The Inter-Company Telepresence & Video Conferencing Handbook

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Executive Summary

Key Findings

• Economic, geopolitical and public health realities are driving the case for inter-company telepresence and effective visual collaboration as air travel becomes more costly and inefficient
• The higher quality end-user experience of telepresence coupled with capable tools for data collaboration are providing an acceptable alternative for many face-to-face meetings
• Telepresence equipment and network interoperability remains a major stumbling block towards widespread inter-company telepresence service adoption
• The need for quality video connections with partners, vendors and customers can be enabled through dedicated video overlay networks and telepresence and video conferencing exchanges which specialize in connecting disparate networks
• Security concerns will compel many companies to invest in premium services
• The cultural and operational issues around inter-company telepresence are as important to understand and address as the technical issues

Video conferencing had been relegated to the corners of the enterprise market for the past four decades, primarily as a communications service suitable for enthusiasts but not really ready for prime time. In recent years, that practice has changed dramatically. The introduction of HD cameras, codecs and low cost high speed networks defined an expectation for performance.

It was the introduction of telepresence that showed the power of quality and the need for a natural, elegant and immersive experience. Now that airlines are regularly failing - more than 25 in 2008 alone - and users have broken the 'must travel to meet' expectation, the technical, operational and cultural hurdles of enabling inter-company telepresence and video conferencing need to be understood and overcome. This handbook, the first of its kind, is a comprehensive overview of these issues and includes six industry best practices that will enable your organization to connect with customers, partners and suppliers while reducing the hard, soft and opportunity costs of doing business.

About The Collaboration

Human Productivity Lab and Brockmann & Company bring decades of experience in telepresence, visual collaboration, managed services and inter-networking.

Inter-company telepresence is the next major requirement in the development of the industry

Look for our follow-on report: The Inter-Company Telepresence and Video Conferencing Exchange Review to be released in January of 2010. The report is a comprehensive look at the Telepresence Exchange and Managed Service Providers that are enabling secure inter-company services. Use the form at the back of this handbook to reserve your copy when released.
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Drivers for Telepresence

The ability for organizations to instantaneously and effectively connect with vendors, investors, joint-venture partners and customers globally will revolutionize business in ways that can only be speculated on at the dawn of this technology’s inception. This level of interconnection will start slowly but accelerate rapidly. Currently, fewer than 40 known companies have deployed telepresence and effective visual collaboration group systems. These companies have barely scratched the surface of the technology, but already their benefits have been substantial, the ROI proven and further adoption among their peers certain.

- Howard S. Lichtman, August 2006 [1]

2200 immersive [telepresence] rooms by 2008 to 5,700 in 2010 and 11,600 in 2012.

- Gartner Group, December 2009[2]

High Growth Is a Confluence of Factors

In three short years we have witnessed enormous growth in room deployments of telepresence and high definition video conferencing. The rapid growth of enterprise telepresence and the emergence of publicly available telepresence environments in hundreds, growing to thousands of firms, is only the pre-amble for the coming revolution in business communications. We are rapidly approaching a world where a business person can walk into a room and connect with their customers, joint venture partners and suppliers anywhere on the globe, instantly in a highly productive environment that closely replicates an in-person experience.

Somewhat ironically, one of the factors driving the growth in next generation communications is the global recession. The worldwide collapse in demand for products and services in 2008 and 2009 has caused most if not all organizations to reduce the variable costs in their operations. Most companies cut deeper and faster than at any other time in recent history. After the layoffs and the budget slashing, CIOs and business managers looked to drive new efficiencies in the

way they do business in order to adjust to a lower and more sustainable cost structure. GM and Chrysler (autos), Nortel (telecom), Japan Air Lines (air travel), Fleetwood Enterprises (recreational vehicles), Idearc (phone books), Star-Tribune (newspapers), Charter (cableco), Eddie Bauer (retail), BearingPoint (consulting) and many other bankruptcies exacerbated the financial crisis.

The airline industry suffered particularly poorly in 2008, foreshadowing the value destruction across a larger swath of the economy later that year. A combination of rising fuel prices, demand destruction and inflexible labor agreements in 2008 saw the bankruptcy of over 25 global carriers and four major airline consolidations. Fortunately for the surviving firms, the industry’s resulting capacity reduction of 21% - which according to OAG is roughly the equivalent of a major airline ceasing operations in 2009 - also saw the average price of commercial flights rise especially in “captured cities” with few carrier options. In addition, the airlines have added a plethora of surcharge fees including luggage, in-flight meals, pillows and blankets, pushing the rising cost of travel even higher.

Driven by reduced demand, airlines scheduled fewer flights between city-pairs, enabled more multi-hop flights and removed aircraft from service. As a result, airlines, in a bid to improve yields per flight, also lowered the available capacity for re-routing passengers whenever bad weather, mechanical difficulty or missed connections disrupt travel plans. This has generally meant less pleasant and more expensive travel, not to mention downright dissatisfaction when disruptions cause delays. In short, the cost of travel for business users continues to rise in hard costs, soft costs, and opportunity cost. CFOs are looking for ways to cut travel costs and find alternatives.

As physical travel becomes more expensive and less convenient the awareness of successful telepresence and effective visual collaboration investments is sky-rocketing. Modern telepresence environments have managed to replicate across-the-table professional meetings with an amazing degree of realism. Modern collaboration tools let users easily share PC data, work in real-time in the same application, view circuit-board-level detail of physical objects, and white board interactively between locations in meetings where the participants are separated by thousands of miles.

Many organizations have leveraged these investments internally over the past few years, using telepresence and video conferencing resources and services to connect their headquarters with regional and satellite offices. But to use these amazing capabilities to conduct business with customers, partners and suppliers has proven too much of a hassle for too many. Coordinating equipment interoperability, security, quality of service and network connectivity have proven to be major impediments to widespread adoption of inter-company telepresence. Until recently, hopping onto a plane was the easiest thing to do.

Yet despite these barriers, smart business leaders are moving toward the puck and improving their ability to connect with their partners, vendors, and customers. They are leveraging telepresence as an

Accenture, the global management consulting and technology services firm operates 50 telepresence rooms around the world. In 2009 they pursued an inter-company telepresence strategy which now connects them to 31 companies, 600 telepresence rooms, and close to 2,000,000 of their partners and clients personnel.
integral part of the sales and customer engagement process to reduce costs, improve productivity and aggressively accelerate their position in new markets.

**SARS, Swine Flu, Terrorism, Economic Crisis and Natural Disasters**

A modern business faces many risks to continued operations: labor strife, product recall, legal troubles, fickle customers and industrial espionage to name a few. The disruption of business travel can be just as disastrous to a company’s health.

The September 11, 2001 terrorist attacks caused significant disruption in the travel industry and the economy proper as all airports in the United States shut down for two days to design and introduce new security procedures. In 2003, Severe Acute Respiratory Syndrome (SARS) infected some 8,000 and killing 775 in 30 countries, disrupting travel, business and public health operations around the world. And the massive path of destruction caused by the December 26, 2004 tsunami affected service on whole swaths of the Indian Ocean coast. No doubt the 2009 swine flu pandemic-in-the-making and viral pneumonia in the Ukraine is raising alarms for many executives being asked to spend hours in the constantly re-circulated environment of aircraft cabins with 200 other strangers of unknown health status.

Further complicating business planning are the ongoing uncertainties of the global economy. The potential for rapid changes in the finances of nation-states and their leading firms was underscored by the 2008-9 Icelandic financial crisis which saw the collapse of the country’s financial institutions, a 90% drop in the Iceland stock market, double-digit interest rates and a sudden decline in the value of the Icelandic krona of more than 35% against the euro from January to September 2008. The more-recent solvency struggles of Dubai World, California, and Greece echo these troubles and symptoms.

Leaders in major companies around the world understand the need for business travel and face-to-face communications to keep key employees in contact with key customers, partners and suppliers. Smart organizations are hedging their bets and cost-justifying a portion of their investment in telepresence and visual collaboration technologies as part of their business continuity and disaster recovery plans. It’s not a stretch for them to view telepresence as an effective substitute and productive complement for business travel. After all, even in the face of public health calamities, natural catastrophe, financial crisis or war, company and ecosphere-wide global collaboration must go on.

**Our Goal**

This handbook is a guide for overcoming the obstacles to inter-company telepresence and video conferencing. With these technologies, you will be able to connect your organization with business associates old and new more frequently and intensely. You will learn how to use telepresence and visual collaboration to reduce the cost of doing business and enter new markets with a greater velocity than ever before. And you’ll learn to make these enhanced inter-company telepresence capabilities become your “Business Continuity Plan” should a further deterioration of economic conditions, currency crisis, pandemic, or a cataclysm arise.
Fundamentals of Inter-Company Telepresence

The value of a network increases proportionally with the square of the number of nodes on the network.

- Metcalfe’s Law, Robert Metcalfe

Metcalfe’s Law understates the value created by Group Forming Networks (GFN) as they grow. Let’s say you have a GFN with $n$ members. If you add up all the potential two-person groups, three-person groups, and so on that those members could form, the number of possible groups equals $2^n$. So the value of a Group Forming Network increases exponentially, in proportion to $2^n$.

- Reed’s Law, David P. Reed [4]

It’s All About The Network

The link between connection possibilities and value to users is intuitively obvious, but Metcalfe’s Law crystallized it. In the 1970s, Robert Metcalfe, the inventor of the most successful networking technology ever created – Ethernet – spoke about the value of the network as a proxy for the network’s utility to the users of the network. The difference between a network of 10 nodes and a network of 1,000 nodes is a greatly expanded possibility of connecting to more nodes, more people and therefore more potential value.

Extending Metcalfe’s observation, David P. Reed, the designer of UDP (and now an adjunct professor in MIT’s Media Lab) observed in 2001 that some networks, especially Group Forming Networks (GFNs), had the ability to grow faster than networks without social networking characteristics. Inter-company telepresence meetings and networks exhibit many if not all of the properties of GFNs. Many different independent organizations require robust communications with any given firm: suppliers, customers, joint-venture partners, outside law firms, recruiters, accountancies, advertising agencies, foreign distributors, industry analysts and investment bankers to name but a few potential participants. Inter-company telepresence networks have the ability to grow exponentially as the interoperability, security, performance, and cultural issues are addressed.

Telepresence has redefined the user expectations of what the video communications experience can be. As a matter of principle, telepresence environmental designers carefully control lighting and wall coverings, employ high density audio designs, and use modern and pleasing furniture implementations - on top of large flat screen monitors, video walls and/or beam splitters that show remote participants in realistic life-size and real-time settings. The telepresence equipment industry has established a “de-facto” standard of three screens capable of displaying two life-sized participants on each screen in a product category we are calling ‘Group Systems’. The compression algorithms and codecs involved are carefully engineered to assure the highest quality and most life-like experiences ever seen. Using what had previously been considered ‘obscene’ quantities of bandwidth, telepresence suites create a business class consistency of quality between locations.

These complex and highly controlled environments are configured with user controls that assure they work instantly, without serious participant intervention or technical experience. Many vendors of these systems incorporate managed services as part of the offer assuring concierge-level service that monitors and fixes all aspects of the telepresence environment and its communications. With telepresence systems users finally have a high quality experience with peace-of-mind operations.

Telepresence systems are almost never purchased in quantities of one unit. The initial business case for telepresence is almost always to replace business travel for internal meetings. Gartner conservatively characterized the deployment pattern for telepresence in enterprise organizations:

Organizations deploy an initial batch of three to six telepresence systems, and then come back between nine and 18 months later for a second batch, which brings the total up to between 15 and 20 rooms. Thereafter, additional deployments are modest, and few organizations ever surpass 30 systems. Given the overwhelming focus on Fortune 5000 companies, this places the upper bound of the core addressable market at something like 150,000 systems (5,000 organizations each with 30 systems). By 2013, we expect that less than a third of this market will have been addressed. [5]

This assessment of the growth in the market seems to reflect static usage through 2013. It doesn’t reflect growth due to the availability of inter-company telepresence and public availability. Publicly available telepresence and inter-company telepresence increases utility, usage and the need for overflow capacity and therefore the number of deployed rooms. Publicly available and inter-company telepresence increases usage and deployments increases beyond the classic Global 5000 firms.

