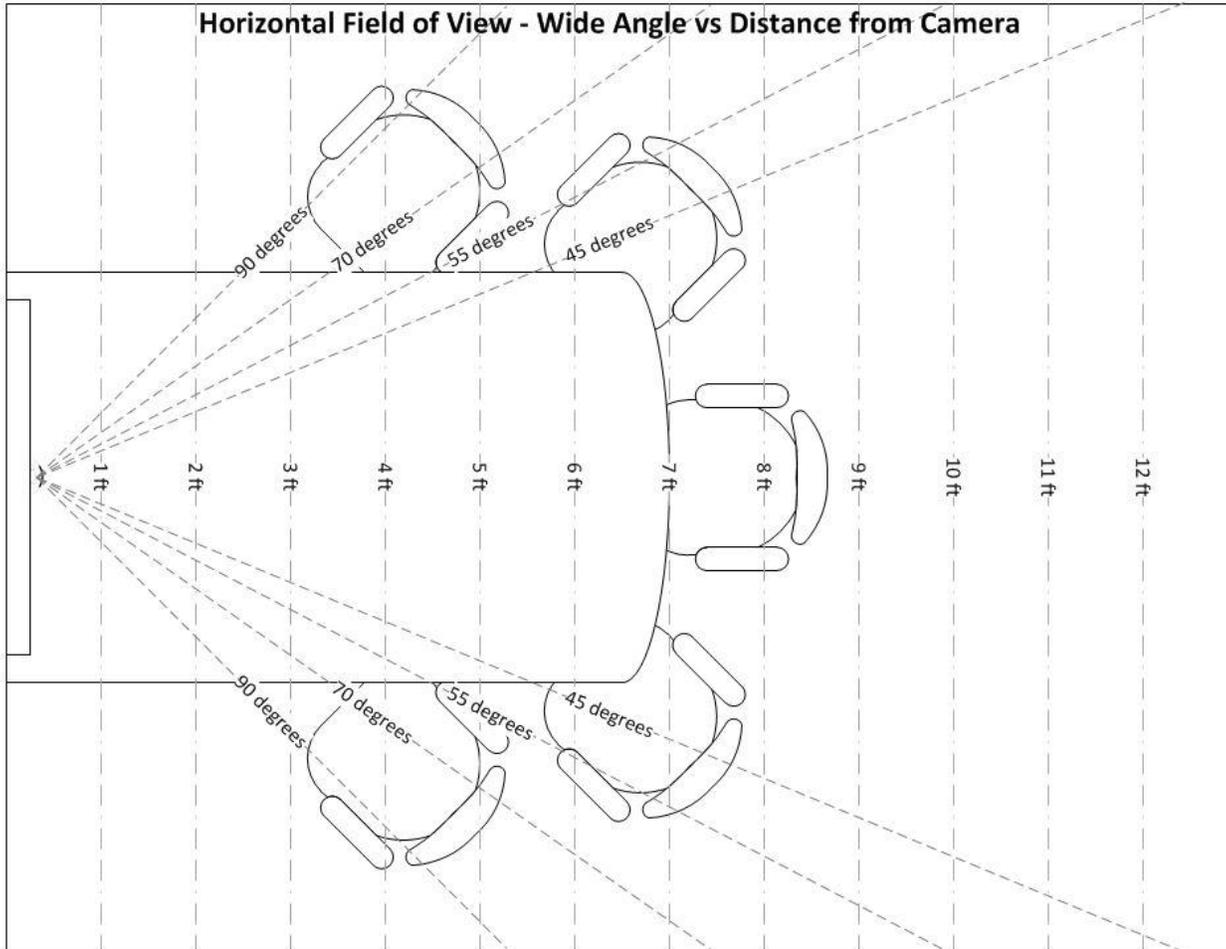
**Large Rooms**

Where attendees or presenters may be far from the camera, will need a narrow angle HFOV.  For instance a camera with a tele angle of **5 degrees** will capture an image 26" wide at a distance of 25 feet from the camera (e.g. the head of a Boardroom table).  This allows a good headshot with great focus on the speaker.  A camera with a tele angle of 22.5 degrees will capture an image almost 10 feet wide at the same distance.  This would not produce a headshot of any type and prevent focusing attention on an individual speaker.  See the graphic below for examples:



