

POLYCOM VIDEO CONFERENCING TODAY — *IT'S NOT YOUR FATHER'S VIDEO EXPERIENCE!*

Whitepaper

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The value of video conferencing has far surpassed the talking head. Improvements in the technologies and applications have resulted in video conferencing being viewed as a communications necessity domestically and globally from ones desktop to highly sophisticated “presence” rooms. This document presents benefits, applications, technology components, and network issues surrounding successful video conferencing implementation. Also included is a look at the value of HD (high definition) video and how Polycom is addressing this aspect of the video conferencing market.

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VIDEO CONFERENCING TODAY

INTRODUCTION

Since its first commercial introduction in 1982, when video conferencing was expensive, could only work over limited networks and was primarily used for talking heads, video conferencing has evolved to the point that the technology available today is nothing like what was available in 1982 or even what was available two years ago. In other words, it is NOT your father's video experience any more! In recent years, the growth of video conferencing has been driven by mergers & acquisitions, corporate downsizing, the drive to control costs, a need to reduce response times, negative events (i.e. war, weather, and illness), and decreased costs and increased functionality of video conferencing technology. Video conferencing has become a valuable tool for many vertical markets, including education, government, healthcare, manufacturing and finance, among others. Vendors have designed the technology to meet specific user needs from individual desktop systems to completely integrated rooms that truly make users feel "like being there" when meeting with distant sites.

Video conferencing, coupled with collaboration, allows increasingly dispersed organizations to pull their human and information resources together to create new ways of working, interacting, and responding to customers and partners.

Worldwide, organizations have heavily invested in computers and communication networks and are now focusing on getting better returns from that massive outlay by seeking new applications that can bring real benefits to the organization. Near the top of the list is conferencing and collaboration. The demand for real-time, high-quality communication tools is driving the growth. No longer just a way to hold telephone-style conversations with pictures, video and data/web conferencing exploit the power of the underlying technologies to build stronger, more valuable organizational networks:

- Networks of people,
- Networks of information and ideas,
- Networks of expertise.

VIRTUAL TEAMS REPLACE THE TRADITIONAL WORKPLACE

Today, geographically dispersed work teams are the rule, not the exception. Video conferencing offers the benefits of face-to-face communication without the inconvenience, wear-and-tear, unpredictability, and expense of traveling to a meeting. But it doesn't just displace travel – it is a better way of communicating for all but the most exacting interpersonal contacts. The fact is that speech is only a small element of human communication. Without a visual dimension, conversations can do little more than facilitate information exchange. That's

because research shows that approximately 80% of what is communicated when people interact is conveyed visually – through body language, gestures, facial expressions, and other visual nuances. People better understand and remember more of what they see than of what they have only heard.

HOW ORGANIZATIONS BENEFIT

The use of video conferencing has the potential of increasing productivity and efficiency by reducing unproductive travel time, preventing meeting delays, creating shorter and more structured meetings, and providing faster exchange of information. This allows for greater reach of message, since individuals may now obtain information when it is convenient for them. Video conferencing also allows for an increased number of participants and allows people who might never meet, yet who work together, to meet virtually – face-to-face over video. With video conferencing, and the data collaboration tools that are now used with it, all individuals who need information can get the information when it is easiest for them, on a real-time or delayed basis. By increasing usage, organizations will quickly see a financial return on investment.

Video conferencing is usually adopted by an organization for a combination of three productivity-enhancing reasons:

- To reduce the need for people or work teams to physically reside in the same place.
- To enhance teamwork and collaboration within organizations by offering a high level of intimacy and interactivity.
- To collaborate on a document or graphic creation, with insertions, deletions or alterations made to the document by any participant in real time.

As a result, users find the benefits of video conferencing to include faster decision-making, reduced time to market for products, interface with scarce talent when needed (regardless of where they are located), better customer responsiveness, and more efficient work practices.

Users like a technology that is transparent to them and easy to use, allowing them to conduct business independently and efficiently. If used with purpose, video conferencing can help users be more strategic and competitive. Users want to improve productivity, increase access to subject matter experts, and allow meetings to be held when needed. Of course, in many instances, travel costs are also reduced.

