zoomrooms

Design Guide
Best Practices

A guide to advanced Zoom Room implementation by Zoom PSO Solutions Architect Ty Buell

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Introduction

Zoom is a unified video conferencing platform built with a software first mentality. Attendees can join a Zoom Meeting via PSTN, Mobile OS, Desktop, or Conference Room. Zoom provides a simple and consistent user experience across all mediums.

In this guide, best practices for the conference room will be discussed from a technical design perspective.

With Zoom Rooms, the compute becomes the appliance in the center of the system with all audio in/out and video in/out connected to it. User controls are separated out on an easy-to-use touch interface that connects to the Zoom Room computer over the network and is registered through the Zoom Cloud.

With this arrangement, seamless wireless sharing, instant one-touch meetings with calendar integration, full directory access, audio dialing, and much more are achieved with a simple physical design running powerful software. Scheduling displays for outside the room and digital signage are also included with the platform with only the cost of the additional hardware and a single Zoom Rooms license, increasing the value of the platform.

What is Video Conferencing?

Video Conferencing (VC) or Video Tele-Conferencing (VTC) is the transport of a human interaction experience both visually and auditorily across a medium utilizing a few different technologies. Zoom technology thrives by encoding and decoding audio and video on a cloud platform with seamless session initiation and user interfaces. Technology hides behind simplicity, making the human experiences on Zoom amazing. We end up with a seamless, real-time interactive experience across many miles. With Zoom, the technology disappears, and we are left with a flawless human conversation with anyone anywhere in the globe. Let's think about a human-to-human interaction with two people sitting across a table. Our bodies have a visual input (eyes) and output (physical presence) as well as an audio input (ears) and output (voice/mouth). With technology, we can essentially re-create each of these senses in a remote location in real time by encoding and decoding in all locations simultaneously. For me as a meeting participant, my existence is represented in the distant location:

- Physical presence is represented on displays
- Eyes are represented as a camera
- Ears are represented as microphones
- Voice is represented as loudspeakers

The best way to think about a video conference is that it truly is a human experience over distance with the removal of distance as an inhibitive factor. Technology components are our best attempts to re-create these biological inputs and outputs, but they are not perfect by any means and we need to understand how these aspects interact with the natural world in today's technology ecosystem.

Audio/Visual Overview

In a commercial environment, there are many things that will impact a video conferencing experience. When we talk about priority, audio always deserves the most attention. This an audio-first experience as the communication platform is a spoken interaction. Visual representations and body language are added bonuses to the design and enrich the experience greatly, but it cannot stand by itself the way that an audio-only conversation can persist. Let's talk about each aspect of the experience

as it pertains to the commercial environment and list some things that we think will impact that experience for that aspect of the design.

Audio Input (Microphone)

Audio into the system will be the microphones listening to your room. Keep in mind this is how the far end is experiencing your room. Microphones function quite differently than human ears, so it is important to consider the following:

- Base noise floor & noise pollution
  - HVAC & air handling systems
  - Elevator proximity
  - Traffic/train proximity
- Room reverberance & wall construction materials
- Physical room size – width / depth / height
- Seated participant proximity to microphones
- Voices directed at displays (talking to people on-screen)

Audio Output (Loudspeaker)

Audio from the far end into the room is achieved with a loudspeaker system of some kind. This is the voice of your far-end participants, so associating this audio with the moving mouths on-screen will create a more human experience. It is important to consider the following.

- Speaker placement
  - This is the voice of the video participants. A soundbar works best when possible
- Speaker/amp power rating and volume capability
- Room reverberance and wall construction materials
- Speaker types
- Seating arrangements/furniture

Video Input (Camera)

The video input, or eyes in the room, is the camera. This experience will be affected by a number of things. Keep in mind this is how the far end is experiencing the room. Ideally, the camera will be placed at eye level within the room. This way, the far-end participants will feel as if they have a seat at the table. Some things to consider:

- Furniture layout
- Room brightness/lighting
- Camera settings
  - Zoom – physical vs. digital
  - Brightness
  - Aperture
  - Autofocus logic
- Window placement and shading
- Building orientation (sunrise/sunset)
- Physical placement

Video Output (TV/Display)

The video output, or window into the distant space, is the TVs/displays in the room. Video conferencing is a collaborative, content sharing use case, which also affects the design.