Table 1 – Comparing frequency of face-to-face meetings with customers and telepresence sessions with customers. [6]

<table>
<thead>
<tr>
<th>Meeting Class</th>
<th>Average Frequency Per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-Face meetings</td>
<td>5.7</td>
</tr>
<tr>
<td>Telepresence sessions</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Table 1 above shows that there are 7 x more meetings with customers that are face-to-face than using telepresence services. Why? Partly because of the cultural expectation that nothing beats a face-to-face encounter in securing or improving business relationships. However, there are also technical, cultural, and operational hurdles also stand in the way of effective and efficient inter-company telepresence and visual collaboration capabilities. These hurdles include:

- **Performance** – Connecting telepresence and visual collaboration systems often involves joining disparate and competitive network providers with different policies and practices for Quality-of-Service and IP addressing. It gets even more complex when multiple providers and their different advanced services get into the mix.
- **Security** – It can be a sad truth that when integrating networks, the security policies of the least secure participant can become the security policy for all. That's why most security professionals are skeptical of network integration. It's essential to pay special attention to the interfacing technologies, assuring these issues don’t risk network integrity or enterprise operations. There's also the increasing phenomenon of co-opetition to worry about. In co-opetition, companies that may be partners in one market, can be fierce competitors in another. The risk of establishing live video connections and potentially sharing meeting information with partners or competitors can be enough to give anyone pause. Are the whiteboards in your executive telepresence and video conferencing rooms cleaned off after each meeting? What can a competitor or investor deduce from your room reservations if they can see that your executive telepresence suite is booked every day this week at the exact same times as that of a publicly speculated acquisition target?
- **Interoperability** – A common practice in the early life of a communications product category is that the initial generations of product are not optimized for inter-brand interoperability, which is seen as a low priority feature (and the standards and testing mechanisms are not well defined either). Besides, in the land rush that is the initiation of any new market, vendors hope to convince customers to stick to one vendor: them. Furthermore, not every telepresence or video conferencing vendor conforms to every standard the same way. In fact, not every product release from every vendor conforms to the same standard the same way. Overcoming these variations in suite-to-suite operations is never trivial.
- **Operational** – The procedure for reserving an inter-company session or for establishing an ad hoc session can be complicated and onerous. It all depends on the blend of technologies that your firm has implemented and the technical priorities of the firms you hope to connect your users with. Ensuring a high quality experience with ease-of-use for end-users (push this button) is the key to the conduct of successful sessions and unearthing the value expected from Reed’s Law.
- **Cultural** – Since it is the culture that defines what is acceptable, what is expected, and what is allowed, the cultural hurdles have the greatest impact on the successful adoption of telepresence or any other technology. Different organizations adopt new applications and new technologies in different ways. Successful telepresence organizations have imbedded inter-
company telepresence directly into the way they do business, making it a natural extension of the company’s communications-rich operations. People have to use the technology to help them do their job. Addressing these hurdles will enable secure, convenient and high performance inter-company telepresence and video conferencing services.

**Inter-Company Telepresence Architectures**

Transmitting video over IP networks involves complex processes for capture of audio and images, compressing, packetizing, transmitting it over the network(s) and then decompressing the video at the remote site(s) for presentation on the screen. Store-and-forward applications like email and web browsing can tolerate lost, late or out-of-sequence IP packets, but not real-time video or voice communications. These service defects cause video artifacts that ruin the immersive experience and jolts the brain into a state of disbelief, while a one-way latency of over 100 milliseconds result in a perceptible and annoying delay when remote participants speak causing audio collisions and stilted communications. Good network architecture is essential in minimizing the negative effects of delay and packet delivery inconsistency.

Inter-company telepresence and video communications implementations typically follow one of two architectures, centralized or decentralized designs. Figure 2 compares the centralized and decentralized architectures. Each of the appropriate WAN services, ISDN, Internet connectivity and MPLS are discussed later, but can be adapted in inter-company configurations to support either centralized or decentralized architectures.

![Centralized Architecture](image1)

**Centralized Architecture:** All inter-company signaling and media flows pass through a central device.

![Decentralized Architecture](image2)

**Decentralized Architecture:** Inter-company signaling and media flows directly to target endpoint(s).
In the centralized architecture, all inter-company session initiation messages and media flows are concentrated through a central portal such as a session border controller (SBC) or a specially-configured video bridge. Since all the traffic is centralized, the security administration is simplified and more easily monitored. Similarly, the telepresence manager can poll the device for reports on the history of every inter-company communication including destinations, service quality and duration, which can be useful in chargeback-for-service environments.

In the decentralized design, every video communications device is empowered to communicate with any other video communications device that its network connectivity can address. In a decentralized design, security policies are more difficult to implement since it often means modifying practices and technologies in a large number of independent endpoint devices. The type of Wide Area Network (WAN) service employed to connect internal video endpoints are important considerations for the inter-company implementation.

**ISDN Networks and Video**

For two decades, most video communications operations in companies relied on ISDN, the Integrated Services Digital Network. While much of video traffic has or is migrating to IP, ISDN still has a significant share of the market to warrant an overview and is occasionally the only option available.

The world’s telephone companies came up with ISDN as the telecom industry migrated from analog communications to digital. Today, ISDN is offered in two basic designs, a low speed Basic Rate Interface offering two bearer channels of 64 kbps each and a 16 kbps data channel for telecom signaling (2B+D) and a high speed Primary Rate Interface offering in North America 23 x 64 kbps channels with 1 x 64 kbps channels set aside for signaling. The European PRI standard offered 30 x 64 kbps channels and 2 x 64 kbps channel for signaling, timing and alarm information.

ISDN BRI did not gain much traction as a residential connectivity service in North America, primarily because of the higher price with no perceived increase in user value. ISDN BRI did gain much traction in western Europe where the service providers offered it as a lower priced alternative to analog dialtone.

ISDN PRI circuits are popular as a method for corporate PBXs to be connected to the Public Switched Telephone Network (PSTN), since they provided a separate channel for signaling data that presents the caller ID information to the digital telephone and indicate to the PBX which DID or office extension the incoming call on a particular circuit was destined for.

In concert with the development of video codecs and endpoint optics, the ISDN bridge performed E.164 dialing and usually bound several ISDN point-to-point circuits together. These aggregated circuits to create the connection speeds associated with a higher quality experience, at n times the cost where n is the number of 64 kbps circuits involved. ISDN services are typically priced on a monthly fee plus time and distance and so the total ISDN WAN costs vary month-to-month with demand.
ISDN services, because of their circuit-switched origins, are not responsive to service disruptions in the network which is not usually an issue for three-minute phone calls, but can often result in nasty service disruption in multi-hour video meetings. A circuit failure means the bridge has to redial which often requires participant intervention. At the same time ISDN services are generally viewed as secure because of the physical separation of traffic and the tight phone company control of the physical access.

**ISDN Gateways**

The major feature of the ISDN-IP gateway is the interfacing between circuit switched and packet switched networks such as enterprise IP networks or the Internet. This device converts media traffic, addressing and signaling information from an ISDN network to an IP network and vice-versa. The gateway supports both IP and E.164 address space. This allows an enterprise migrating their internal video architecture from a legacy ISDN deployment to IP to continue to reach both internal and external ISDN end-points.

From a performance perspective, ISDN networks can theoretically support the multi-Megabit services that high quality telepresence systems demand, but since it takes the initiation and binding of 125 channels of 64 kbps each (6 x ISDN PRI) to deliver one circuit of 8 Mbps between two codecs in a typical telepresence suite-to-suite session and there are usually three codecs that might need as much as 8 Mbps each, it is not a practical option.

ISDN services are however appropriate for inter-company video conferencing in a decentralized inter-company architecture. That’s because any endpoint can dial out to any other endpoint over a dedicated circuit with no firewall traversal issues. However, the low speeds attained always present an inferior experience for users, not to mention the time and distance charges. ISDN service can be configured as part of a centralized architecture where IP-attached users connect into a video bridge or MCU, which then engages with the ISDN network to dial out to the ISDN-attached sites or enable dial-in from the ISDN-attached users. Interestingly, many carriers are ‘hollowing out’ their ISDN networks by migrating ISDN traffic onto an IP transport WAN. ISDN-dialed traffic is packetized by ISDN-IP gateways at the access central office and depacketized at the egress central office.

**MPLS VPNs and Video**

Many large enterprises have deployed telepresence and video conferencing either in a standalone or converged network using a carrier-provided Multi-Protocol Label Switching (MPLS) service. In an MPLS network, transmission packets are assigned headers called labels including traffic classification specifying eight classes of packet priority, which are processed by the networking hardware to quickly route the packet without regard to the contents or protocols of the packet being transported. This allows any communications to traverse any network regardless of the underlying physical infrastructure, whether SONET/SDH, Ethernet, ATM or frame relay.

Carrier implementations of MPLS typically create logically-unique Virtual Private Networks (VPNs) for their enterprise customers that aggregate many different customers’ traffic onto a shared network. For internal applications such as intra-company telepresence, MPLS provides traffic segmentation so video packets get the priority they deserve and very fast transmission.
Peering MPLS VPNs through a carrier or by connecting to a telepresence and video exchange are effective methods for reliable and secure inter-company telepresence networking. Each enterprise member of an MPLS peering group enables connectivity and MPLS tunnels to the central peering point or Network Access Point. Each enterprises’ VPN terminates on a Gbps Ethernet interface of the peering service provider’s switch, isolating the enterprises’ internal address and security policies from any other network participant, but enabling inter-connectivity with any other participant.

This mechanism assures both peering of SIP registry servers and very low transit delay in processing media transport, regardless of the number of carriers involved in the communications path.

**DiffServ Introduces Performance and Complexity**

Much of the complexities in interconnecting independently operated MPLS networks - as was the case with every predecessor virtual network technology (ATM, Frame Relay and X.25 before that) - was the coordination of signaling specifying packet treatments for congestion across peer networks and especially across carrier networks. This is an issue because there are preferences and in many cases economic consequences associated with different classes of traffic, defined by the Differentiated Services (DiffServ) architecture for IP networks.

MPLS and DiffServ however, do not work naturally well together since they operate at different layers – MPLS operates between the network and data link layers while DiffServ operates at the network layer – and are subject to differing proprietary treatment on traffic.

DiffServ is a class-based mechanism for traffic management, first proposed in 1998 by the IETF as a mechanism for assigning each packet to one of 64 possible traffic classes so each router in a DiffServ domain can uniformly differentiate each packet’s priority treatment on the basis of its class. At the time, routers processed each IP packet on a first-come, first-routed basis. In the low speed, high congestion designs of the 1990s, this resulted in many packet discards and a poor user experience in real-time services such as voice or video. DiffServ was developed to enable disparate traffic classes to traverse a common IP network with appropriate priority available to real-time applications.

DiffServ-configured routers implement Per-Hop Behaviors (PHBs), which define the treatment expected for each class. Some PHBs may be defined for low-loss, low-latency traffic and others for best-effort delivery. DiffServ makes recommendations to network operators about router operations and does not mandate a specific classification for voice or video traffic. In practice and despite the 64 possibilities, there are four commonly-defined PHBs:

- **Default** is typically a best-efforts delivery.
- **Expedited Forwarding** is for low-loss low-latency traffic (like video).
- **Assured Forwarding** assures delivery below some subscription maximum.
• Class Selector provides backward compatibility with earlier mechanisms.

But since MPLS was defined before DiffServ, the MPLS protocol designers agreed to use the 3-bits that had been set aside for experimental purposes in the MPLS label header, for Quality of Service, enabling 8 possible PHBs in MPLS. Aligning one IP network implementation of DiffServ with another IP network implementation of DiffServ is hard enough, yet the complexity is compounded more severely when you have to similarly align the DiffServ implementations of disparate MPLS service providers as well on opposite sides of a telepresence exchange.

It is not surprising then that DiffServ is a frequent source of inter-company telepresence problems. It is at the edge of networks where DiffServ classification happens and where it first becomes apparent that two carriers and two enterprises have different practices for traffic classification. Inter-company telepresence is all about expanding the edge of networks.

Inter-company telepresence services push beyond the pre-determined boundaries of carriers where sessions are viewed as either on-net or off-net. Only the peer enterprise telepresence manager has to worry about the end-to-end experience. Their contractual limits extends to the edge of the telepresence exchange, but not across their partner’s carrier. Users may never notice that a few email packets are being discarded on the other network since the application quickly retransmits. But telepresence users can quickly spot a degraded experience as a result of packet loss or greater instance of packet jitter. Given these sensitivities and complexities, the burden of higher complexity is more than offset by the higher quality experience associated with modern traffic management practices.

Economics of Carrier Inter-Company Telepresence

The telephone network of the past century originated with service providers operating in distinct local footprints. As it became clear that users in one locality were willing to pay to speak with users in another, the industry developed procedures for settling payments for traffic originating on one network and terminating on the other and vice-versa. In wireless networks, roaming service agreements between mobile operators assures their users are granted mobile services in territories and countries well-beyond the footprint of their home service providers.

