WHITE PAPER

Selecting the Right Conference Phone for Different Room Environments

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Introduction

When was the last time you used a conference phone? Today? Yesterday? It probably hasn't been more than a day or two. Voice conferencing is as ubiquitous as the traditional two-way telephone conversation—maybe even more so for many of today's businesses. Conference calls in boardrooms, conference rooms, and even from our desktops, are critical to maintaining the pace of 21st century business.

Polycom revolutionized the conference call experience in 1992 with the introduction of the original SoundStation® conference phone. The renowned, integrated triangular form and unprecedented voice clarity quickly became the standard of choice for boardrooms and conference rooms around the globe.

It's been a number of years since the first triangular Polycom SoundStation conference phone entered the market and many are still in use today. In that time, however, Polycom has continued to aggressively develop and incorporate new discoveries in audio processing, noise reduction, system integration and microphone compensation. As a result, Polycom has created a new generation of conferencing solutions that, using more advanced technologies, materials and algorithms, delivers a new level of transparency and reliability in today's global conferencing environments.

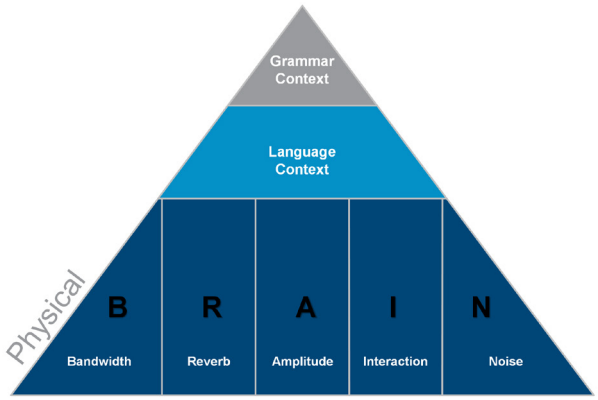
This paper will discuss different kinds of voice conferencing equipment, identify some of the common environments in which they are used, and examine how to match the right device with each environment to maximize the efficiency and productivity of your conference calls.

What do today's conference phones do that is so important?

The most critical element in business telephony is intelligibility: the degree to which speech is understood. Understanding speech requires that we hear it clearly. Our minds are good at trying to compensate for missing words and blurred sounds, but the more time our brains spend in figuring out what might have been said, the less efficient and more prone to error our conversations become. Therefore, it is vital that the physical "what we hear" stage be as clear and as accurate as possible.

There are five aspects of speech audio that work together to make or break a clear, understandable conversation: bandwidth, reverberation, amplitude, interactivity, and noise. The job of any conferencing system is to tune and balance these aspects automatically to provide the best possible hearing experience for the parties on both ends of the call. You can remember these five characteristics by their first letters, which form the word BRAIN.

For more information on intelligibility in business telephony please refer to Polycom's white paper, "*The BRAIN Model of Intelligibility in Business Telephony*".



Polycom's new generation of conference phones, developed through the past decade, implements numerous improvements, but they all focus on enhancing performance of the BRAIN model. Here are a few of the most important changes to be found in recent models.

Polycom HD Voice technology—Many of the latest SoundStation models (and all new SoundPoint IP phones) feature Polycom® HD Voice™ technology, which combines wideband audio with Polycom's unique acoustic technology and system design to deliver amazing clarity that makes it seem as if you are in the same room as those on the other end of the call. Once you have experienced this breakthrough technology, you will never want to return to ordinary telephone calls.

Suppressing unwanted pickup—With this capability, which is one important component of Polycom's integrated gain management, a conference phone will eliminate pickup from microphones that are not being used and continuously adapt this behavior as the meeting progresses. This cuts down substantially on room echo and noise and delivers much clearer speech to the listeners.

Point the microphones at the talkers—Directional microphones discard most of the noise and echo that comes from behind them. While some tabletop systems achieve lower prices using less-expensive "omni- directional" (non-directional) microphones, they also pick up all of the room noise and room echo the entire time, which is extremely distracting and makes it hard to understand what is being said. Such systems should be avoided.