- Furniture layout
- Furthest viewer
- Wall size/material
- Window placement and shading
- Building orientation (sunrise/sunset)
- Power and data location
- Content type (ie. Spreadsheet or Powerpoint)

Audio Guidelines

Audio is the most important aspect of your Zoom Room!

Without audio, the meeting cannot happen. In this section we will discuss many of the concepts and features that are most important when thinking about audio performance in a Zoom Room design.

Think about everything that happens from the word being spoken to that word being heard by a participant on the far end. The following are all factors along the way:

1. Good sounding room (talker)
    - Reduced reverberance
    - Reduced environmental noise
2. Microphone quality and proximity to source
3. Input processing quality
4. Network connectivity - encode
5. Network connectivity - decode
6. Output processing quality
7. Speaker quality
8. Good sounding room (listener)

What is Audio?

Audio is vibration that travels through air that can be perceived when it reaches an ear. In a video conference, a few extra steps are added to that explanation. We represent our ears as a microphone that hears this audio. The Zoom Room takes that audio, processes it if needed, and transmits it over the internet. The audio is turned back into audio waves by local speakers so that you can perceive that audio. All of the steps along the way play a role in the perception when it hits the human ear.

Audio Processing Methods

Digital Signal Processors or DSPs are audio processors that are software-based and may have associated hardware that optimizes audio for different applications. There are two methods for processing audio within a Zoom Room:

1. Zoom's Software Audio Processing is enabled, and the external mic and speaker are independent and unaware of each other.
2. The DSP is external to Zoom, and all processing and relationship between mic and speaker is completely external and Zoom's Software Audio Processing has been disabled.

External DSP

If the input and output device are the same, such as a Logitech Rally System, Logitech Meetup, Aver VB342, Polycom Trio, or rack-mounted DSP such as a Q-Sys Core110f/Core510i or a Biamp TesiraForte as a couple examples, that device will handle all of the audio logic that is needed to have an optimal audio experience. Since Zoom is not handling the DSP in this instance, the Software Audio Processing setting should be disabled.

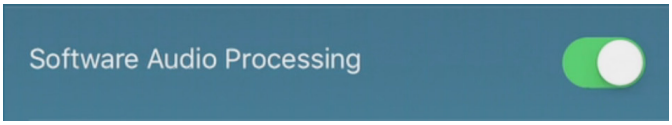
For external DSP designs, please reference:

- Phone Room (1-2 people)
- Huddle (2-7 People)
- ProAV Conference (7-13 People w/table mics)
- ProAV Conference (9-19 People w/ceiling mics)
- ProAV 3-Screen (6-10 people w/speaker tracking camera)
- ProAV All Hands Space (w/ presenter mics only)
- ProAV Training Room/Classroom (w/ ceiling & presenter mics)
- ProAV Divisible Space (w/ ceiling & presenter mics)

Zoom Software DSP

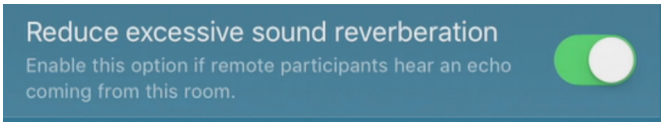
There is no need for an external device to do this processing for you if you need to use a mixer or other microphone source that is not integrated with a speaker

output. Zoom will do all of the optimization based on adaptive processing to learn the room and optimize the audio. Zoom can hear multiple independent channels of audio in certain applications and apply processing to each channel of audio for an optimized experience. To enable the Zoom software audio processing, on the Zoom Room controller tap **Settings > Microphone** > tap the **Software Audio Processing** toggle:



This will be selected automatically whenever the input and output devices differ.

Additionally, you have a setting which will reduce some of the reverberation in the room. Keep in mind that highly reverberant rooms will still sound reverberant, but this setting may make it more tolerable with some processing applied to mitigate the issue. This setting may be destructive. Please do not use if not needed. With the Zoom DSP enabled on the Zoom Room Controller, tap **Settings** > **Microphone** > tap the **Reduce excessive sound reverberation** toggle:



Note: If you select a different speaker, such as internal computer speaker, and go back to the other speaker that matches the microphone, that may trigger this setting to turn on when it is not wanted.