There are no standard settlement processes for carriers terminating or transporting one-another’s telepresence traffic at this time. So although carriers are interested in facilitating inter-company telepresence services, it will only be as a mechanism to grow the overall service utilization in the early days.
Telepresence and Video Conferencing Exchange Providers

A telepresence and video conferencing exchange is a service provider that sits between multiple networks (carrier and private) that frequently use different DiffServ classes, different MPLS tagging schemes and have independent network addressing policies and practices. An exchange provider will typically provide some or all of the following services:

- Physical network connectivity between networks
- MPLS tag matching
- IP address conflict resolution between public, private or public-public or private-private address conflicts
- E.164 calling support
- Directory services for inter-company video sessions and publicly-available telepresence suites

Telepresence exchange services can include access to shared video network infrastructure for multi-site calls, and access to publicly available telepresence and video conferencing rooms.

Pricing-wise, exchange services can include one-time charges for on-boarding each endpoint and for port activation. Clients can then expect to pay a monthly recurring charge which can include either a flat-rate fee for a certain amount of bandwidth transfer between your network and your partners, or a per-minute charge. Options often include access to video network infrastructure.
and usage-based ISDN gateway services. Attractive value-added options include end-to-end call diagnostics to pinpoint quality issues among multiple networks, carriers and service providers.

Leading providers include:

• Cisco has developed an inter-company architecture for Cisco TelePresence. Tata Communications, BT Conferencing, Orange Business Services, Telmex, NTT, Telefonica, Telus and AT&T offer services based on Cisco’s architecture. Number of endpoints supported in practice is not available.
• IPV Gateways is a major wholesale exchange that matches DiffServ tags on 20 carriers with potential connectivity to 700 other carriers through its partner, Telx. IPV supports tens of thousands of downstream endpoint connections on some of the largest telepresence, video conferencing managed service providers including MASERGY, IVCi, Telemerge, InterCall, York Telecom and Providea.
• Independent Video Managed Service Providers running their own exchanges with the option to connect to wholesale exchanges include BCS Global, Glowpoint and Iformata.

Telepresence and Video Conferencing Communities of Interest Networks (CoINs)
A telepresence and video conferencing CoIN is a specialty network where the participants of the CoIN can reach any other member of the CoIN and are united by the equipment vendor, the carrier and/or managed service provider. Some telepresence and video conferencing CoIN providers include MASERGY, HP Halo HVEN, Glowpoint, Iformata and Teliris. Some telepresence CoINs have relationships with Telepresence Exchange Providers to route traffic to other networks.

The Internet and Video
The commercialization of the Internet in 1995 marks one of the most important milestones in the history of the telecommunications industry since it inaugurated an amazing period of innovation in protocols, applications, access equipment, services and end user experiences. Today, 74% of US homes have broadband Internet access using cable, DSL, WiMax or Fiber connectivity at an advertised average download speed of 9.4 Mbps. The widespread availability of high speed Internet access for residential applications at only $15-$140/month is a major influence in what business users expect to pay for high speed connectivity to the Internet.

Part of the great success of the Internet is due to it being a giant shared network. It is a best-efforts delivery service where packets in transit...
are discarded in the event of network congestion and all applications and all users have an equal probability of being correctly processed. Applications are assumed to correct for discarded packets by requesting retransmission, which is not practical in demanding real-time applications such as voice or video communications. For applications like email and web browsing this is a huge shared-cost advantage.

However, being a shared network is a giant liability for real-time applications like voice and video communications. Since each of the packets in an inter-company video communication has an equal probability of being processed or queued as an email dispatch or web browser communication, there is also a high probability of jitter, which is variation in transit time across the network. Jitter and packet loss are the two most frequent and significant quality-of-experience problems associated with the Internet.

Although the Internet offers inexpensive access, the trade off is that there’s no Quality of Service in practice where some applications’ jitter and discard tolerances are respected. Instead every application and every user is treated the same.

As an important shared network resource, the Internet has also been the major vector for information crimes including viruses, spyware, eavesdropping, identity theft and denial of service. As a result of these threats, the security of traffic traversing the Internet needs to be a major concern for enterprise telepresence managers.

Internet address space is a finite resource so many companies and home users rely on Network Address Translation (NAT) to expose only one IP address to the Internet and then use a different dynamically-assigned addressing scheme in the company or the home network. Packets traversing the NAT firewall have addresses substituted as appropriate so that the external site knows only of the address of the NAT firewall and can’t reach the hidden computers, appliances and devices without the firewall’s active cooperation. This way the many computers in the office are hidden from any probes originating from the Internet.

Internet Security
A firewall is an inter-network security appliance that is designed to intercept and process all incoming protocols, ports and service requests unless otherwise noted, in conformance with some enterprise security policy. The simplest of these is the packet forwarding firewall that filters traffic on the basis of direction, protocols and port numbers. Ports are used in the transport layer (as TCP or UDP) of the IP protocol suite to name the ends of persistent logical connections with certain port numbers reserved for specific protocols. For example, email servers pass messages on port 25, email clients retrieve email on port 110 or 143. Web browsers generally communicate on port 80 while https occur on port 443. Session Initiation Protocol (SIP) messages are passed through port 5060 or as secure SIP using port 5061. Similarly, H.323 signaling messages are passed through port 1719 and 1720.
### Trivial Firewall Settings for Single Station Inter-Company Video Communications

It is instructive to consider the trivial home office setting. In many small offices or home offices (SOHO) there is only one video communications endpoint so it is not necessary to implement an address manipulating solution that enable complex interactions or reporting services. To support Internet-based inter-company or inter-office communications to and from this endpoint, it is recommended to:

- Assign a dedicated IP address from within the internal address pool to the endpoint.
- Acquire a dedicated IP address for the SOHO router from the Internet service provider. Publish that IP address to the video communications participants.
- Configure the firewall to forward all incoming H.323 and SIP messages to the endpoint.
- LifeSize users: define a minimum of 8 UDP ports and 2 TCP ports in the range port 60000 – 64999 for each of the maximum number of other endpoints in a multiway conference and point the firewall to forward this traffic to the endpoint. A three-way conference from this endpoint needs 16 UDP and 4 TCP ports.
- Polycom users: Ports 1718 with UDP, 1731 with TCP and then allow dynamic use of ports 1024-65535 with both UDP and TCP services.
- TANDBERG users: Ports 970-973 with UDP, Ports 2326-2373 with UDP, Port 2837 UDP and Port 5587 if Multipoint Control Unit (MCU) is present and 5555-55xx TCP, forwarding to the endpoint.

More sophisticated small offices might also have an installed IP PBX server requiring SIP communications to and from the SIP trunking service provider. In these circumstances, it is not appropriate to forward all the SIP and H.323 traffic to the video endpoint so a more sophisticated solution, such as a session border controller, is in order.

As compared to the PC video implementation, the communications industry has to replace this complicated security regime with simple, built-in works-anywhere functionality if there is any hope at enabling broad market deployment. Under no circumstances should trivial implementations require any firewall configuration, let alone the specifications defined here.

### Session Border Controllers & Inter-Company Gateways for IP Video Networks

Session Border Controllers (SBC) provide a specialized real-time communications intermediary service typically at the boundary of IP networks or the enterprise-service provider demarcation point at the edge of a SIP trunking service provider network. They isolate addressing conflicts and assure efficient real-time packet flows without compromising security.
Video Automated Attendants

Figure 4 – Avatars ought to be used in video auto-attendant applications.

Although typically deployed in support of SIP-based telephony networking over IP, SBCs are increasingly finding applicability in SIP and H.323 inter-company video communications applications. These specialized gateway applications provide services such as back-to-back user agent service where signaling and media flow traffic is terminated on each side of the SBC and passed between the internal and external interfaces to overcome addressing issues, H.323-to-SIP signaling gateway services and can provide encryption/decryption service for packets traversing the Internet thereby freeing the endpoint from onerous encryption/decryption processing.

Another gateway-class of network infrastructure, the video automated attendant functions like its VoIP-equivalent. It enables video users from outside the company to access a corporate directory of video users within a centralized architecture and initiate an ad hoc video communication. Visitors see and sometimes hear a message, peruse the corporate directory and select the person or room that they’d like to video with. The auto-attendant then hands off the session onto the appropriate endpoint with corporate standards for bandwidth and messaging.

When used in conjunction with the SBC functionality, the automated attendant maintains consistency with corporate standards for addressing since the SIP registry/H.323 gatekeeper are aware of the online status and dynamic IP address of all internal users and that information is not shared with incoming sessions.

Virtual Waiting Rooms

A similar approach for scheduled inter-company video meetings involves the deployment of a MCU in the enterprise De-Militarized Zone (DMZ) where each video-authenticated employee in the enterprise is assigned a virtual video meeting room, just as they might be assigned an audio conference bridge ID and moderator password. The MCU supports two (or more) Ethernet interfaces where one connects to the public Internet and the other conforms to the enterprise network. Incoming participants are authenticated at the MCU and electronically ushered into a virtual waiting room where they authenticate themselves and listen to music while perhaps viewing the upcoming meeting agenda if the organizer had published it to the virtual waiting room. When the organizer is ready to proceed, they authenticate themselves to the MCU and all the meeting participants are bridged together.

Telepresence Interoperability

System-to-system interoperability is not as simple as implementing standard codecs for audio and video presentation and transmission. In legacy video conferencing implementations, single cameras and single screen presentations are quite common. Therefore, interoperability involves only a few degrees of freedom for each critical dimension of the communications path.
In telepresence systems however, many more degrees of freedom need to be factored into the interoperability equation. Figure 6 on the next page shows the operating attributes of six commercially available systems. As you can see, the basic assumptions about which camera should be shown on which screen, and at what relative size and so on are important to delivering on the user expectation in an inter-company telepresence session. Frequently, systems may be ‘inter-operable’, but they may only be able to connect a single screen while losing high definition, spatial acoustics and the ability to collaborate on data.

![Eye-Line Diagram](image)

**Figure 5 – The angle between the line of the camera capturing the image of a participant and the eye position of the person they’re speaking to on the monitor is the eye-line, which needs to be as close to 0° as possible for the most natural experience.**

When the CFO decides she would like to conduct an inter-company telepresence session and asks you to make it happen, the answer may hinge on the level of system-to-system interoperability between disparate telepresence suites. Even when the network challenges are overcome, the quality of experience might be considerably lower than end-users are accustomed to when connected with like-systems. The endpoints from different telepresence vendors have different assumptions around the number and placement of cameras, the geometries of monitors and the availability, location and quality of speakers.
Figure 6 – Interoperability of six commercially available systems.

BrightCom Lumina Telepresence L37
Three 37” screens and a three camera array over the center screen. Proprietary H.264 codec with support SIP.

Digital Video Enterprises
Tele-Immersion Room
Single camera, single codec located at eye-level behind beam splitter. Uses standards-based video conferencing endpoint as the engine.

Polycom RPX 400 Series
Four pencil sized fixed cameras mounted behind the screen at eye-level, four 4’x4’ rear projection video wall segments. H.264 standards based codecs.

Cisco CTS 3000
Center Mounted 3 Camera Array, proprietary codec;3 flat screen monitors, 3 position spatial audio, interoperable with traditional video conferencing via MCU.

LifeSize Conference 200
Three cameras each positioned below or above each monitor, 3 flat screen monitors, H.264 standards-based video conferencing compliant.

Teliris VirtuaLive
Single moveable camera over each screen with 2-5+ flat panel monitors depending on configuration. Proprietary H.264 SVC codec interoperable through gateway.
That’s because telepresence interoperability goes beyond being able to connect codec to codec and passing video streams. The magic of telepresence is creating an experience that as closely as possible replicates being in the same physical space. This experience is the combination of many tightly engineered factors including: eye-line and spatial acoustics where the speaker closest to the speaker’s image plays her spoken audio stream so that the direction of the sounds of the person speaking are consistent with the image of the person speaking.

Table 7 on the next page provides observations about the interoperability offsets associated with each of two-vendor telepresence sessions.

Video conferencing interoperability is a simpler challenge since it is something that the endpoint vendors have been working on for a decade or more, and since the number of screens and audio inputs is greatly reduced, often to one each. Even two-monitor systems typically display the near and far ends on each monitor as a default, with the far end and an H.239 data display available as the next-to-default setting. In addition to the much simpler expectation, endpoint vendors have also been quick to exploit new monitor technologies capable of 720p or 1080p HD presentation, and deployed codec electronics and software that can really take advantage of the H.264 standard for a crisp visual experience.

In audio terms, the improvements in audio sampling and compression from the digital music industry associated with Advanced Audio Coding (AAC) take audio treatments way beyond the telecom assumptions in the old standby G.711 and G.729 techniques. These new implementations have paved the way for significantly superior experiences over the classic Standard Definition and telecom audio treatments, but negotiate with the legacy device to the highest common denominator.
Table 7 – Telepresence interoperability offsets for a range of leading market participants.