USERS OF VIDEO CONFERENCING

Today, there is no longer an industry that is not using video conferencing. People from a wide variety of business entities, academic institutions, healthcare organizations, and government

bodies have benefited from video conferencing and collaboration. Regardless of size or location, today's video conferencing and collaboration technologies are within reach of any organization. Video conferencing is no longer confined to executive boardrooms. Video conferencing has seen significant changes with technology available from the desktop, (at very attractive prices), to high end communications (with the advent of high definition and improvements in telepresence) that make meetings truly "like being there". Improvements in audio and video quality, display devices, camera designs and user interfaces have made the experiences users had only a few years ago (i.e. jerky video, dropped calls, poor sound and images) a thing of the past. Now users can select a wide range of video conferencing technologies to meet any communication need, including the ability to hold video conferences on mobile devices.

Also, video conferencing is no longer confined to the office environment. Price reductions and improvements in connectivity make video conferencing available to any conference room, desktop, or home office.

APPLICATIONS

Healthcare

Mansfield Health Education Center, Montana

Tom Brewer is the Director of operations for the Mansfield Health Education Center, which is managed by the Northwest Research & Education Institute (NWREI) in the state of Montana, and is a joint venture of St. Vincent Healthcare and Rocky Mountain Health Network. Mansfield Center facilitates clinical and applied research, providing continuing medical education for physicians and other healthcare professionals, and coordinates community health education programs. The Mansfield Center is an eight-room facility that includes a room with integrated video conferencing at the touch of a button to accommodate up to 240 people. This room enables "town hall" video conferences during which 30 to 50 video-equipped sites are connected in a single call. The town hall format frequently covers state and local government healthcare policy issues.

Brewer Stated, "From one end of our video network to the other is about a seven-hour drive; so the importance of eliminating that distance and seeing patients immediately and in real time cannot be emphasized enough."

University of Vermont College of Medicine & Fletcher Allen Health Care

Patients in rural America suffering a severe trauma accident are twice as likely to die as trauma patients in urban areas. Because of this alarming statistic, the University of Vermont (UVM), College of Medicine and Fletcher Allen Health Care has a teletrauma program to link rural hospitals and leverage a 24-hour operator service to help people obtain teletrauma consultations. The operator contacts the trauma doctor on call, who responds by connecting to

the rural hospital using video conferencing. Michael Caputo, Director of Information Systems and Telemedicine Operations at UVM College of Medicine states, "Polycom units easily mount on a ceiling or wall and provide the reliability and robustness we need." In the hospitals, video units are mounted above patient beds on the wall to give a birds-eye view of the room. Trauma doctors can then zoom in and out, gaining access to the entire room.

Education

Waterloo University, Canada

Waterloo has long been recognized as the most innovative university in Canada. Like other universities, Waterloo is committed to advancing learning and knowledge through teaching, research, and scholarship. One of Waterloo's researchers who is garnering a lot of attention is Associate Professor of Drama and Theatre Studies, Gerd Hauck. Hauck has become interested in theatre and the new media, specifically using video conferencing as a medium for creating collaborative theatre. "I truly believe that multipoint video conferencing collaborative theatre has the potential to transform the outcomes of creative processes and, ultimately, to expose actors, audiences, creative directors, and students to a far broader range of experiences, perspectives, and voices within the context of theatre production and performance," explains Hauck. He adds, "By broadcasting over video, it's conceivable that one day you could do *Hamlet* and have an audience of 10,000 or more people.

Government

North Dakota

Connecting businesses, residents and government agencies over the often remote and sparsely populated 70,665 square miles of North Dakota is no small task, especially in the harsh winter months that commonly make rural travel difficult and downright dangerous. These were chief concerns for the 1999 legislative session and are largely responsible for the creation of the North Dakota Statewide Technology Access for Government and Education network (STAGEnet). STAGEnet provides broadband connectivity, Internet access, video conferencing and other networking services in North Dakota for all state agencies, colleges and universities, local government, and K-12 schools. Jerry Rostad is the Director of the North Dakota Interactive Video Network (IVN). He states, "In six months time we supported just short of 20,000 hours of video conferencing activity including 15,041 class sessions and 1,352 meetings. On average, we facilitate more than 3,000 hours of conferencing each month. And keep in mind, these numbers don't even include a significant percentage of the video conferences on the network which are routinely initiated on a local system without the help of my staff."