Click here for a video overview of Zoom's DSP

For Zoom DSP designs, please reference:

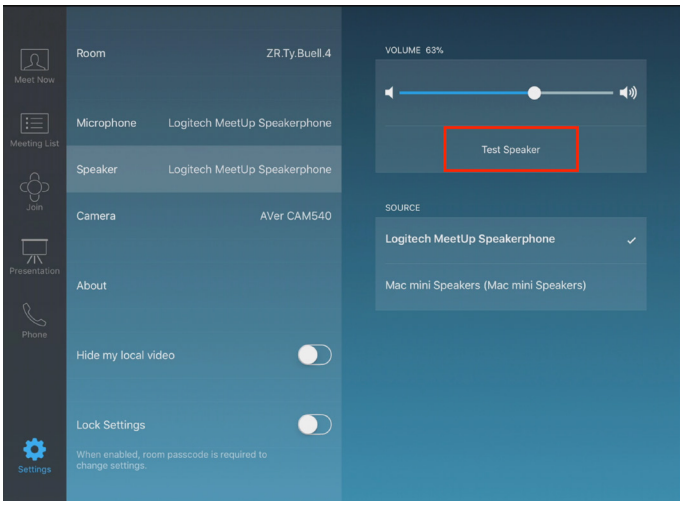
- Mobile Cart (2-5 people)
- Collaboration (2-7 people)
- Conference (7-13 People w/table mics)
- Conference (9-19 People w/ceiling mics)
- Broadcast Using a Zoom Room

Testing

Here we will discuss some utilities to test your Zoom Rooms environment. It is always recommended to do a test call with at least a couple of peers to hear the space, check each microphone and validate performance.

Test the Speakers

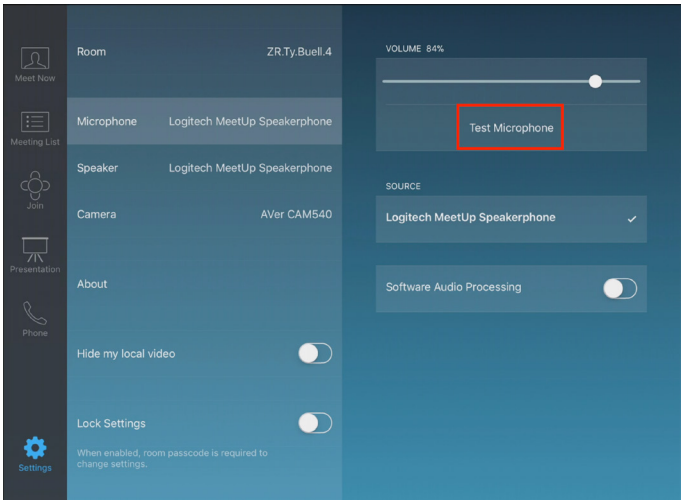
1. Navigate to Settings > Speaker.
2. Tap Test Speaker.