This chart features self-reported interoperability information from each vendor represented in the 1st column and each vendor’s answers are represented across their row. Each vendor along the top row was invited to participate and some declined for a variety of reasons. This chart is intended to help telepresence managers understand the issues in connecting to disparate systems and is not intended to be an authoritative guide. It doesn’t contain information on a variety of systems especially single screen systems and some vendors are not represented at all.

<table>
<thead>
<tr>
<th>Telepresence Group System</th>
<th>Screen Capabilities</th>
<th>BrightCom Lumina 37</th>
<th>Cisco CTS 3000 &amp; 3200</th>
<th>RVE TeleImmersion Room</th>
<th>Polycom RPX 200 Series</th>
<th>LifeSize Conference 200</th>
<th>Major High Definition Meeting Room</th>
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<tbody>
<tr>
<td><strong>BrightCom Lumina 37</strong></td>
<td></td>
<td>Can It Call / Answer: Yes / Yes - see caveat</td>
<td>Max Resolution / FR: CIF / 30 through gateway</td>
<td>Audio Fidelity: G-722 through gateway</td>
<td>Max Resolution / FR: CIF / 30 through gateway</td>
<td>Audio Fidelity: G-722 through gateway</td>
<td>Can It Call / Answer: Yes / Yes / see caveat</td>
</tr>
<tr>
<td>Lumen Telepresence Series - Linea System: L7 (modular), life/real room, L8 (customized fixed room) - 10ft Panel/Unis, 3 Cameras Fixed Array, Over Camera Screen, HD 1080i 60fps, 5ft wideband audio, 2x3 Telepresence participants, Data and video displayed and automatically adjusted on any of three screens.</td>
<td>Can It Call / Answer: Yes / Yes Max Resolution / FR: 1080p/30</td>
<td>Spatial Audio: No</td>
<td>TP Multipoint/60 Frames: N/A</td>
<td>Spatial Audio: No</td>
<td>TP Multipoint/60 Frames: N/A</td>
<td>Data Collaboration: N/A</td>
<td>Can It Call / Answer: Yes / Yes Max Resolution / FR: 1080p/30</td>
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<td><strong>LifeSize Conference 200</strong></td>
<td>1080p 30 fps, 720p 60 fps, 4 cameras + 0.125x data, LifeSize phone 4 minutes and placement is dealer responsibility, H.264, AAC-LC</td>
<td>Can It Call / Answer: Yes / Yes Max Resolution / FR: 1080p30</td>
<td>Audio Fidelity: G-722</td>
<td>Spatial Audio: No</td>
<td>TP Multipoint/60 Frames: N/A</td>
<td>Data Collaboration: N/A</td>
<td>Can It Call / Answer: Yes / Yes Max Resolution / FR: 1080p30</td>
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<td>2x3 Rear Projection Video Wall Segments (3 ft x 3 ft), EyeConnect camera, H.264, content monitors, built in controls. Supports HD 1080i 60fps and HD 720p 60fps, supports 22 kHz wideband audio.</td>
<td>Can It Call / Answer: Yes / Yes Max Resolution / FR: CIF through gateway</td>
<td>Audio Fidelity: G-722 (3.4kHz)</td>
<td>Max Resolution / FR: CIF / 30 through gateway</td>
<td>Audio Fidelity: G-722 (3.4kHz)</td>
<td>Max Resolution / FR: CIF / 30 through gateway</td>
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<td>Can It Call / Answer: Yes / Yes Max Resolution / FR: CIF through gateway</td>
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<tr>
<td><strong>Polycom RPX 200 Series</strong></td>
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<td>Can It Call / Answer: No / No Not directly, only through gateway</td>
<td>Max Resolution / FR: CIF through gateway</td>
<td>Audio Fidelity: G-722 through gateway</td>
<td>Max Resolution / FR: CIF through gateway</td>
<td>Audio Fidelity: G-722 through gateway</td>
<td>Can It Call / Answer: Yes / Yes Max Resolution / FR: CIF through gateway</td>
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<tr>
<td>2x3 Rear Projection Video Wall Segments (3 ft x 3 ft), EyeConnect camera, H.264, content monitors, built in controls. Supports HD 1080i 60fps and HD 720p 60fps, supports 22 kHz wideband audio.</td>
<td>Can It Call / Answer: / Max Resolution / FR: CIF through gateway</td>
<td>Audio Fidelity: G-722 through gateway</td>
<td>Max Resolution / FR: CIF / 30 through gateway</td>
<td>Audio Fidelity: G-722 through gateway</td>
<td>Max Resolution / FR: CIF / 30 through gateway</td>
<td>Audio Fidelity: G-722 through gateway</td>
<td>Can It Call / Answer: Yes / Yes Max Resolution / FR: CIF through gateway</td>
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<table>
<thead>
<tr>
<th>Product Name</th>
<th>Audio Fidelity</th>
<th>Spatial Audio</th>
<th>Data Collaboration</th>
<th>Max Resolution/FR</th>
<th>Can It Call / Answer</th>
<th>TP Multipoint/# of Streams</th>
<th>Caveats</th>
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<tr>
<td>TANDBERG T3</td>
<td>G.722</td>
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<td>Yes</td>
<td>1080p 30fps</td>
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<td>720p 30fps</td>
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<td>Siren 14 (14kHz)</td>
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<td>TP Multipoint</td>
<td>AAC-LC</td>
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<td>Telepresence Group</td>
<td>System</td>
<td>BrightCom Lumina 37</td>
<td>Cisco CTS 3000 &amp; 3200</td>
<td>JVE TeleImmersion Room</td>
<td>LifeSize Conference 200</td>
<td>Megah High Definition Meeting Room</td>
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<td>Polycom RPX 400</td>
<td>Series</td>
<td>4 rear projection video wall segments (16 feet), EyeConnect technology, 4-in-screen, EyeConnect camera, H.264, content monitors built into tables, supports HD 1080p 30fps and HD 720p 60fps, supports 224/36 wideband audio.</td>
<td>Can it Call / Answer: No / No directly, only through gateway Max Resolution/F.R.: 1080p 30fps Audio Fidelity: G.711 (3.4kHz) through gateway Spatial Audio: No TP Multipoint/Ref Streams: Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes / Yes TP Multipoint requires MCU</td>
<td>Can it Call / Answer: Yes / Yes Max Resolution/F.R.: 720p 30fps Audio Fidelity: N/A through gateway Spatial Audio: No TP Multipoint/Ref Streams: Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes, using IL239 Caveats: TP Multipoint requires MCU, we tested with RMS 2000</td>
<td>Can it Call / Answer: Yes / Yes Max Resolution/F.R.: 720p 30fps Audio Fidelity: N/A through gateway Spatial Audio: No TP Multipoint/Ref Streams: Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes, using IL239 Caveats: TP Multipoint requires MCU, we tested with RMS 2000</td>
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<td>Polycom TPX &amp; ATX 300 Series</td>
<td>3 x 16-inch flat panel monitors, fixed array camera, over center screen, H.264, content monitors can be built into tables, supports HD 1080p 30fps and HD 720p 60fps, supports 224/36 wideband audio.</td>
<td>Can it Call / Answer: No / No directly, only through gateway Max Resolution/F.R.: 1080p 30fps Audio Fidelity: G.711 (3.4kHz) through gateway Spatial Audio: No TP Multipoint/Ref Streams: Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes / Yes TP Multipoint requires MCU Caveats:</td>
<td>Can it Call / Answer: Yes / Yes Max Resolution/F.R.: 720p 30fps Audio Fidelity: AAC-LC Spatial Audio: No TP Multipoint/Ref Streams: Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes / Yes Caveats:</td>
<td>Can it Call / Answer: Yes / Yes Max Resolution/F.R.: 720p 30fps Audio Fidelity: AAC-LC Spatial Audio: No TP Multipoint/Ref Streams: Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes / Yes Caveats:</td>
<td>Can it Call / Answer: Yes / Yes Max Resolution/F.R.: 720p 30fps Audio Fidelity: AAC-LC Spatial Audio: No TP Multipoint/Ref Streams: Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes / Yes Caveats:</td>
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<td>TANDBERG T3</td>
<td>3 x 16-inch flat panel monitors, fixed array camera over each monitor, H.264, 4 integrated 22” presentation User interface displays on the table, supports 1080p30 and 720p60, AAC-LC Directional audio</td>
<td>Can it Call / Answer: Yes / Yes directly, only through gateway Max Resolution/F.R.: 1080p 30fps Audio Fidelity: G.711 (3.4kHz) through gateway Spatial Audio: No TP Multipoint/Ref Streams: Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes / Yes TP Multipoint requires MCU Caveats:</td>
<td>Can it Call / Answer: Yes / Yes Max Resolution/F.R.: 720p / 30fps Audio Fidelity: AAC-LC Spatial Audio: No TP Multipoint/Ref Streams: Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes / Yes Caveats:</td>
<td>Can it Call / Answer: Yes / Yes Max Resolution/F.R.: 720p / 30fps Audio Fidelity: AAC-LC Spatial Audio: No TP Multipoint/Ref Streams: Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes / Yes Caveats:</td>
<td>Can it Call / Answer: Yes / Yes Max Resolution/F.R.: 720p / 30fps Audio Fidelity: AAC-LC Spatial Audio: No TP Multipoint/Ref Streams: Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes / Yes Caveats:</td>
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<td>Telsis Express &amp; Virtualize Telepresence</td>
<td>1.2, 3 or 4 x 68-inch flat panel monitors with cameras mounted atop each, H.264, NOTE: Telsis Express comes with a maximum of three screens. Virtualize is the flagship product that provides an option for up to 6 screens.</td>
<td>Can it Call / Answer: Yes / Yes directly, only through gateway Max Resolution/F.R.: 720p / 30fps Audio Fidelity: G.711 (3.4kHz) through gateway Spatial Audio: No TP Multipoint/Ref Streams: Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes / Yes Caveats:</td>
<td>Can it Call / Answer: Yes / Yes directly, only through gateway Max Resolution/F.R.: 1080p 30fps Audio Fidelity: G.711 (3.4kHz) through gateway Spatial Audio: No TP Multipoint/Ref Streams: Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes / Yes Caveats:</td>
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<td>Telepresence Group System</td>
<td>Polycom RPS 200 Series</td>
<td>Polycom RPS 400 Series</td>
<td>Polycom TPS 300 Series</td>
<td>LANDBERG T3</td>
<td>TelePresence Digital Presence</td>
<td>TelePresence ViralLaw and Express</td>
<td>TelePresence Tech TP 4000</td>
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<td><strong>Polycom RPS 400 Series</strong></td>
<td><strong>Can It Call / Answer: Yes / Yes</strong> Max Resolution/FR: / HD 1080p 30fps or HD 720p 60fps Audio Fidelity: Siren62 (22kHz) Spatial Audio: Yes TP Multipoint/# of Streams: / Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes, using H239 Cava...</td>
<td><strong>Can It Call / Answer: Yes / Yes</strong> Max Resolution/FR: / HD 1080p 30fps or HD 720p 60fps Audio Fidelity: Siren62 (22kHz) Spatial Audio: Yes TP Multipoint/# of Streams: / Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes, using H239 Cava...</td>
<td><strong>Can It Call / Answer: Yes / Yes</strong> Max Resolution/FR: / HD 1080p 30fps or HD 720p 60fps Audio Fidelity: Siren62 (22kHz) Spatial Audio: Yes TP Multipoint/# of Streams: / Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes, using H239 Cava...</td>
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<td><strong>Can It Call / Answer: / Max Resolution/FR:</strong> / HD 1080p 30fps or HD 720p 60fps Audio Fidelity: Siren62 (22kHz) Spatial Audio: Yes TP Multipoint/# of Streams: / Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes, using H239 Cava...</td>
<td><strong>Can It Call / Answer: / Max Resolution/FR:</strong> / HD 1080p 30fps or HD 720p 60fps Audio Fidelity: Siren62 (22kHz) Spatial Audio: Yes TP Multipoint/# of Streams: / Each codec receives one stream from MCU which can include up to 16 CP images Data Collaboration: Yes, using H239 Cava...</td>
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**Caveats:**
- Polycom RPX 400 **Can It Call / Answer:** through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway
- Polycom RPX 200 **Can It Call / Answer:** through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway
- Polycom TPS 300 **Can It Call / Answer:** through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway
- LANDBERG T3 **Can It Call / Answer:** through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway
- TelePresence Digital Presence **Can It Call / Answer:** through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway
- TelePresence ViralLaw and Express **Can It Call / Answer:** through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway
- TelePresence Tech TP 4000 **Can It Call / Answer:** through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway Can It Call / Answer: through gateway

### Table Explanation:
- **Polycom RPS 200 Series:**
  - **Can It Call / Answer:** Yes / Yes
  - Max Resolution/FR: / HD 1080p 30fps or HD 720p 60fps
  - Audio Fidelity: Siren62 (22kHz)
  - Spatial Audio: Yes
  - TP Multipoint/# of Streams: / Each codec receives one stream from MCU which can include up to 16 CP images
  - Data Collaboration: Yes, using H239 Cava...