Virginia Supreme Court

Virginia is one of a handful of states in the nation that employs judicial officers – magistrates – to issue a warrant for every arrest that's made. While this system provides an additional source of checks and balances and speeds the process for the accused, it can also put a strain on law

enforcement resources. "Video conferencing was an ideal way to cut down on travel time for our police officers and sheriffs by allowing them remote access to magistrates. But we still faced the issue of printing an original warrant with a signature at the remote location," explains Bob Kelley, applications engineer for the Magistrate Team with the Virginia Supreme Court. "We came up with the idea of using the data port on a video conferencing system to accomplish that, but we needed help, so we went to Polycom to see what they could do for us. Together we came up with a remote print feature that lets a magistrate print a signed warrant at the officer's remote site."

Enterprises

Owens-Illinois

Owens-Illinois is the world's leading manufacturer of glass and plastics packaging products, and with more than 140 locations around the globe and 34,000 employees, its communications needs are complex. That's why the company implemented video conferencing in 1996.

Recently, Altajir Glass in the United Arab Emirates contracted Owens-Illinois to design a glass plant. In the middle of the project, the tensions in Iraq began and Owens-Illinois was able to use video conferencing for project review meetings instead of traveling to the Middle East. "Video conferencing gave us the ability to continue conducting business even in a time of chaos and unrest," says Dianne Stroshine, multimedia specialist for Owens-Illinois. "And given the uncertainty of the world, this makes video conferencing more important than ever for the company."

Owens-Illinois uses video to communicate with its affiliates and licensees in the Asia Pacific region, France, Germany, Italy, Poland, Portugal, Spain, the U.K., Mexico, Brazil, Colombia, Peru, South Africa and the United Arab Emirates.

Adobe Systems

With annual revenues exceeding \$1.6 billion, Adobe Systems is one of the world's largest software companies. And the mission that has helped make Adobe so successful – helping people communicate better – starts internally. But, in a company with nearly 4000 employees located around the world, facilitating seamless communication can be a challenge. That's why Adobe deployed Polycom's complete end-to-end solutions for integrated voice, video and data communications.

"As a global company, one of Adobe's highest priorities is keeping our staff around the world connected," says Bill Weatherwax, director of global operations for Adobe. "With more than 2000 video meetings held each month, and usage of the systems increasing steadily every quarter, it's evident that video conferencing is an integral communications tool at Adobe."

Each of the above organizations presents examples of how video conferencing has positively impacted the organization, making communications easier and allowing each organization to accomplish tasks better than before.

TECHNOLOGY COMPONENTS

Video conferencing systems include video cameras, microphones, display screens or monitors, and processing technology to create virtual meetings between geographically dispersed participants. Conferences involve the ability to see and hear other participants, as well as share data, presentations, and anything else – prototypes, scale models, samples – that is brought to the meeting. Video conferences can be conducted either point-to-point, meaning two locations are connected in the call, or multipoint, meaning more than two sites are on the call at one time.

Today's growth in conferencing and collaboration is real and sustained, with more people in the U.S. now meeting electronically than in person. Research has confirmed that unrelenting market pressures, combined with security concerns, have jolted people into reassessing the role of conventional in-person meetings. This has resulted in a strong upsurge in usage of all the collaborative applications – voice, data/web and video conferencing. In the past 5 years there has been an 800% increase in the number of virtual workers and 90% of employees work somewhere other than the headquarters site. Per Gartner Group, "By year-end 2007, supporting and encouraging collaboration as part of a high-performance workplace will become one of the top five CIO priorities."

Several factors are promoting this accelerating trend

Evolution

Technology is changing the way people hold and share information. While seeing and hearing people are key elements of human interaction, and thus of video conferencing, one of the most significant advances in group video systems is the ability to share data. Now everyone can view and work off the same presentation, spreadsheet, or any other image or document, while still being able to see all participants in the video call.