3. You will hear the Zoom ring tone played through the speakers to verify the output is working.

Test the Microphone

1. Navigate to Settings > Microphone.
2. Tap Test Microphone.

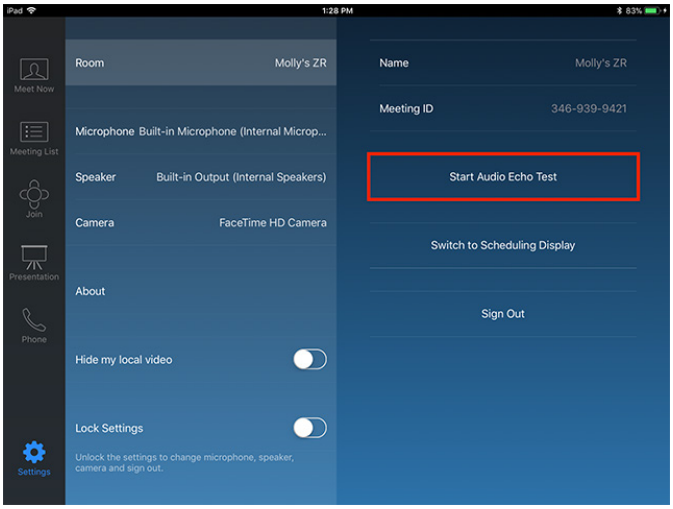


3. This will start a process of alternating recording and playback so that you can hear the microphones within the room.

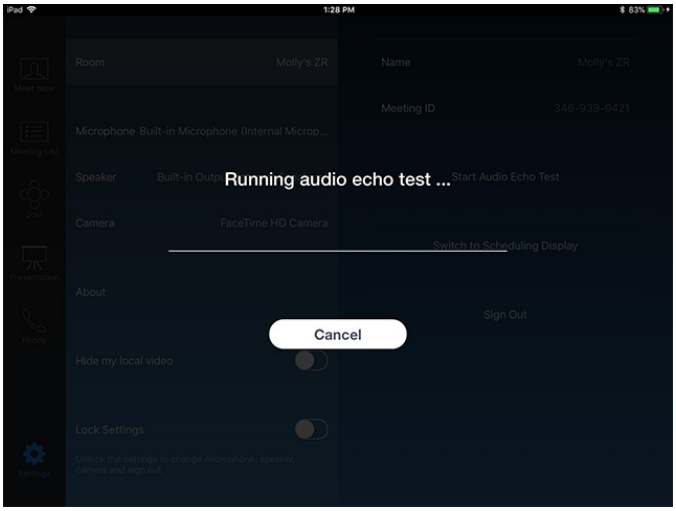
Audio Echo Test

Now that we know the inputs and outputs are working, verify that the software audio processing toggle is in the correct location.

Navigate to **Settings > Room**. Tap **Start Audio Echo Test.**



A progress bar will appear on the Zoom Room controller and display. Tap **Cancel** at any time to end the test.



Once the test is over, the Zoom Room controller and display will show the results of the test.

Also see: Zoom Rooms Daily Audio Testing

Once passed, you are ready to set up your test call with peers to validate the room's performance. Based on feedback, you may need to check firmware, adjust DSP site files, adjust microphone placement, increase microphone counts, etc.

Signal Processing Types

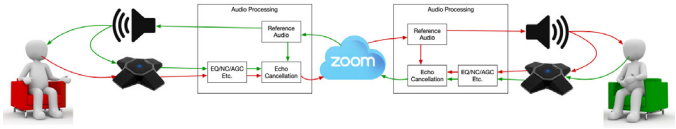
For the Zoom Rooms application, there are four key components that we will elaborate on:

1. Noise Reduction
2. Acoustic Echo Cancellation
3. Auto Gain Control
4. Equalization

Noise Reduction is the reduction of steady noise, such as HVAC or electrical hum. Steady noises are identified by the DSP and reduced at those frequencies that the DSP determines as recurring and inhibitive to the signal. With the steady noise attenuated, speech will be more intelligible as it will pass through the system without reduction.

Note: Noise Reduction will not reduce traffic noise, papers/typing, and most importantly, reverberation. A reverberant room will always sound reverberant both to the participants in the room's ears as well as the microphones.

Acoustic Echo Cancellation (AEC) is the removal of your voice that is heard by the microphone on the far end through the speaker on the far end. Here is a diagram that explains the concept for two endpoints:



If AEC is working properly, you will not hear your own voice back in the call. If it is not working, you will hear an echo of your voice that the microphone on that endpoint

is picking up and sending back to you.

Note: The endpoint that does not hear the echo is where the issue exists.

Automatic Gain Control (AGC) is utilized to deliver the optimal volume to the system depending on the circumstances. The big variation here is people. Some people have loud voices, and other people have soft voices. When either is the primary audio source, they will be adjusted up or down. This is something that is automatic within Zoom's DSP and may need to be enabled and configured if it is a feature of an external DSP.

Equalization (EQ) is a means to eliminate unwanted frequencies and boost wanted frequencies. Human speech sits in a range from about 250 Hz up to about 6,000 Hz. This range sits within the range of human hearing, which is about 20 Hz up to 20,000 Hz. This means any unwanted non-speech noise between 20 and 250 Hz and 6,000 to 20,000 Hz will be heard if not eliminated and will never be part of the human speech we want to hear.

It is best practice to include a boost around 2,000 to 4,000 Hz to increase intelligibility, as this range is the most sensitive to the human ear. Giving this frequency some extra attention will improve intelligibility.