- **Polycom RPS 400 Series:**
  - **Can It Call / Answer:** Yes / Yes
  - Max Resolution/FR: / HD 1080p 30fps or HD 720p 60fps
  - Audio Fidelity: Siren62 (22kHz)
  - Spatial Audio: Yes
  - TP Multipoint/# of Streams: / Each codec receives one stream from MCU which can include up to 16 CP images
  - Data Collaboration: Yes, using H239 Cava...

- **Polycom TPS 300 Series:**
  - **Can It Call / Answer:** Yes / Yes
  - Max Resolution/FR: / HD 1080p 30fps or HD 720p 60fps
  - Audio Fidelity: Siren62 (22kHz)
  - Spatial Audio: Yes
  - TP Multipoint/# of Streams: / Each codec receives one stream from MCU which can include up to 16 CP images
  - Data Collaboration: Yes, using H239 Cava...

- **LANDBERG T3:**
  - **Can It Call / Answer:** Yes / Yes
  - Max Resolution/FR: / HD 1080p 30fps or HD 720p 60fps
  - Audio Fidelity: Siren62 (22kHz)
  - Spatial Audio: Yes
  - TP Multipoint/# of Streams: / Each codec receives one stream from MCU which can include up to 16 CP images
  - Data Collaboration: Yes, using H239 Cava...

- **TelePresence Digital Presence:**
  - **Can It Call / Answer:** Yes / Yes
  - Max Resolution/FR: / HD 1080p 30fps or HD 720p 60fps
  - Audio Fidelity: Siren62 (22kHz)
  - Spatial Audio: Yes
  - TP Multipoint/# of Streams: / Each codec receives one stream from MCU which can include up to 16 CP images
  - Data Collaboration: Yes, using H239 Cava...

- **TelePresence ViralLaw and Express:**
  - **Can It Call / Answer:** Yes / Yes
  - Max Resolution/FR: / HD 1080p 30fps or HD 720p 60fps
  - Audio Fidelity: Siren62 (22kHz)
  - Spatial Audio: Yes
  - TP Multipoint/# of Streams: / Each codec receives one stream from MCU which can include up to 16 CP images
  - Data Collaboration: Yes, using H239 Cava...

- **TelePresence Tech TP 4000:**
  - **Can It Call / Answer:** Yes / Yes
  - Max Resolution/FR: / HD 1080p 30fps or HD 720p 60fps
  - Audio Fidelity: Siren62 (22kHz)
  - Spatial Audio: Yes
  - TP Multipoint/# of Streams: / Each codec receives one stream from MCU which can include up to 16 CP images
  - Data Collaboration: Yes, using H239 Cava...
Collaboration Tools
For most video conferences or telepresence sessions, it’s not enough to see and hear the remote participants. It’s increasingly important to be able to share PowerPoints, documents, high resolution graphics and movies. Collaboration tools and services such as data sharing, interactive white boards, high resolution image sharing and document cameras, are increasingly an important part of any effective telepresence system operation. Users need the telepresence technology to support the artifacts and collaboration processes that they would normally need to participate in during face-to-face meetings.

Most of these collaboration tools use the ITU’s 2003 standard, H.239, which specifies the method for multi-vendor data-sharing as an integral part of the communications media flow between participating endpoints. In practice, video conferencing sessions with less than 384 kbps of bandwidth available experience a severely degraded video, audio and or data-sharing presentation. Some telepresence vendors integrate a web conferencing server with the telepresence system enabling not only high definition document or screen sharing, but also the control of the telepresence session from within the web conference screen.

Interactive Whiteboards
For collaborations with partners, vendors and customers where a higher degree of interactivity or shared experience is appropriate technologies such as interactive white boards where you draw on the white board in the telepresence room in Berlin and the results appear on the interactive white board in San Jose are appropriate. The San Jose user can then use their interactive white board to make edits to the drawings and share the results with Berlin. However, it is usually a requirement that both telepresence rooms need to be equipped with the same interactive system, a dedicated collaborative computer and be accessible over the IP network.

A popular default approach is the simultaneous execution of a web collaboration session. Of course, this introduces further complexity to the meeting participants who must bring their PCs to the telepresence session, exchange meeting invitations and then independently authenticate in to the session.

Visualizers and Document Cameras
The ceiling visualizer (an optional HD camera mounted on the ceiling to present documents and physical objects), is one in a series of video input devices that often times needs to be factored into interoperability plans for inter-company sessions. Support for document camera input streams is not entirely the same approach from one vendor to another, let alone one organization to another. So, telepresence managers need to be sensitive to the capture and presentation

Activision, a leading video game producer (Call of Duty, Guitar Hero, Tony Hawk series) uses HD video conferencing to accelerate video game development enabling faster QA cycles. Remote QA engineers are able to share their experience with the game developers without either party leaving their offices, or the software load leaving the development studio.
requirements of both their company telepresence and video conferencing systems and those of customers, partners and suppliers that they may be expected to conduct inter-company telepresence sessions with.

**Recordings**
The ability to record conferences is a handy feature. Depending on your industry, it may even be a regulatory requirement. In some industries such as financial services sector and in some countries such as the United Kingdom, all electronic communications - including video communications - are required to be recorded and later made available in regulatory investigations. Regardless of the legal requirement, there are merits in recording sessions even if it’s not legally required in your industry or state. That’s because the communication can then be edited, replayed and otherwise improved to satisfy training, safety or quality needs. Recording sessions can be played back for colleagues that couldn’t make the meeting but need to hear and see the meeting, as part of training courses, litigation defense, remote casting calls, deposition and to simplify the communications required with rolling software development initiatives across multiple time zones where the recorded video conference at the start and stop of each day leaves a recorded status report for the next team.

Recordings of inter-company meetings involve privacy and legal sensitivities. Some jurisdictions require the permission of only some participants, while in other jurisdictions it is required to gain the permission of all participants.
Best Practices in Inter-Company Telepresence Operations

No report or presentation can credibly claim to deliver all of the industry best practices in a field as diverse and dynamic as telepresence and video communications, and this handbook is no exception. For your consideration and professional review we present several best practices for an inter-company communications framework.

1. Strategic Review of Video Communications
Thinking of video communications as a strategic service within the company puts a greater emphasis on the strategic planning of the service. It also puts emphasis on the investment profile and the staffing of the video communications management function. An independent audit of the video communications resource in the enterprise is the best place to begin the strategy development process. This audit procedure should articulate the location, condition and standards for the company’s video infrastructure, endpoints, administrators and key users. Randomly checking processes and resources through onsite inspection and interviews can determine the confidence in the data gathered as the baseline for the operation.

Higher quality, greater numbers of endpoints, sessions and length of sessions, and significant growth in inter-company video communications are major industry trend lines. Sharing the audit results and mapping them onto these industry trend lines in video communications have implications for the many assumptions in the original design and deployment of infrastructure. This process will highlight those assumptions that no longer fit with the overall implementation expectations and goals within the company.

For example, a common practice has been in the past to install MCUs at the corporate HQ. After all, most communication flows are from the HQ to the regional sites and the regional sites to the HQ. However, in an inter-company telepresence setting, this may no longer be valid. Instead, a lower cost, and ultimately higher performance operational practice would indicate that housing the bridge and other infrastructure ‘in the cloud’ is more effective. This would involve relocating your video and VoIP servers and infrastructure into a carrier-neutral collocation facility preferably at a telco-hotel. You can connect to various video, voice, data network and

Recommendation:
• Conduct an independent audit of your video communications capabilities, infrastructure, practices and operations.
• Map the audit results onto the trend lines for the industry and reconsider the basic assumptions inherent in endpoints, network, operations, infrastructure and administration.
• Develop and present strategic plan. Reset assumptions about operations and investments.
exchange service providers using cross-connects versus pulling multiple dedicated T1-E1/T3-E3/Ethernet circuits to your HQ, which may or not be available but most certainly will be expensive.

Managing those resources remotely with aid of the Video Managed Service Provider (VMSP) connected to a telepresence and video conferencing exchange provider will drive efficiencies, reduce bandwidth bottlenecks and increase service availability than if the infrastructure was centralized at HQ.

While most telepresence rooms establish a business class consistency of quality in capture, distance to camera and screen, lighting, and acoustic wall treatments, classic video conferencing rooms do not. Sometimes the camera and monitor are placed at the end of a boardroom table, sometimes in the corner, sometimes across the table. Standardizing or minimizing the variations in a room configuration is a boost to user confidence and user satisfaction.

For example, in one client, all camera presets are standardized so that 1 is the wide shot of the room, 2 is the head of the table, 3 is left speaker position and 4 is right speaker position. All rooms are configured with speaker phones in the center of the table, speed dial 1 is the help desk and VGA cable for H.239 data presentation on the right side of the table. This simplifies the user experience in much the same way that standard invocation of telephone features (‘76’ is delete message command in a popular voicemail application) improves personal productivity.

And, in another circumstance, the company’s implementation of the video auto attendant server forwards all problem sessions and or misdialed calls to the on-duty video engineer’s endpoint for immediate attention. This best practice impresses video visitors with its responsiveness and accelerates repeat use for inter-company visual collaboration.

2. To Converge or Not To Converge
Enterprises have historically implemented video communications within the constraints of their ongoing budget for connectivity services – they’ve typically implemented the highest speed and most efficient network services that their budgets can tolerate in some futile attempt to balance cost with quality. The power of the immersive experience however, turns this old practice on its ear.

Converging real-time voice traffic with best efforts data traffic has been an initiative within enterprise networking for the better part of the past decade. It’s driven carriers, bandwidth budgets and equipment vendors in a race for the fastest, cheapest and highest performance capabilities for processing, managing and troubleshooting these dynamic, mission-critical environments. The recent changes in communications habits and technologies promises to reset this strategy and drive video onto a new, particularly high performance WAN, independent of the converged voice and data environment.

Off-enterprise-network mobile communications is increasing as is video communications use. Telepresence 2009 report by Brockmann & Company shows that the frequency of video communication has doubled since 2007. This greater frequency and longer duration of video sessions is coupled with the reduction in enterprise-terminated voice sessions. It is entirely likely that the corporate share of bandwidth allocated for transport of video services exceeds the corporate volume of voice traffic in many organizations.
Some organizations dampen the insatiable appetite for video bandwidth with a corporate-wide constraint on the video service, limiting any one session to a maximum of 384 kbps, even though the lowest cost personal HD video system can easily consume as much as 1,000 kbps in a point-to-point session. In this way, the firm can more easily converge the voice, video and data traffic onto a single enterprise WAN. Yet, there are consequences in terms of the user experience and overall satisfaction with the service.

And, because any one telepresence session uses more bandwidth than most organizations have for all other applications, telepresence facilities often don’t fit in the converged WAN at all. In the short to medium term, the traffic engineering and bandwidth management practices suitable for converging voice and data may not be appropriate for the very high per-session requirements of video traffic.

Instead, leading organizations have implemented specialized video overlay networks for their telepresence and video traffic. Instead of hiring a video-specific WAN management team, they have engaged with video managed service providers to enable the firm to manage video as a strategic service for the enterprise. This way the investment in equipment and infrastructure can best deliver higher productivity and higher business performance and the VMSP can best be held accountable for operational excellence. As part of this initiative, the firm should insist on DiffServ in all network equipment and conduct periodic formal reviews with the VMSP to discuss outages, performance gaps and corrective actions taken or to be taken.

3. Establish an Inter-Company Telepresence Program Champion

As discussed in this report, inter-company telepresence is not easy nor simple. But the benefits are extensive and real, particularly in large organizations where business travel to visit, train or support customers in other large organizations is a major hard cost, soft cost, and opportunity cost reduction target for both firms.

Hiring or developing a Virtual [Inter-Company] Meeting Specialist is a best practice because it aligns responsibility for an initiative with a professional resource that can be held accountable, or that hold others accountable as appropriate. A Virtual Inter-company Meeting Specialist is a dedicated employee whose responsibility would be to coordinate, monitor, measure, and promote inter-company virtual meetings between the organization and vendors, joint venture partners, and customers. They are the focal point and project manager for implementing

Recommendation:

- Move video communications onto the telepresence MPLS WAN.
- Engage a Video Managed Service Provider to assure the highest quality user experience and performance.
- Insist on DiffServ commonalities
- Periodically, and formally review reports on service levels and outages with VMSP.

Recommendation:
Systematic prioritization and focus on the benefits of inter-company telepresence assures that:
- Efforts are rewarded with benefits
- The changes stick
- Success momentum continues to drive the initiative forward
- Lessons learned are applied
On April 22nd, 2010, the Human Productivity Lab will be hosting a conference to help organizations develop an inter-company telepresence business strategy and develop effective virtual meeting specialists. See our ad in this handbook for more. Contact us if you’re interested in developing a custom program for your organization.