The popularity of collaboration reflects the degree to which knowledge workers and managers have moved from paper and filing cabinets to electronic documents and data storage.

Revolution: More Cost Efficiency

The rapid development of information technology has not only changed the way information is stored and processed, it has also significantly lowered the costs and improved the effectiveness of video conferencing technology. Since 1998, the prices of video conferencing endpoints have dropped ten-fold.

Cost, picture and sound quality, and ease of use have all greatly improved as a result of development work and increasingly powerful, lower cost technology. Just as important, the emergence of IP (Internet Protocol) as the pervasive network technology for local area

networks (LANs), wide area networks (WANs), and the public Internet promises standard connectivity, making it easier to set up conferences on an as-needed, cost-efficient basis.

Revolution: Dramatically Changed Environments

With technical hurdles to video conferencing mostly overcome, psychological and organizational barriers to adoption and use are now falling fast, as well. Video conferencing is no longer seen as just a cheap alternative to travel.

Organizations understand that it can also help them address issues such as the dispersion of global teams, the need to make decisions and implement them within ever-shorter time frames, and the need to respond more quickly to intense competitive pressure. In addition, as cost, environmental, and security concerns heighten, video conferencing is also being seen as a more responsible option from a variety of perspectives, including:

- With the global business slowdown, prudent organizations are acting to reduce their costs.
- Environmental concerns are increasing the pressure on organizations to adopt green policies, including optimization of business travel which, it can be argued, contributes to global warming.
- Security and health concerns mean that organizations must be concerned about the well being of their employees. This increasingly means curtailing travel to certain destinations at certain times.

Not surprisingly, many organizations are promoting video conferencing as an alternative to air travel. Some companies already require employees to confirm on travel requisition forms that video conferencing is not an option for a specific trip.

IP To EVERYWHERE

Due to advances in network management and prioritization capabilities, converged IP networks are becoming the norm for voice, data, and video communications. The growth of broadband connection to the Internet has resulted in applications such as Web casting – live, audio and video conferences being set up for everything from company financial results discussions to corporate seminars – to become highly popular. Hosting video conferencing traffic on the corporate LAN or WAN simplifies system deployment and management, as well as results in lower overall cost of ownership for conferencing technologies.

This IP network deployment has provided an alternative to ISDN connections for video conferencing and will result in the eventual replacement of ISDN as the network transport for video. Beyond becoming the standard corporate data networking protocol, IP has also become the network layer protocol that is often deployed with broadband access services using DSL, broadband wireless, or optical fiber.

Advantages

IP connectivity offers many advantages, including the fact that there is continued development of the network with increased functionality. Also, IP networks are being proliferated globally. Many organizations also like the fact that there are no toll charges with IP calls, like there are with ISDN calls. Finally, with IP networks there continue to be development of add-ons like chat, directory services, etc.

The ability to integrate video conferencing into PC platforms and use standard data networks to make connections between conferencing systems is very powerful. This enables video conferencing applications to scale with the growing corporate, public, and IP managed networks, while sharing the economies of converged voice, data, and video.

Disadvantages

There are, however, disadvantages to IP networks which need to be overcome. For the most part, the advantages of an IP end-to-end network do not extend outside private networks. When traffic flows between organizations on different networks the bandwidth is not always enough to ensure adequate performance. IP networks were not originally designed to handle time-sensitive traffic like video conferencing. That is because IP transmits data using a 'connection-less' approach, with packets contending as they progress through the network. At congested links, packets are queued. If the queue grows too long, the packets are sometimes dropped, prompting the end system to request retransmission. With video conferencing, one-way packet delay of more than 150 milliseconds, jitter (uneven arrival of data), or dropped packets can badly compromise performance and cause periods of screen freeze, a change in the appearance of artifacts (such as blank rectangles), or contribute to poor audio quality and synchronization problems.