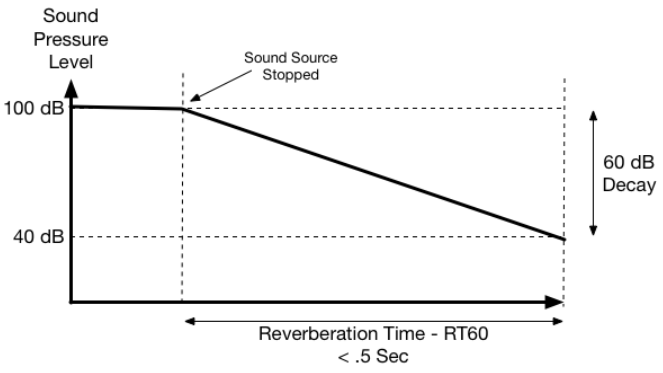
Scooping is another technique that may improve a room based on a frequency that is being emitted in a space or an unwanted reverberation at a specific pitch. By scooping that frequency, performance may be improved in a space. Scooping low-mid frequencies may alleviate some of the resonance in the room.

Acoustics & Audio Concepts

Here, we will discuss some additional audio concepts. Ideally, we think about how the microphones are going to be listening to the space. How can we make the environment work for the conferencing technology before the technology is even introduced? We will discuss key concepts including:

1. Acoustics (Reverberation Issues)
2. Signal to Noise Ratio (Noisy Rooms)
3. Microphone Concepts
4. Speaker Concepts

Acoustics is a very important aspect for any conference room. Reverberation in a room will always degrade the sound quality and intelligibility of a conference participant. Treatment (adding soft and non-flat surfaces) will allow the microphones to hear the source more directly and diminish the sound artifacts that may be residual in the room because of reverberation caused by hard surfaces such as walls, ceilings, glass windows or conference room tables. RT60 is a measurement expressing the time during which a sustained sound drops by 60 dB after the sound stops. A general rule of thumb is to make sure that there is no more than half of a second of reverb time in an average-sized space based on RT60.



If the reverb time is higher than half of a second in a space, another calculation can be applied for room treatment. Take the square footage of the floor of the room with an average ceiling height. Forty percent of that square footage should be the general square footage of treatment or non-hard surfaces in the space. There are many manufacturers of acoustic paneling, ceiling baffles, etc., that can be placed on the wall to mitigate

reverberation. This tends to be expensive depending on how heavily a space needs to be treated, which may be the case. Before consulting a specialist, think about soft objects you can add to a troublesome space, such as book cases, overflow soft seating, carpeting, canvas artwork or plant life, all of which will dampen reverberation.

Signal to Noise Ratio is the relationship between the noise floor or ambient state of the room as compared to the actual volume of the desired audio we are trying to capture and transmit. Ideally, the noise floor in any space is no louder than about 40 dB SPL A-weighted. If we assume that a normal speaking voice is about 70 dB SPL A-weighted, then our Signal to Noise Ratio is 70 minus 40, equaling 30 dB, which would classify this room as an optimal candidate for conferencing. The noise floor in a conference room can be affected by things like heating, air conditioning and ventilation (HVAC), elevators, building mechanics, open sales offices or trading floors, traffic, trains, planes, etc. What action can you take? When designing room layouts and you can anticipate issues, absorption and sound-proofing materials will be the best approach.

- Double-paned glass between a room and a busy street
- Heavier wall and ceiling tiles with a higher transmission coefficient
- Wall construction from floor to infrastructure ceiling (above ceiling grid)
- Sound absorbing ceiling tiles

Microphones take energy and convert it from one form to another. This is also known as a transducer. In our scenario, we are taking acoustic energy and turning it into electrical energy to produce digital data. In a video conferencing scenario, there really are two different use cases when it comes to audio capture in a space.

There are a few mic configuration varieties:

- (a) All microphones are part of the room listening experience, with some processing to optimize the experience.
- (b) Presentation microphones are prioritized for local voice lift and primary audio into the conference system. Additional room mics may exist alongside in this scenario.
- (c) The third option is a hybrid of the two typically seen in boardrooms with long gooseneck microphones for each seated participant utilizing the 3-to-1 rule, where for every participant to mic distance of one there will be a relative distance of three between mics. This invasive model is a bit outdated.