Interaction—Full-duplex technology lets participants speak at the same time without cutting off one another, which ensures that participants interact as naturally as possible. Without full duplex sound, participants will end up talking over each other and interrupting the flow of the meeting. All conference phone systems should be thoroughly tested for effective and seamless full-duplex performance. To test this capability, simply turn up the volume to maximum at both ends of the call while both parties are talking. A conference phone with good full-duplex technology will enable the talkers at both ends to be heard clearly.

Versatile interconnection abilities—Today's enterprise-grade systems include much more flexible audio input and output capabilities, enabling the connection of external recording and speaker systems, external lapel or podium microphones, extended microphones, and even integrated operation with an installed room system.

Types of group conferencing systems

A number of options are available when selecting a group conferencing system. The following describes some of the different types of solutions.

Speakerphone—The traditional "speakerphone" is often found incorporated into a desktop telephone. It generally has only one microphone and no echo cancellation capability. This solution is designed for one individual sitting directly in front of the phone to occasionally participate in a hands-free conversation. Speakerphones are sometimes used in group discussions, but because the systems are not designed for group interaction, the sound can be very poor and impact productivity.

Conference phone—A conference phone is a single unit, sometimes with extension microphones, built to operate in an open-air environment. A conference phone supports communications for the whole room and all the people in it. Although conference phones are as easy to use as any standard telephone, today's models are complex, sophisticated communications tools. High-quality conference phones incorporate an array of digital signal processing and echo cancellation techniques to reproduce the voices of the participants clearly in spite of room noise, echo, computer and overhead fans, side conversations, and any number of acoustic challenges that occur during the average meeting.

Conference phones have become enormously more capable in the last 15 years. There are significantly more models to choose from to meet the unique needs of the many different environments in which conference calls take place. Having so many options may seem overwhelming, but the selection and installation of the right system for a particular environment can also make a big difference in how well it performs. This paper will guide you through the selection process to make sure you have the right system in the right environment.

Installed audio conferencing system—An installed room system partitions the pieces of a traditional self-contained unit into separate elements so that they can be placed where needed to maximize the conferencing experience. Each of these components is controlled by a very sophisticated system that adjusts the microphone gain levels, speaker outputs and myriad other variables to maximize the quality of the audio throughout the room. This system includes advanced digital processing capabilities to eliminate the problems that emerge with larger rooms such as feedback, loudspeaker zones, multiple echo canceller mixes, and tricky noise problems. These systems also provide a wide range of remote control options, and can integrate with other room systems such as video conferencing equipment. Installing these systems is usually done with the help of an A/V consultant or system integrator.

Selecting the right conferencing system for a particular room environment

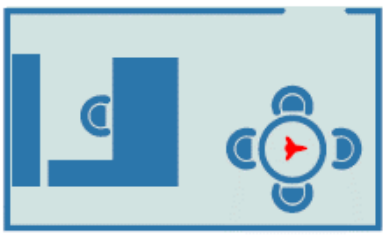
The maturing of conferencing systems over the last several years means that new technologies and new designs are embodied in a range of systems. This allows for models that are optimized to meet the price and performance goals of different room environments and different user interface requirements. The challenge is to make sure that the selected model will meet the needs of the specific room environment where it will be installed.

Selecting a conference phone with enough microphone pickup to cover the entire room is critical in ensuring that everyone can be heard, especially during dynamic and fast-moving conversations. However, as we look at some specific environments, keep in mind that one important rule to maximize the performance of a voice conferencing system is this: the closer the microphone is to the mouth, the better. No matter what the pickup range of a single microphone may be, as the microphone gets farther from the talker, it's more likely to pick up noise and room echo. To keep fatigue down and understanding up, if you have someone who you expect to be the most frequent contributor to a conversation, seat them within a few feet of a microphone. If you can't get them near the console, you can use extension microphones such as those available with the SoundStation VTX 1000® and SoundStation® IP 7000. Following this rule will pay off richly in comfort and consistency during long meetings.

Different environments have different needs

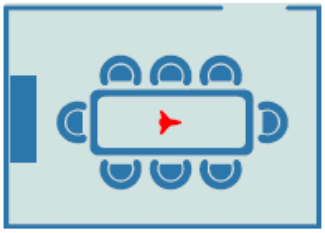
Each conferencing environment has its own acoustical challenges that require an appropriately designed conferencing solution. Let's examine some of these differences.