The Solution

Quality of Service (QoS) is the mechanism used to insure that the packets associated with video conferencing make it through the network in a timely manner, without getting lost, and with no help from the transport protocol. Queues are the primary contributors to packet loss and delay in a packet network. The network must have a QoS mechanism that operates at each switch and router to prioritize real-time traffic. To gain the maximum benefit, QoS must work from end-to-end. All routers and switches between the real-time sender and the real-time receiver must have a QoS mechanism available and enabled. Currently, standards bodies are working on the development of a QoS scheme to create consistency between vendors to eventually allow quality of service to be across multiple providers while maintaining similar forwarding behavior through each.

Bandwidth use is an integral part of QoS. Sufficient bandwidth must be in place on each link to carry the expected real-time traffic. It is important to analyze expected demand so that proper bandwidth planning can be done to support video conferencing on the network links. Once the bandwidth demand has been calculated, an evaluation of existing network bandwidth and utilization is required to determine if there are sufficient resources to support the new real-time

load. Each link of the network needs to have sufficient bandwidth to support the voice and data traffic expected, plus the existing data applications that use those same connections. Although this sounds like a daunting task, in practice it usually means evaluating the wide area network links, the backbone connections to the bridge, and client connections where there may be 10 Mbps Ethernet or shared Ethernet connections.

POLYCOM ULTIMATEHD™

Given the breadth and depth of applications where video conferencing, and now HD video conferencing, can be used to provide value, Polycom brings to market a solution that addresses all of those applications. It is not enough to just provide an HD resolution and high frame rate. A true HD experience needs to take into consideration every aspect of the video meeting and provide an "UltimateHD" experience.

Polycom® UltimateHD™ is a next generation architecture that enables the worlds most lifelike and engaging collaborative communication experience. Polycom's UltimateHD architecture is a long term strategy that conceptually describes the essential elements (HD voice, HD video, HD content sharing, HD infrastructure, HD services) and how they blend to enable remote meetings to be as engaging as face to face meeting, dramatically improving productivity and efficiency.

What does the UltimateHD architecture provide?

UltimateHD products and solutions based on this architecture will provide users the greatest visual, audio, and content detail in a multimedia collaborative meeting.

- **Enhances productivity, effectiveness, and efficiency** – an engaging life like experience with superior audio fidelity, video clarity, and detailed content that allow you to manage globally dispersed teams, speed time to market and build loyal relationships over distance
- **Facilitates a new class of Unified Collaboration applications** – applications that require the enhanced detail supported by UltimateHD where you used to have to be there are now possible remotely
- **Ensures a lifelike user experience everywhere** – consistent premium experience from mobile, desktop, and conference room
- **Enables the next generation of unified collaboration** – conferencing, broadcasting, streaming and archiving
- **Becomes the collaboration core of any unified communications strategy** – leverages and enhances incumbent infrastructure telephony and presence based systems
- **Provides unmatched flexibility** – supports simultaneous On-Demand and scheduled HD collaborative meetings
- **Delivered without compromise by only Polycom** – can provide all of the essential elements with best in class HD Voice, HD Video, HD Content, HD Infrastructure, HD Services

How is Polycom's UltimateHD architecture different from what competitors offer?

In order for customers to have a complete and consistent life like collaborative communications experience everywhere, the technology must be approached from a strategic and holistic level. Unlike other solutions claiming high definition, which only focus on delivering the requisite video resolution, Polycom HD solutions adhere to the UltimateHD architecture enabling a complete high definition experience with every aspect of the meeting enhanced by UltimateHD architecture conformity: HD video as well as HD voice, HD multimedia content, HD bridging, HD recording/archiving/streaming, and supporting HD services.

Polycom Advantages

Polycom's full, end-to-end video conferencing solutions give customers considerable advantages, since Polycom is able to support the broadest range of video conferencing end-points over networks. Successful organizations have learned that conferencing and collaboration must be built into their business models and culture, where it can provide real returns on both cost and organizational performance.

Polycom designs and delivers the world's best-selling voice, video, and multinet network gateways, and multipoint conferencing solutions. Due to recent advances in technology, Polycom conferencing is easier and more affordable, while the quality is higher than ever before.