Horizontal Field of View - Tele Angle vs Distance from Camera
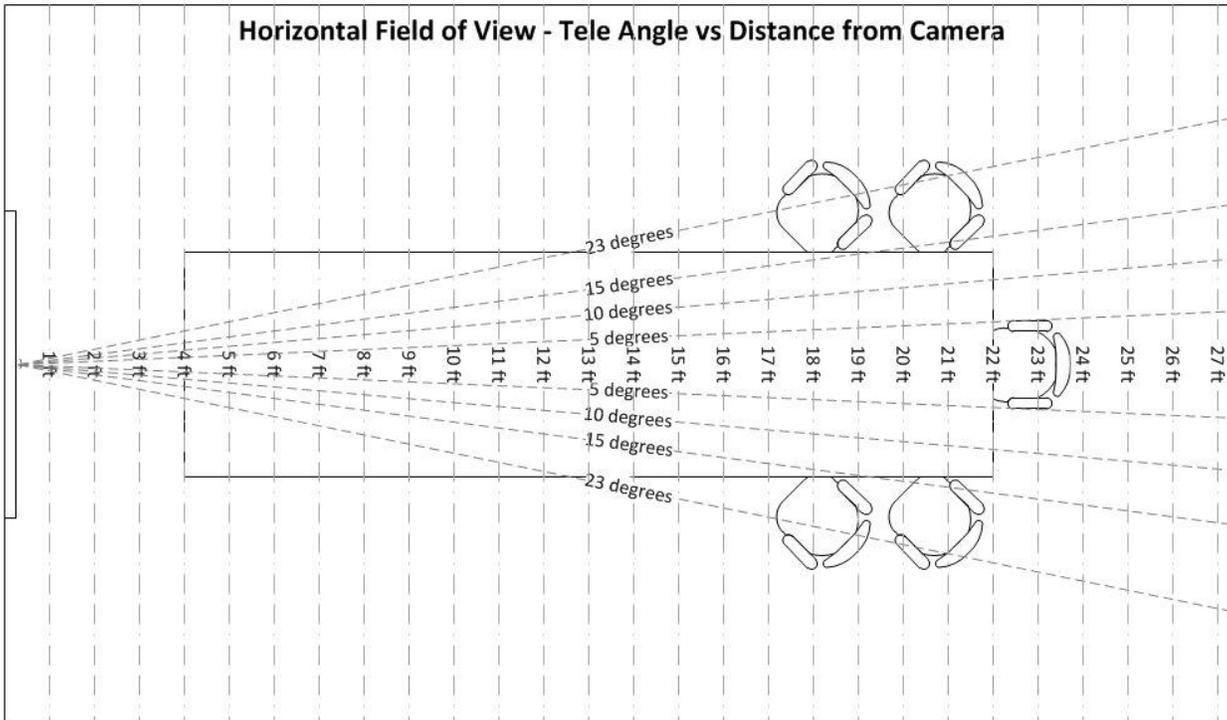
**Selecting the Right Zoom for Your Room**

Looking at your space and your application, you will hopefully be able to focus on one end of this range and easily select a camera.  However, your application may have needs that span the entire zoom range (e.g. a long Boardroom table that is also close to the camera).  In this case, you will have to compromise on one end or the other but still try to find a camera that offers the **best compromise** (e.g. a 5-70 degree HFOV range would provide good headshots and capture all but the closest seats to the camera equally well).

**Presets:**

Presets allow a user to automatically return to a set position (pan and tilt) and set zoom level, without manually driving the camera.  This is desirable as it is faster, smoother, more reliable and easier than steering a camera during a meeting.  Are presets important for everyone?  That depends upon how many different shots you will use during meetings.  In a huddle room with 3 seats, where everyone is always large and in frame, you would likely leave the camera in one location and presets are not necessary or important.  In a large room where you might often only use a portion of the table or when the table is full, you might desire chairman head shot, left side seats, right side seats and wide "all" shots, presets would be critical.  Some cameras have no presets, some have 64 presets.  If you will only ever use a handful of them, **6 presets is as good as 64 and either is better than none**.

**USB2.0 vs USB3.0:**

USB 2.0 provides a bandwidth of 480 Mbps.  USB 3.0 (aka "SuperSpeed") provides 4.8 Gbps - or 10 times the bandwidth of USB 2.0.  There are other differences between the two but this is the one that's important to camera performance.  This factor of magnitude level of improvement in bandwidth is beneficial for carrying 1080p-30 video from the camera to your PC.  1080p-30 at 24 bit color depth requires approximately 1.5 Gbps, which as you can see does not fit within the USB2.0 bandwidth and therefore video must be compressed by the camera itself before being sent over the USB connection.  **USB 3.0 allows the camera to send uncompressed video** over the USB connection to the PC where the PC's better equipped hardware and software can be brought to bear for **better final compression performance** over the web connection during a call.  USB 3.0 does bring with it some restrictions.  As with HDMI, this higher bandwidth requires different cabling than its predecessors.  USB 3.0 will only work with USB 3.0 ports on devices and with USB 3.0 cabling and extenders.  Some USB 3.0 cameras are USB 2.0 "compatible", which means that they have the capability to recognize a USB 2.0 port or cabling and downgrade to a low resolution video stream (e.g. 640x480, 1024x768, 720p-30-16bit).  In this case, you would probably be better off with a USB 2.0 camera.  Happily, most modern laptops and PCs have been shipping with at least one USB 3.0 port for some time now.

**Serial Control (e.g. RS232, RS485, VISCA):**

Serial control allows remote PTZ, preset calling/setting and other control from 3rd party devices (e.g. joystick, Crestron) or software (e.g. RocoSoft) over a wired connection to the camera.  **Most meeting room users will be perfectly content with their infrared hand-held remote control**, especially when all PTZ command are executed via preset calls.  However, some operators will require a better control interface for their application (e.g. Produced events with camera operator(s); Rooms with centralized touch-panel control systems, like Crestron/AMX/Extron, where all hand-held remotes have been removed from the room, etc…).  Cameras with serial control capability will often conform to the industry standard mini-Din8 connector and Sony VISCA protocol.  This makes using this feature fairly straightforward, as long as you have the right control cabling and set both the camera and controller to a matching baud rate, etc…

**Summary:**

Any new camera purchased for a meeting room should provide native 1080p-30 resolution. 720p looks fine on the desktop but in meeting rooms, it simply doesn't meet expectations.

Select a camera with true optical zoom and with an optical zoom range that best meets your specific application. Take room measurements and check them against the graphics above to be sure. Digital zoom is not a useful feature for most applications.

Presets are great for all cameras but after about Qty 6 you will likely see no additional benefit for most applications.

USB 3.0 is the new standard for USB HD cameras. You must maintain USB 3.0 compliance throughout the connection including any extensions from camera port to and including PC port.

Serial control is only necessary for certain applications. When you do need it, a miniDin8 connector or DB9 connector and VISCA protocol compliance is all you typically need to confirm for the camera and controller.