The small office, home office or very small conference room—This is a relatively small room or office that seats up to four participants. It may have clutter, too many chairs for its modest size, and a low or normal height ceiling. However, this kind of room can deliver some of the best voice conferencing experiences. The chairs and other items cut down possible echo. The small size also forces the talkers to remain close to the microphones, and it places them closer to the loudspeaker.



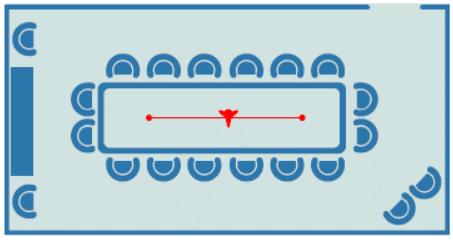
A conference phone with five to seven feet of microphone coverage, one that incorporates the new generation technologies described earlier, will satisfy user expectations in most of these environments. Polycom VoiceStation® conference phones offer an ideal solution when this type of room has an analog phone connection, while the SoundStation® IP 5000 is a good fit for these smaller rooms in environments where the network is SIP-based VoIP.

The standard conference room—This is a more conventional conference room or large office that seats up to 12 participants. The larger size of this room means that there will be additional acoustic challenges (air vents, more participants, more room echo, and noise) that were not present in the smaller room described above. To their credit, however, these rooms typically have carpeting, an acoustical eight-foot ceiling, furniture, drapes, and some wall hangings that all work together to keep the echo under control.



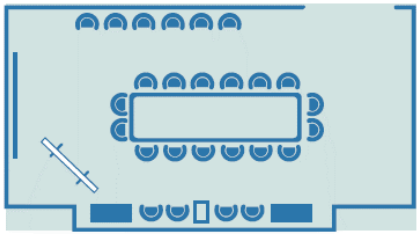
The smaller rooms in this range should be equipped with a conference phone that has 10-12 feet of microphone coverage. Medium and larger conference rooms will require a unit that includes the ability to attach expansion microphones (EX) to fully cover the area. A new generation product such as the Polycom SoundStation2™ EX (analog), SoundStation® IP 6000 (VoIP) or SoundStation® Duo (dual-mode analog and VoIP), which can add optional expansion microphones, is ideal for many standard conference rooms.

At a room size of 20 x 30 feet or larger, we reach an inflection point. While this range is within the abilities of the SoundStation2 EX, SoundStation IP 6000 or SoundStation Duo conference phones with expansion microphones, a more powerful conference phone such as the SoundStation VTX 1000 (analog) or SoundStation IP 7000 (VoIP) will deliver a better experience in this environment. The reason is that the SoundStation VTX 1000 and SoundStation IP 7000 perform independent echo cancellation and gain management for each microphone, including the expansion microphones. This capability becomes critical for a room of this size. An older or conventional conference phone cannot independently optimize all of the acoustic parameters, which results in more noise, more echo, and more interruptions in conversation. Some businesses try using newer but less capable conference phones in these rooms, but this approach provides far less satisfactory results because their algorithms lack the independent pickup and control for larger rooms. The sound will be noisier, less clear, and participants will find it harder to stay focused.



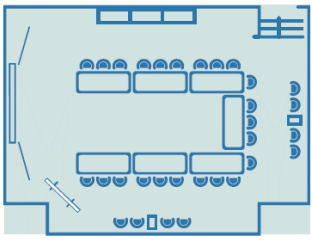
In these larger but acoustically friendly rooms, it is also important to understand the behavior of the participants. If talkers will generally be located near the microphones, the more powerful SoundStation VTX 1000 and SoundStation IP 7000 conference phones, with expansion microphones and 20-foot microphone reach, is a good choice. This will provide primary quality sound across a 30-foot span and reasonable coverage for the occasional talkers within a 50-foot diameter. But if the primary talkers are spread throughout the room or tend to move around, it is time to consider an installed audio conferencing system.