Generally, it is desired that the video experience be seamless and invisible. Ideally participants do not know the technology is there. (a) for conference rooms and (b) for presentation spaces are the preferred design approach.

In the conference room, new array microphone technologies can now simplify and steer microphone pickup with more directive technology, enabling the microphone experience to be unnoticed instead of invasive. Close proximity to microphones is not usually preferred. More and more that scenario is not beneficial with typing, whispering, and eating as a factor. If I am in a conference room, the last thing I think I would want is to put my ears right in front of everyone's computer keyboard, tapping fingers, etc. I would rather hear the room as a whole. This is a more natural room listening experience.

Speakers are also transducers that take the digital data, converted to electrical energy, and convert it back into acoustic energy so that we can hear it. Speakers should be thought of as the voice/mouth of the video participants.

The conference phone in the center of the table has historically been the point of focus. This has translated into some room designs as a speaker/mic on the table with video participants on the wall. This is an unnatural experience, but in most all cases, the mic/speaker must function as both for it to work properly as those devices (such as Poly Trio, Crestron Mercury, Logi Group etc.) have their own internal processing.

In a lot of Zoom designs, we try to put speakers as close to the people on video as possible as that is where we aim our attention. We are, after all, talking and listening to a face on-screen, which is just a recreation of their image captured by a camera. The technology becomes invisible. With that, we need to create a natural environment. In smaller huddle rooms, an all-in-one soundbar emits sound nicely while combining microphone and camera. In a standard conference room, a pro soundbar mounted near the displays works best. For larger conference rooms, we run into the issue of lacking uniformity of the sound system in the space, which can be problematic. In much larger systems, it is preferred to distribute the audio so that all participants continue to have a good listening without great volume fluctuation depending on the seat location.

Video Guidelines

Here we will discuss some guidelines around the visual experience of video conferencing.

The Display Types & Variations should be selected with certain considerations. We recommend a 4k display that is commercial grade to verify the longevity of that product. If longevity is not a concern, consumer-grade displays are acceptable as long as you are anticipating a lifespan of 3 to 5 years. Commercial-grade displays will allow for a lifespan of 5 to 7 years of use or more. Today, Zoom will display a max of 1080p for video calls and sharing. For info on the latest resolutions around screen sharing, visit Screen Sharing with Zoom Rooms.

Displays will always be recommended over projection simply to optimize room uptime and reduce maintenance. Some laser projection has improved this, but we still see maintenance issues due to increased components, including video extension and control connections for screens and projection. Let's reduce complexities and produce a full Zoom Room experience.

Display sizing & arrangement is a complex subject. We are transporting far-end video into the room and also sharing content for that business. You may want to use larger displays for financial info and spreadsheets and smaller displays for just video and no content. Zoom adheres to the Avixa standard of sizing displays. For more information on display size calculations, please see Avixa's standards for ***Display Image Size for 2D Content in Audiovisual Systems (DISCAS) Tools.***

Zoom Rooms can be configured with one, two, or three displays. An ideal Zoom Room will be built with two dedicated displays, one for content and one for video. Three displays will be suggested in a more intimate design with gallery view, active speaker, and content. This may not be the best boardroom experience as we want participants to laser focus on what is productive (people and content) and not be confused. Single screen works well in a huddle room, but keep in mind, with content, the video experience becomes minimized and it's more of an audio + content experience.

Cameras are a vast field. Let's talk about capabilities and design. There are many types of cameras with certain benefits over others. There are a few key specifications that we should look for in all cameras for Zoom Rooms as we move into the future. Depending on the use case, certain cameras will outperform others. Field of View (FOV) is a measurement of the angle at which the camera will capture the seats. Depending on how close the table/seats are, a wider FOV may be necessary. Pan/Tilt/Zoom (PTZ) capability is another function that will allow

recalling presets or manually zooming in on subjects. The Zoom specification is important in large event spaces or long boardrooms. Ideally, cameras can be located closer to participants, such as in an event space where we can put pole-mounted confidence monitors for an incoming video experience with a camera mounted below for an outgoing video experience. The back-wall camera is a bad experience when it comes to far-end video watching a presentation. It tends to have a fly-on-the-wall effect.

Zoom utilizes USB Video Class (UVC) for control protocols native. Any UVC capable PTZ camera will be controllable by the Zoom Rooms environment.