The Inter-Company Telepresence & Video Conferencing Handbook

The necessary technological, cultural and organizational changes so that the firm can capture the benefits.

Build the business case for inter-company telepresence by working with the travel accounting department, vendor relations, training and the major accounts manager. Together, you can analyze the business travel to the top ten major customers. Keep in mind that productivity gains from avoiding even local travel are both
time saved in travel avoidance and cash cost to the firm. In one case inter-company telepresence between the Los Angeles Police Department and the City of Los Angeles instead of face-to-face meetings saved thousands of hours sitting on that city’s congested freeways.

With a systematic approach, the specialist can work with the network, operations and business units to overcome all of the hurdles preventing widespread inter-company telepresence. The role has a mentoring responsibility in communications with suppliers and customers who may or may not share the firm’s priority for inter-company telepresence. Picking a manageable number of customers or suppliers in a pilot mode as part of a controlled project assures that the mistakes made in the controlled pilot are not repeated across the entire organization. Appendix B offers sample letters to initiate various dimensions of an inter-company program.

4. Expand Your Network by Reaching Public Rooms

Public room telepresence providers operate or coordinate video-capable rooms for an hourly fee. Earlier this summer, a number of alliances were announced bringing equipment, business hotels and network service providers together. The alliances include:

<table>
<thead>
<tr>
<th>Venue</th>
<th>Telepresence System(s)</th>
<th>Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starwood Properties, Sheraton, Westin, W Hotels</td>
<td>Cisco CTS 3000 &amp; 1300</td>
<td>Tata Communications</td>
</tr>
<tr>
<td>Regus Executive Suites and Virtual Offices</td>
<td>Polycom RPX</td>
<td>Cable &amp; Wireless</td>
</tr>
<tr>
<td>Marriott, JW Marriott, and Renaissance sorts</td>
<td>Cisco CTS 3000</td>
<td>AT&amp;T</td>
</tr>
<tr>
<td>Taj Hotels, Resorts, and Palaces</td>
<td>Cisco 3000</td>
<td>Tata Communications</td>
</tr>
</tbody>
</table>

These relationships bring global networks of rooms of both telepresence and video conferencing capabilities to bear. Top hotel and executive conferencing brands partner with telepresence service providers and equipment vendors to create networks of telepresence systems linking their capstone properties in convenient locations in key cities. Clients can participate in telepresence business conferences on a moments notice, and in many convenient locations from the extensive inventory of thousands of video conferencing rooms or dozens of telepresence facilities at a far lower cost basis than owning and operating their own meeting rooms.

Although most services are marketed as telepresence between suites within an alliance’s inventory which has some business potential, the real opportunity is to expand the range of connection
possibilities to mix enterprise and public rooms. That’s why developing interoperability procedures with these leading public room service providers is such a strong recommendation. It greatly expands the footprint of your video network, expanding the opportunities to avoid travel and thereby accelerate the business, without the cost of owning one more telepresence suite or one more video conferencing room or unit. Users can do inter-company video conferencing or telepresence with customers or suppliers who’s employers don’t have or don’t allow inter-company telepresence but are willing to travel locally to an executive suite, hotel or conference facility to participate in telepresence sessions.

Costs of service are closely associated with consumption, so there’s no fixed cost. Of course public rooms could be used for internal sessions too. In this case, reviewing reports from the public service provider could provide insight on where the company ought to expand its own video service network.

Overall, inter-networking with one or more public room service provider is a great way to expand the potential endpoints that your users can reach, increasing the appeal and utility of the service just as Reed and Metcalfe predicted it would.

5. Leverage Your Travel Management Supplier
Substituting business travel with telepresence sessions can also conveniently be done at the point of sale for travel services. Leading travel management companies are beginning to offer clients the ability to intercept travel reservations and present telepresence or video conferencing alternatives that are lower cost, greener and faster transactions than the typical business trip. In its initial release, these services facilitate intra-company telepresence where the travel management can flag the routes most likely reflecting intra-company trips and access the company’s internal telepresence and video conferencing scheduling resources.

The on-boarding of these services typically involves having the telepresence manager share their room inventory, including their preferred public room service providers. Often the telepresence manager makes available an interface into the company room scheduling capabilities, so that agents and or the web travel portal can book appropriate transactions directly and in real-time. Eliminating any transactional friction is the goal of this initiative, making the substitution of video services for business travel easier.

Recommendation:
Standardizing relationships with selected public room service providers:
• Expands network, increases utility of video services
• Accelerates the business
• Are billed on a per-hour basis
• Provide insight on new potential sites for video services

Recommendation:
Incentivize your travel management agent and travel portal to substitute telepresence and video conferencing for travel:
• Work with your travel management company to develop a program or find a virtual meeting provider
• Make your room scheduling application available to your travel management company
• Internally market the service
As telepresence and video conferencing exchanges and managed service providers become more sophisticated around inter-company telepresence services, you should expect the travel management companies to expand their offerings to book ever-more sophisticated sessions including inter-company sessions and company-public sessions.

6. Integrate Telepresence Into Sales and Customer Support Processes

Begin to integrate telepresence into your company sales processes. Advertise your organization’s telepresence capability in the contact options for your sales organization and include the video auto attendant URI or IP address on company business cards. We recommend that organizations set management goals for appropriate sales representative to conduct some minimum number of sales calls via telepresence or video conferencing each month. Implement methods to measure results and over time raise the goals as achievement becomes a regular practice in the sales organization.

One leading organization, as part of an internal ‘culture adjustment’ program, sent sales professionals travel soaps, bar coasters and little bags of peanuts together with a wallet card highlighting the practices and benefits of video conferencing and the scheduling portal’s URL. The accompanying note expressed sympathy by providing all the goodies they’ll likely miss getting with less travel, but then highlighted the benefits of video conferencing: fewer x-rays and security inspections, less time wasted waiting, less time spent completing travel expense forms, and more time on profitable business and with family.

Product or service failures are inevitable, but they can be great opportunities for creating loyalty and superb customer experiences. Equipping the customer support professionals with personal video conferencing devices and publicizing the capability can go a long way towards implementing a consistently high quality, premium support service for customers that have also invested in video conferencing equipment and inter-company infrastructure.

At least one retailer is equipping stores with eye-level personal telepresence systems that allow product specialists to be concentrated in a national video call center. Expensive and highly knowledgeable product specialists are therefore always available to potential customers to answer questions and win more business.

In larger, more complex product organizations the deployment of video conferencing or telepresence suites for the exclusive use of customer service can give the business customer a more sincere and personal service. And service recovery supported by video conferencing leads to a more loyal customer. Video conferencing is a powerful aid to the support team because the team can be more sensitive in the sharing of the status of the problem resolution process with the affected customer(s), who, likewise, can communicate more information through a video conference than they can in email or over the phone.

**Recommendation:**

*Sales and customer service professionals are always looking for ways to do more, faster:*

- Educate the sales leaders on how intercompany telepresence can make their teams more productive
- Educate external-facing coworkers on video - make them program ambassadors
- Have fun with showing the sales team what’s in it for me (them)
Conclusion

Inter-Company Telepresence and Video Conferencing is a Business Priority

No doubt telepresence and video conferencing services have and will help many thousands of firms reduce cost and improve personal and organizational productivity. Accenture’s connectivity with 31 firms, 600 rooms, and almost 2,000,000 partner employees is a glimpse of the future here today. There aren’t many practices adopted with vigor in the current recession that have environmental benefits, reduce wear and tear on employees, and preserve a firm’s stockpile of cold, hard cash. That makes telepresence and effective visual collaboration a growing phenomenon for business communications in good times and in bad.

For any organization experiencing the effects of higher utilization of video communications services, the enabling of standardized connectivity with public rooms assures an increase in capacity without the usual capital expense. In these circumstances, the public room service provider becomes the ‘overflow’ infrastructure that fiscally tight organizations prefer, where there’s only a bill when utilized. Other best practices recommended include conducting a telepresence and video communications strategic review, developing an inter-company telepresence and video conferencing champion, leverage the company’s travel management supplier to capture video sessions as travel substitutions, integrate video conferencing and telepresence into sales and customer support organizations.

Inter-company telepresence and video conferencing services promise to accelerate the pace at which visual collaboration is changing business practices. Telepresence managers must make sure their organizations are correctly poised to exploit these trends. It’s a matter of capturing the productivity improvements necessary to lead the global economy out of this long and nasty recession.
Appendix A: Security Resources

Cisco

Polycom
Download. Delivering on the Promise of Easy to Use, Secure and Inexpensive Video conferencing in an IP Environment - Solving the Challenges Created by Firewalls and Network Address Translations in a Video conferencing Environment.

RADVISION
Download. Port Security Scopia Solution 7.0, publication 19, June 2009. This document details RADVISION use of TCP, IP, UDP ports throughout the company’s NBU product range.
Appendix B: Sample Letters

Dear [NAME OF XYZ EXECUTIVE],

As you may know, the IT department is evaluating telepresence and visual collaboration solutions that will allow us to deliver training globally. We are also evaluating solutions that will not only connect the corporate headquarters to key XYZ locations around the world but that could also provide vital connections to key vendors, joint venture partners, customers and trading partners.

No doubt that as the airline industry restructures itself (2008 saw the bankruptcy of 25+ airlines globally and the International Air Transport Association announced recently that airlines are projected to lose $12 billion dollars this year) there will be higher ticket prices, fewer non-stop flights, fuller flights and significantly reduced ability for the airlines to efficiently reroute passengers when delays or mechanical problems occur. Business travel will likely get a lot less convenient for doing business, greatly affecting your team’s productivity.

Our telepresence service can help. We are surveying the leaders of the business units within the company to determine what external organizations it would be important and/or critical to have effective telepresence and/or video conferencing connections with to reduce our cost of doing business, improve our productivity and collaborative efforts, particularly as the convenience of air travel is predicted to continue to deteriorate.

If you could please complete this short survey by Friday, it will help us in evaluating the equipment and network options that would best connect us with our key stakeholders, and most likely improve our business faster.

Sincerely,

YOUR NAME, TITLE
EMAIL
TELEPHONE

<table>
<thead>
<tr>
<th>Organization &amp; Contact</th>
<th>Key Location(s)</th>
<th>Customer/Supplier/Partner</th>
<th>Estimated No. of Face-to-face Meetings/month</th>
<th>Importance to Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: Schlumberger, Al Smith, 408-555-1212</td>
<td>Sugar Land TX, Buffalo NY</td>
<td>Supplier</td>
<td>25</td>
<td>Very important</td>
</tr>
</tbody>
</table>
Your company is a key [CUSTOMER/SUPPLIER/PARTNER] in our business and we’d like to take steps to deepen our corporate relationship, reduce both our costs of doing business and limit our environmental impact. Over the past three years XYZ company has invested significantly in our internal network, telepresence and video conferencing implementation. We have reaped substantial benefits to our company, the environment and our employees and now we’d like to expand our network footprint to include the ability to conduct inter-company telepresence and video conferencing with your company.

No doubt face-to-face meetings are a regular part of working with your fine organization and are likely to continue for important joint initiatives. However, our experience has been that we can substitute telepresence and video conferencing services for most of the routine, but important team collaborations. We’d be happy to discuss our success and detailed technical proposal with the appropriate responsible member of your organization.

I would like to introduce our Virtual Meeting Specialist, Ms Francine Venky whose contact details are below. She is best positioned to answer any questions your staff may have and is responsible for facilitating this important initiative here at XYZ. I am also attaching a directory of our telepresence and visual collaboration assets and contact information to share with your IT staff and appropriate administration professionals.

Sincerely,

[HIGHEST RANKING APPROPRIATE EXECUTIVE FOR CUSTOMER/SUPPLIER/PARTNER]

XYZ Corporation
Dear Partners,

The XYZ Corporation uses telepresence and visual collaboration internally to save time, money, and reduce the wear and tear of travel on our valuable employees. We invite our partners, vendors, and customers to connect with us to improve our ability to collaborate and reduce the shared costs of our relationship. We have these capabilities in all of our major facilities and business units including: Executive Management, Sales, Research and Development, Manufacturing, and even offer training and certification on our entire line of oil field redevelopment products and services.