The boardroom—A large or very large conference room, often running 25 x 45 feet or larger in one or both dimensions, is often designed more for looks than for good sound quality. Its acoustics can suffer due to factors such as large open spaces, hard surfaces, and multiple panes of decorative glass. These rooms often include chairs along a side wall and a worktable or two in the corners. Great sound quality is needed throughout the room and not simply around the main conference table.



This type of room is too big and too distributed for a tabletop system. An installed audio system (such as Polycom® SoundStructure®) is needed, because it can accommodate as many microphones as are required to give each talker the clarity and performance they and the listeners require. Such a system can be precisely tuned to overcome the unique challenges of the room acoustics, and will also look “cleaner” because of its ability to work with a much wider variety of microphones and longer (and better concealed) cables. These types of rooms typically hold high-level meetings with “C-level” executives, making an installed system worth the investment, because it will deliver the best sound quality possible.

The offsite—This is a large room with multiple six-foot rectangular tables arranged in an “L” or “U” shape. This type of environment is commonly found in hotels and conference centers. The room is big, but does not have much echo due to its padded sliding room partitions, acoustic ceiling, and carpeted floor. The noise levels are also relatively low.



With these longer “L” or “U” shaped designs, the challenge is to achieve good sound pickup for everyone at the table, while also providing enough volume for everyone to hear the conversation. Polycom’s most advanced conference phones, the SoundStation VTX 1000 and SoundStation IP 7000, provides the capabilities, options and accessories to deliver a great conferencing experience in this environment.

In addition to their audio processing, noise reduction, gain management, and echo cancellation, they include a powerful internal loudspeaker and an output speaker port (optional on the SoundStation IP 7000) capable of driving a full room-size distributed loudspeaker system, including the speaker systems found in many of these rooms. They can use all of these features while maintaining an excellent full-duplex connection over a standard phone or IP network line.

A small offsite setting, such as a “U” table configuration built from three tables along each arm, can be served by a SoundStation VTX 1000 or SoundStation IP 7000 positioned in the center. Because these conference phones have a 20-foot microphone pickup range, having all talkers well within this range means that this very simple configuration will provide a good conferencing experience. If closer microphone placement is needed, adding the optional expansion microphones provides a total of five independent microphones and better performance. This variation would be helpful when the room is noisier or is more susceptible to echo. Note how the expansion microphones are oriented—they are pointed outward. This gives good pickup to all of the talkers.

As the room grows larger and the tables longer, the conference phone can be extended by using longer expansion microphone cables (up to 15 feet). If there is a primary talker, such as a seminar leader, they can use a wireless lapel microphone that connects directly to the SoundStation VTX 1000 or SoundStation IP 7000. With so many conference phone systems to choose from and so many variations in room size and acoustic characteristics, the task of choosing the right conferencing solution may seem daunting. The good news is that today’s technology coupled with the knowledge conveyed in this paper should make these choices far easier.

When there is a choice between an analog network connection and an IP VoIP connection, it is highly recommended that the latter be selected. One reason for this is that all VoIP Polycom conference phones today support Polycom HD Voice, also known as wideband audio, which delivers much more of the sound of the human voice over the network connection. Where an analog phone carries only one-sixth the bandwidth that the ear can hear, a VoIP phone—depending on its model—will deliver from two to six times that. Especially in speakerphone applications, this makes a dramatic improvement in intelligibility and ability to identify who’s talking, while substantially reducing fatigue.

Conclusion

The world of voice conferencing has evolved significantly over the past decade, and a new generation is now available with models that can much better meet the unique challenges of the conferencing environments found in today’s global businesses. The key to success is understanding the unique challenges of each room and selecting the conferencing solution that will result in the best possible conferencing experience for parties on both ends of the call.

The apparent simplicity of a conference phone often disguises the complexities inherent in creating the ultimate conference experience. Hopefully, this paper has equipped you with the insight and the tools needed to better plan and deploy your voice conferencing equipment. For additional information or to learn more about Polycom’s voice conferencing solutions, visit w*ww.polycom.com.*

About Polycom

Polycom helps organizations unleash the power of human collaboration. More than 400,000 companies and institutions worldwide defy distance with video, voice and content solutions from Polycom. Polycom and its global partner ecosystem provide flexible collaboration solutions for any environment that deliver the best user experience and unmatched investment protection.

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