Deployment Guidelines

There are a number of different concepts around creating a video experience and a platform-based environment. These harden around certain use cases that have been defined by the industry and are ever-evolving. Let's discuss a few concepts for video conferencing and the ideas around them.

Network Readiness

It is very important to make sure your network is ready to withstand the video environment. Zoom's adaptive technology allows for high quality in very low bandwidth situations. That said, we want you to have the best Zoom experience across all devices, not just the Zoom Rooms, so it is important to consider many Zoom Rooms, desktops, and mobile devices connected simultaneously across a network. One-to-one Zoom meetings will take place within a network if the two endpoints are accessible to each other. A third attendee will push that experience to the Zoom Cloud and the meeting will be hosted outside of that local network. We always recommend Zoom Rooms to be hard-wired to the network with a reasonable up/down link to the internet.

Regarding Zoom Rooms, we always recommend that the computer is wired to the network for a stable connection throughout meetings.

Please click here for additional Network & Firewall information.

Technology Design

How can we deploy Zoom Rooms in an effective and simple way? Zoom Rooms is so simple to install, optimize and commission with the hardware ecosystem that exists today. To start with a deployment plan, the first thing to do is to assess the landscape. Which products fit well into the company's needs? Talk to those companies, get demos if possible, and assess what you feel as the IT professional would be a good fit as far as technology performance. Consider the use case for the common spaces so that you can replicate your environment. How will people use the space? Who are the key stakeholders that will use the space? What do they value in a conference room experience? Get them involved in the product testing so they can have some ownership over that space as well! So, what do we think about when it comes to design? It really comes down to the experience of audio and video on each side of the call. Scale of design is defined by a few things:

- Display size and number
- Camera coverage
- Microphone coverage
- Speaker coverage

These four components can be scaled up and down very easily and need to be considered for each space to dictate the design. As we scale down and things become simpler, more components become integrated such as a touch display with mic/speaker/cam integrated as well as PC and Control via touch. From a deployment perspective, this device is wall-mounted and plugged into power and data. After Zoom Room creation and calendar integration,

the unit is logged in and ready to start scheduled Zoom meetings for that calendar. This is a design that scales.

Consistency is very important in a Zoom environment. Your desktop, mobile, conference room, and phone experiences are unified across different segments of the product. For the purpose of this guide, the Zoom Room experience is the same in the corporate environment whether you walk into a room in California, London, or Tokyo. The environment is the same across room design, schedulers, and signage. Perfect consistency across all conference rooms will always make users feel right at home with something they are familiar with. We achieve this with a consistent user interface with recognizable controls cross-platform.

With the ease of Zoom Rooms deployment, video conference room density and consistency are key components of what is possible. Every conference room can be enabled from phone rooms and huddle rooms, to boardrooms, training rooms, and large event spaces. Even outside of a walled environment, a controlled open area with an all-in-one device may be a great way for a team to start the week with a standup meeting across miles or an always-on window between offices. IT professionals must always consider AV design consistency to allow a consistent experience from both a user and support perspective. With a dense Zoom Room environment, a company will feel much smaller than it actually is with instant connectivity to everyone in the organization.

Environmental Design Guidelines

From an interior design perspective, there are a number of non-technological aspects that really define a room environment.

Furniture comes first. This dictates the seating arrangement of the room, and some of the technology is defined by what furniture is used. In certain instances, some devices may need to be mounted under the table or in a hidden compartment, such as a USB extender or a network switch for networked microphones. This may be a part of the consideration when selecting furniture. Larger tables may be configured in a V pattern optimized for video conferencing. This approach allows an easy face to face with all seated participants. In smaller rooms a U-shaped table may go right up against the wall. This eliminates the option of sitting on the display side of the table, which should really be eliminated for video conferencing. Ideally in all situations, the far end gets a seat at the table with a video experience of being at the head of the table where the displays are mounted. They receive the room the same way that the room receives them.

Furniture materials should be carefully selected. Pick a table surface that is light but not reflective. Off-white, light gray, or natural wood are all good choices.

Background Color will have a high impact on the video experience that is had on the far end. Certain harsh colors can really put a strain on a camera to deliver that great video experience. Soft, textured wall coverings with muted colors are a great option to create a warm video environment. Smooth, painted walls utilizing earth tones with the correct lighting will also work well.