Virtual Meeting Coordinator: Ms. Francine Venky
123 Oil Patch Way (888) 555-1234, fvenky@xyzservices.com
Sugar Land, Texas 77478 http://www.xyzservices.com/telepresence

Capabilities Include:
Telepresence Group System – Brand A – 18 Seats,
- Interactive Whiteboard, Visualizer, Brand A Data Collaboration, Webconferencing
Telepresence Group System – Brand B – 6 Seats,
- Brand B Data Collaboration, Webconferencing
HD Videoconferencing System – Brand C – 24 Seat Classroom
- Interactive Whiteboard, Visualizer, Brand C Data Collaboration, Webconferencing
HD Videoconferencing System – Brand C – 4-8 Seat Meeting Room
- Interactive Whiteboard, Visualizer, Brand C Data Collaboration, Webconferencing

Please Note: We also have the ability to offer real-time support and troubleshooting via video on any piece of equipment that we sell or service. We can connect with your employees on rig or platform and use handheld video units to both examine issues in the field and/or troubleshoot/illustrate fixes and work-arounds from our testing & development lab in Sugar Land or our manufacturing facility in Victoria, Texas.

Technical: Our telepresence and video assets are managed by VMSP Corp. and you can reach their Network Operation Center at (888) 555-4321. VMSP will coordinate connectivity and interoperability issues and do a test call to your telepresence system prior to our first scheduled virtual meeting to ensure a quality connection.

Network: We operate a dedicated IP video overlay network with VNSP Corp and are “on-net” with everyone else on the VNSP Corp network. We also subscribe to a telepresence exchange service with TESP Corp and can establish QoS connections with hundreds of different networks through their exchange. We can also reach ISDN video endpoints as well.

Multi-point Capabilities: We can host multi-site telepresence and videoconferencing calls with dozens of sites.
Telepresence and Video By Business Unit

Sales – Every Sales Rep has a personal video number and can set up telepresence meetings in any of our dedicated rooms. If you have general sales questions or to reach an engineer 24 x 5 Monday-Friday via video:
- videosales@xyzservices.com  Video Sales IP: 116.12.45.126 or E.164: 281-555-1234

Customer Support – You can reach our global customer support desk at our testing & development lab in Sugar Land via video 24 x 7 x 365
- Videosupport@xyzservices.com  IP: 116.12.45.125 or E.164: 281-555-1235

Training and Certification – We offer regularly scheduled training and certification classes via telepresence and video. You can find the 2010 schedule here: www.xyzservices.com/training. You can also call Jane Smith @ (888) 555-1236 to schedule a private training session or certification class.
- videotraining@xyzservices.com IP: 116.12.45.127 or E-164: 281-555-1236

Telepresence and Video at Regional Offices
Al-Khobar, Saudi Arabia
Telepresence Group System - Brand A, 18 Seat Classroom
-Interactive Whiteboard, Visualizer, Brand A Data Collaboration, Webconferencing
• Site Contact & Scheduling: ALKVideoScheduling@xyzservices.com or +966 3 555 1234
Appendix C: The Inter-Company Telepresence Glossary

AAC – advanced Audio Coding is standardized by the ISO as the lossy compression technique for digital audio. It is designed to supercede MP3.

Audio Compression - the encoding of audio information so that it uses less bandwidth or storage space on digital media or in transmission while retaining audio quality. Popular examples of audio compression techniques include G.729 and AAC.

Bandwidth – the amount of data a communications link can transmit in a given period of time. Measured in bits per second.

Beam splitter - an optical device that splits a light source into two beams. This device is frequently used in telepresence deployments to better replicate direct eye contact between remote participants.

Camera Platform - a device for mounting a camera on, usually movable, but can also describe a platform that uses an exacting placement. Camera platforms can use simple pan and tilt mechanisms, or have an additional roll axis to increase anthropomorphism, depending on the demands of the application.

Camera Convergence - situation where all available camera foci aim their gaze onto one point in 3D space. Think of multiple human eyes focusing on a single object moving nearer and further away from the group.

Camera Divergence – situation where all available cameras views appear as if they emanate from a single point in 3D space. Picture a 360 degree panoramic image created by ten cameras attached to single pole in the center of a large room.

Codec - a portmanteau of en-CO-ding and DEC-oding to represent a hardware device or software algorithm that encodes and/or decodes a signal for transmission, storage or encryption.

Converged Network – a telecommunications wide area network where an array of applications and traffic types are simultaneously supported.

CPE or “customer premise equipment” - networking and telecommunications systems typically purchased for customer use and located at the customer's location.

Concierge Service - in telepresence conferencing deployments, Concierge Services refers to a class of service where employees of a managed service provider assist telepresence session
participants with scheduling, operating, and necessary adjustments during the meeting. In some implementations they are present in silent observation mode and can be made available by asking for the ‘operator.’

**DS3 or T3** – digital signal level-3 T-carrier is a US telecommunications standard for 44.736 Mbps transmission.

**E1 or level 1 E-carrier** - the international standard (not in Japan, USA, Canada and some Caribbean countries) for transmission circuits operating at 2.048 Mbps throughput.

**E.164 Numbering** – the ITU-T standard for the worldwide telephone numbering plan. Also used for ISDN services.

**Endpoint** – a camera, microphone, speaker, codec, and environment at one end of the telepresence transmission path. A typical telepresence session connects the cameras, the microphones, the monitors, the speakers, codecs, and environments between two sites.

**Environmental Telepresence** – a telepresence solution where the physical setting of a meeting room or classroom is precisely modeled with the intent of simulating the experience of actually being there. Techniques include creating mirrored spaces in multiple locations, architectural elements that add to the illusion that both sides of a telepresence session create a single space, and studio quality lighting and acoustics.

**Field Maintenance** – a service agreement where covered equipment is repaired, replaced, or serviced on the customer’s site.

**G.711** – an ITU-T standard for voice communications sampling at 8000 samples/second, with logarithmic quantization to define each sample in 8 bits, generating a 64 kbps bit rate. G.711 is widely used in telecom networks.

**G.729** - an ITU-T standard for audio compression capable of 8 kbps or in some applications as low as 6 kbps.

**Gateway** – a device that interfaces between disparate networks. In telepresence implementations, gateways are necessary to connect telepresence systems to standard definition IP video conferencing systems or to legacy IP video conferencing systems.

**H.239** – an ITU-T standard for computer screen sharing.

**H.263** – a ITU-T standard for video compression.

**H.264** – also known as AVC and MPEG-4, is standard in video communications that provides high quality video at very low bit rates. The algorithm uses advances in frame prediction, color prediction, motion and compensation techniques.
H.323 – an ITU-T standard for multimedia communications over any packet network.

Immersive - a term used to refer to certain types of sensory reproduction systems used in VR and Telepresence where the user actually becomes or has the feeling of being part of the experience, as opposed to observing the experience. For example, a user using a Head Mounted Display or a Virtual Reality CAVE system would be immersed in the experience, whereas someone viewing a remote location on a simple computer monitor would not be.

Interactive Whiteboard - a large interactive display showing the computer’s desktop on a board’s surface, where users control the computer using a stylus or by physically touching the surface.

ISDN - Integrated Services Digital Network refers to an ITU-T standard for circuit-switched digital communications in 64 kbps increments of a Bearer service. Services are available in Basic Rate Interface of 2B+D where D is a 16 kbps data channel for signaling for 128 kbps, and in Primary Rate Interface of 23B+D where D is a 64 kbps data channel for signaling in North America and 30B+2D in Europe.

ISDN-IP Gateway - a device that converts media traffic, addressing and signaling information from an ISDN network to an IP network and vice-versa.

Jitter - variability in the arrival rate of one packet as compared to the next. Usually measured in ms.

Latency - also known as delay; the short period of delay that occurs when devices must convert or decode each other’s encoded signals. Typically measured in milliseconds.

LCD - Acronym for Liquid Crystal Display, a low power type of display found on a myriad of devices from pocket calculators and digital watches to laptop computers and head mounted displays.

Lumen – the unit for the perceived power of light. The light output of projectors are rated by their lumen output.

Meeting Governance - refers to the ability to schedule meetings and telepresence or video conferencing rooms with disparate organizations while maintaining organizational security. For example it is helpful to know that Company Y’s 5th floor conference room is available for a call on Monday, January 5th. It is not helpful to know that the executive conference rooms at Company Y and Company are both booked at the exact same time three out of the next four days, fueling the rumor that they are contemplating a merger.

MP3 - abbreviation of “MPEG Audio Layer 3”, a method of audio compression using perceptual coding techniques. This allows high compression rates at high quality through use of knowledge of the audio properties of the human ear. Commonly used at bandwidths of between 8kbps (telephone quality) and 128kbps (CD quality). Superseded by AAC.
Modular Telepresence – a category of telepresence conferencing systems which does not address the surrounding environment of an installation space. These systems can usually be installed in a traditional conference room without extensive preparations.

Orientation - the rotational state of an object relative to a set of reference axes. The orientation of an object free to move in three dimensions has 3 components, sometimes referred to as pan, tilt and roll.

Overlay Network – an independent telecommunications network that is deployed to support outsized, unusual or new applications such as telepresence and videoconferencing applications. The network is named usually because it is usually deployed in addition to an organization’s existing network that cannot support the quality required for real time video communications. Some organizations deploy Overlay Networks so they can participate in Telepresence CoINs.

Pan - from a human viewpoint, moving one’s head from left to right or vice versa constitutes a panning movement. More specifically, a pan is a rotation in the horizontal plane. Sometimes referred to as azimuth.

Panoramic Display – a large format display, typically a video wall or large beam splitter that takes up a large percentage of the participant’s peripheral vision.

Phase Lag - the ability of a tracking system to determine an object’s position within a given period of time after a change in object position, determined by the sum of update rate and latency. This can lead to a symptom known as simulator sickness since there is a conflict between what the eye sees and the inner ear perceives.

Presence – dial tone for people the online state and willingness of a person to participate in a communications.

Session Initiation Protocol (SIP) - IETF-defined signaling protocol for controlling multimedia communications such as voice and video between IP endpoints. SIP is a text-based protocol incorporating many of the features of http and smtp allowing for rapid troubleshooting.

Stereo Sound - a method of sound recording and reproduction using two or more audio channels to reproduce spatial depth in the sound.

Telepresence - the experience or impression of being present at a location remote from one’s own immediate environment.

Telepresence CoIN – Telepresence Community of Interest Network – A telecommunications network, usually an Overlay Network or a Virtual Private Network provided by a network provider where an organizations.

Telepresence Conferencing - the science and art of creating visual conferencing environments that address the human factors of the participants and duplicate, as closely as possible, an in-
person experience. Telepresence conferencing greatly improves end-user acceptance, which dramatically increases usage and substantially improves demand, ROI and customer satisfaction. While a variety of methods can be used to deliver telepresence solutions, they typically offer some combination of the following improvements over the “talking heads” experience of traditional videoconferencing:

- Life-size participants with accurate flesh tones
- Fluid motion
- Studio quality video, lighting and acoustics
- The absence of visible technology
- True eye contact, or the approximation of eye contact in large group settings
- Immersive and or mirrored environments where participants feel as if they are in the same physical space
- A consistency-of-quality between disparate locations

**Telepresence Multipoint** – A multipoint telepresence session where participants from multiple locations are capable of being presented life-size in continuous presence creating a virtual roundtable.

**Telesurgery** - Use of telepresence and/or teleoperation techniques allowing a surgeon to operate at a location remote from his real physical location. Sometimes also used to refer to remote medical diagnosis of certain conditions, it is useful in areas where access to medical facilities is scarce.

**Tilt** - To move an item, such as a camera or human head, in an upwards or downwards rotation. Technically, a camera rotation about an axis perpendicular both to the pan axis and the optic axis.

**Unified Communications** – refers to the integration of disparate communications applications such as instant messaging and VoIP systems. Sometimes conferencing servers, IP PBX and media such as voice and video services are bundled together to be sold as a unified communications package.

**Video Overlay Network** - a video-specific network design operated independently from underlying physical networks. See overlay networks.

**WAN or Wide Area Network** – a telecommunications network connecting points that are separated by distances greater than found in a metropolitan area.

**Zoom** - The ability of a camera lens to change its focal length in order to view objects at varying distances while retaining a sharp focus.
Appendix D: Related Research

**Telepresence 2009**
*Details.* Telepresence has gained a great deal of attention and market penetration since it burst onto the scene in later 2006. This report summarizes the views of 229 business users of telepresence and video conferencing technologies gathered in mid-2009.

**Video Communications 2.0**
*Details.* Despite the fact that only 5% of respondents in the Video 2.0 panel of 2009 also participated in our 2007 panel, a particularly consistent demographic across these two panels is maintained. This report on the views and experiences of the Video 2.0 panel shows that the investments in video communications endpoints, networks and services have worked to greatly improve user satisfaction, leading to more frequent usage, particularly in room video communications sessions.

**Tips for Improving the Users’ Experience**
*Details.* This Brainshark presentation reviews a comparison of the experience of the Video 2.0 panel members (229 business users were polled in 2009) as compared to The Perfect Storm Panel (450 business users were polled in 2007) and reviews in detail 20+ tips to improving the video communications experience.