There are a vast number of companies that make paints ideal for the conference room. Feel free to reference both your interior designer and paint manufacturer for the best recommendations for your environment. As an example, please see a few color samples that would give an optimal video experience in the room.

It is always important to consider the Camera Shot in the room as well, which is how the far end is actually experiencing the interior design of the room. Any distracting backgrounds can reduce the productivity of a meeting. It is best to avoid a camera shot including a window to high foot traffic or outdoors to a busy street

with cars passing by. Any movement or attention-grabbing objects as part of the interior design will be distracting to the far end participants.

Lighting plays a large role in the video experience. As we move into the future of video, we need to realize that the experience will be defined by the environment and lighting of that environment. The lighting selection and configuration will always impact the far-end experience. Ideally, you will want to approach lighting in a controlled way. External daylight influence will have a large impact on the camera's perception of that room depending on the time of day if the space is not shaded well. Ideally, natural light is shaded, and only controlled or non-natural lighting is being used within the room to maintain some ownership over the experience. Indirect light should always be used in a video conference unless it is intentionally being set up as a studio design with cross-key lighting as well as wall washing, etc., to keep a nice balance across every person and surface being captured.

The following are guidelines around illuminance, measured in foot candles:

- Less than 5 fc on front projection
- Less than 15 fc on rear projection
- Less than 20 fc on TV displays
- 20-30 fc of vertical illuminance on faces
- 10-15 fc of average illuminance on walls

Another concept to keep in mind when building a video conferencing space is reflection. Walls, windows, tables, blinds, whiteboards, and more all can have considerable reflective properties and become either a distraction to the video participants or obscure a camera's perception when attempting to automatically adjust the picture.

For presentation spaces, consider installed lighting to capture a stage or podium. This will optimize the video experience considerably.

Signal to Noise is again applicable to lighting as it was to audio design. Keeping in mind the base light level, brightness needs to be considered. Balance of brightness will all be relative and every aspect of the lighted environment in the camera shot needs to be considered to keep a nice smooth image through and through.

Generally, keep lighting as a non-invasive component of the room. A 3:1 rule can be applied where the luminance on faces is about three times that of the walls and other surfaces in the room. Following this rule will allow a comfortable and distraction-free lighting experience in the conference room.

Click here for additional lighting info.

Conclusion

Concluding this report of video conferencing as applied to Zoom and Zoom Rooms, we hope that you consider some key takeaways from reading this document:

1. Simplicity is the future of conferencing, whether in a room environment, desktop or mobile.
2. Technology cannot mitigate existing environmental or human issues. You must build the groundwork for an optimal video experience before any technology is introduced.
3. Think scale first. Optimize and duplicate the experience over and over. Develop standards that can easily be repeated. A dense video environment takes a productive workforce and makes them more efficient, productive, and collaborative.
4. Design rooms holistically and mindfully. It takes one bad endpoint on a call to slow down productivity and progress.

For more information about Zoom and Zoom Rooms, please reach out to your account executive. You also can ask about our Professional Services Organization (PSO) for design and installation assistance.

About Zoom

Zoom helps businesses and organizations bring their teams together in a frictionless environment to get more done. Our easy, reliable cloud platform for video, voice, content sharing, and chat runs across mobile devices, desktops, telephones, and room systems. Zoom is publicly traded on Nasdaq (ticker: ZM) and headquartered in San Jose, California. Visit zoom.us and follow @zoom_us.

About Zoom Rooms

Zoom Rooms is a software-based room system that is revolutionizing the way businesses use their meeting spaces. At a fraction of the cost of traditional video conferencing systems, Zoom Rooms supports flawless and high-quality video and audio conferencing with up to 1,000 interactive video participants. Zoom Rooms is a **simple** solution for IT to deploy, and is easy for anyone in the conference room to use with the Zoom Rooms Controller. The **versatility** of Zoom lets you meet with any device from your room, keeping your teams connected with video, audio, screen sharing, and instant messaging from anywhere. From huddle rooms to large training rooms, bring the power of Zoom's award-winning, frictionless video communications experience to any meeting space.

Contact

Want to learn more? Visit our website at zoom.com or contact sales.