**Cost Saving Strategies: Why Video Managed Services?**
*Details.* This Brainshark video provides insights from research about the selection criteria and scope of services for video managed service providers. We review IT communications priorities and how managed services fit within that priority. We also discuss the economics of managed services, and the four major building blocks you should look for in a video managed service provider. The critical selection criteria for video managed service providers are also reviewed. Our goal is to show how video managed service providers fit within the enterprise communications priorities and goals for 2009.

**Why Video Communications is a Business Best Practice**
*Details.* This report compares the performance of those who use video communications as part of their business operations with the performance of those who don’t use video communications. It clearly shows a distinct performance advantage that accrues to those who use video communications. Results are based on responses from 228 business users from the Brockmann & Company research panel. Based on a survey conducted in 2009 and updates the content presented in The Perfect Storm: Why Video Will Dominate Business Communications.

**The Perfect Storm: Why Video Conferencing Will Dominate Business Communications**
*Details.* Critical factors driving the adoption of video communications are reviewed and presented in this breakthrough report defining the conditions for ‘The Perfect Storm.’ Significant business benefits have accrued to the Top Performers, making their debut in this report.
Appendix E: Our Sponsors

Many thanks for the financial support of our sponsors.
Company Overview
MASERGY, a global telecommunications company, has redefined enterprise wide-area networking by providing superior service performance, an exceptional customer experience and innovative network solutions, including global Ethernet virtual private networks (VPNs) and hosted network services. The privately held company is financially sound and continues quarter over quarter growth while maintaining positive cash flow and zero debt.

MASERGY Advantage
With a proven track record in building superior network solutions, MASERGY simplifies the corporate wide-area network (WAN) for enterprises across six continents with value-added offerings, including:

Global Ethernet
• Proven, scalable network services reduce costs and simplify WAN management
• Less network equipment and virtually no training
• Seamless network solutions easily accommodate corporate expansion

Service Performance
• Superior network quality purpose-built for real-time application transport
• Reduced implementation costs
• End-to-end service guarantees

Embedded Services
• Award-winning advanced services offering unmatched network management and control
• No hardware, software or integration costs
• No capital and maintenance expenses
• Facilitates regulatory compliance

Customer Experience
• Superior technical sales support
• Aggressive service installation
• Responsive service support
• Simple, accurate bills

Masergy Communications, Inc.
2740 North Dallas Parkway, Suite 260
Plano, TX  75093 USA
Main (USA): +1 (866) 588-5885 [Toll-free]
Sales (USA): +1 (866) MASERGY (627-3749)
Fax: +1 (214) 442-5756

European Headquarters (UK)
Masergy Communications, Ltd.
32 Farringdon Street, 2nd Floor
London  EC4A 4HJ United Kingdom
Main: +44 (0) 207 173 6900
Fax: +44 (0) 207 173 6899

Global Networking Redefined
How far can your corporate network take you?

Now more than ever businesses must reduce costs while staying connected with customers, prospects, partners and colleagues. But their investments in high-definition conferencing equipment are being undermined by the limited capabilities of their existing network providers. MASERGY's global IP MPLS network is engineered specifically to support real-time applications, even across a converged corporate network. MASERGY guarantees 100% packet delivery for global voice and video traffic between all office locations, supported with advanced customer-controlled network management capabilities launched at the click of a mouse. So whether your company is seeking to reduce travel budgets, sales cycles, time to market, or carbon footprints, MASERGY will help you get there.

1-800-MASERGY | masergy.com
BCS Global – Solutions Overview
At BCS Global, we understand the complexity of implementing and maintaining an effective video conferencing solution and the resources needed to deploy effective visual collaboration across the enterprise. Our mission is to make video conferencing an easy-to-use and a reliable solution that becomes a part of your everyday business life – from standard desktop applications to boardroom and high-end telepresence systems.

With a fully deployed Global Video Exchange, we simplify video conferencing by allowing you to easily connect with clients, partners, and vendors that are critical to your business success. We provide a comprehensive and flexible set of managed services that enable you to seamlessly conduct point-to-point and multi-point video meetings regardless of your video system, network provider or type of connection. With our globally distributed point-of-presence systems and support capabilities, we are able to interconnect with a multitude of private, carrier and public video networks – all aimed at providing you with a superior user experience.

BCS Global – Managed Video Conferencing Services
BCS Global provides exceptional, reliable, secure and consistent video conferencing services that are unmatched in the industry for quality, breadth and global reach on a network optimized specifically for video and audio collaboration. Irrespective of the complexity of your business needs - whether you require just bridging services or a completely managed on-demand reservation-less video service, our solutions enable you to collaborate seamlessly from your desktop, home office or boardrooms.

BCS Global – Company Overview
BCS Global Networks Limited is a leading worldwide managed service provider for video conferencing and telepresence solutions. The company owns a fully deployed Global Video Exchange, which enables users across the world to meet instantaneously regardless of their video system, network provider or type of connection. BCS Global provides video services to some of the world's largest public and private companies. BCS Global’s Virtual Presence suite of services provide a scalable application that can traverse ISDN, IP, 3G mobile and standard broadband video connections to enable on-demand virtual meetings. BCS Global provides live video and audio help desk services to its customers that are available 24x7 globally and always attended by a qualified video engineer.

BCS Global is headquartered in the UK, with offices in New York, Toronto, Shanghai and Hong Kong.

www.bcsglobal.com
With Carin, its award-winning IP call recording suite, TC&C is extending its proven technology in video call recording to include Cisco TelePresence endpoints. Carin can capture life-size, ultra-high definition video, including spatial audio and auxiliary audio/video streams — enabling users to effectively share presentations and documents. With the ability to record Cisco TelePresence solutions, companies can take advantage of a value-added feature for preserving and sharing information applicable to:

- Remote expert applications in the financial services industry
- Healthpresence solutions in health care
- E-learning situations in education
- Compliance recording in various industries, including government, banking, and insurance.

The only true unified platform for voice, video, and telepresence recording, Carin allows enterprises to consolidate systems and access recordings from a single, easy-to-use web interface. The Carin TelePresence recording solution supports Cisco TelePresence 3200, 3000, 1300, 1000, and 500 configurations, as well as multipoint conferences. Additionally, TC&C is expanding its supported TelePresence platforms and vendors to include LifeSize, Polycom, Tandberg, and Vidyo. Carin’s voice recording solution includes support for Cisco, Avaya, Broadsoft and other SIP compliant systems.

For more information, visit TPrecording.com.
IPeak Networks is a privately held Canadian networking technology development company headquartered in Ottawa Canada. The company is focused on solutions for one of the most vexing problems of IP communications: the problem of packet loss.

IPQ

The company’s flagship product, IPQ (for “Internet Performance & Quality”) cuts packet loss by more than 90% while adding no latency to telepresence conferences and HD video conferences. With IPQ, enterprises and organizations large and small can take advantage of the business and environmental savings made possible high quality video conferencing while using only very low cost business Internet bandwidth.

IPQ implements advanced algorithms to protect against packet loss at the transport layer. It is application aware but completely application agnostic to support unconstrained interoperability across applications, and between vendors and disparate end-point technologies.

IPQ can be added at any end-point in any standards-compliant video conferencing system installation with the plug-and-play IPQ Network Appliance to bring instant performance and quality to any Internet connection. Off-net B2B video conference callers, remote offices, and teleworkers all enjoy the same great video conferencing experience as on-net participants. For more demanding situations, packet loss protection for telepresence and multiple simultaneous conferences is available in the IPQ VCP series of concentrators that deliver VNOC-grade performance and reliability.

To learn much more about packet loss protection, IPQ, and IPeak Networks, visit our website at www.ipeaknetworks.com or get in touch.
Hello,

We are BrightCom. We design and manufacturer fully integrated, processor based, and software driven, telepresence and video conferencing solutions. BrightCom offers the largest range of options to connect people, content and data from home offices, mobile devices, desktops, conference rooms, work spaces and telepresence suites simultaneously around the world.

One of a kind telepresence infrastructure

BrightCom’s Visual Collaboration System 2.0 provides a robust and unique infrastructure for Lumina Telepresence and ClearView Video Conferencing.

Unlike other solutions, VCS 2.0 is a single network appliance that can:

• Deliver communication in one package
  Meeting administration, meeting scheduling, a complete set of Web conferencing features and NAT firewall traversal.

• Combine people, ideas and data
  High definition video, standard definition video and audio broadcasts with multiple data broadcasts in a multi-screen layout that the meeting moderator can configure.

• Connect you to everyone
  Support for SIP connects BrightCom to any other standards compliant conferencing vendor. Endpoints display up to 16 video screens that can be seen by an unlimited number of participants.

Learn More...
One of the largest ranges of telepresence and video conferencing solutions

**Lumina Telepresence**

Instant, everyday emotion and success

- A natural environment for success
  - life-like, instant communication
  - eye contact and spatial audio
  - environment best suited for natural collaboration

Sizes to fit any size meeting
- personal one to one
- small teamwork sessions
- presentation and large meeting sessions
- custom board room configurations

Lumina Telepresence: L37 without the optional private enclosure. Suited for 2 to 6 people for instant teamwork. Each solution requires the VCS 2.0.

**ClearView Video Conferencing**

Get your message across, clearly and effectively

- Face to face connection vital for effective communication and collaboration
  - high definition video
  - standard definition video
  - audio broadcasting.

Wide variety of endpoints
- office desktop PCs
- small to large conference rooms
- mobile cart-based conferencing

Clearview Room Conferencing can be configured with 1 to 3 displays.

ClearView Mobile Carts are flexible for any size workspace. ClearView Desktop PC delivers instant communication from the comfort of your personal office.

Learn More...
COLLABORATE
IN HIGH-DEFINITION

Our 24x7 managed Telepresence service means your meetings are effortless. Our network of public Cisco TelePresence Suites means access to this brilliant collaboration service for users globally. And our open Telepresence Exchange means you can meet with your ecosystem of users effectively, working better together.

Tata Communications Telepresence Services
www.tatacommunications.com/telepresence
Accelerating the Pace of Business: Cisco TelePresence
The World Is Flat...and Moving Fast
To excel in today’s fast-paced, global business environment, you must continuously innovate and transform your business model—and you need a plan to respond rapidly to unexpected situations that affect business continuity.

Relationships and effective communications are critical to success, determining how competitive and responsive you can be, how quickly you can make decisions, and how fast you can get to market. They can even play a role in your level of environmental responsibility.

Meeting Face-to-Face Is Competitive Advantage
Cisco® TelePresence can help. It delivers a unique, “in person” experience with remote participants—you can interact and collaborate with others like never before, moving faster and more effectively. Cisco TelePresence interactions use industry-leading video, audio and environmental tools to create real-time, live, in person communications.

Join the many companies reaping the benefits of faster decision making and accelerated time to market—made possible by Cisco TelePresence. In a global marketplace, your executives and employees need to be able to connect immediately, and your experts must be able to interface with customers, solve problems, and focus on global concerns.

The Network Effect: More Units, Higher Usage

“TelePresence allows us to build relationships globally, which accelerates productivity through innovation and a broader access to talent. This creates a competitive advantage that is even more enduring than the dramatic reduction in travel cost.”

—Rebecca Jacoby, CIO, Cisco
Cisco TelePresence connects people thousands of miles apart in dozens of locations, bringing you together with one simple connection. For companies with locations, partners, or customers spread globally, the solution helps keep time-sensitive processes moving ahead, presenting a cost-effective and time-saving alternative to travel.

**Body Language Is Business Language**

Communicating across language and cultural boundaries can be challenging, and being in person gives you optimum benefits. Cisco TelePresence allows you to meet “in person” with customers, vendors, and partners at the touch of a button, so you can be more effective and more available than ever before.

With the rapid speed of business today, the quality of the experience is vital. Your customers and business partners expect understanding, but real understanding involves subtext and context. More than 60 percent of communications is nonverbal, and Cisco TelePresence delivers subtleties of communication in tone, facial expressions, and body language, leading to greater connection and understanding.

**Be Green with Better Quality of Life**

By reducing the need for travel, Cisco TelePresence can help boost productivity and your company’s environmental sustainability efforts: less travel means a smaller carbon footprint. And reducing travel also gives your employees control over more of their valuable time, improving their quality of life.

**Using Cisco TelePresence**

The Cisco TelePresence experience embodies three important principles: quality as good as being there, simplicity of use, and a low total cost of ownership.

Cisco TelePresence was designed to make you look and sound like you do in person. With very high-quality audio and high-definition video at low latency and a optimized meeting environment, you can communicate and converse in real time, catching every comment, gesture, expression, and nuance of the conversation.

Cisco TelePresence was designed to take advantage of the tools you use every day, integrating with enterprise groupware and unified communications, so scheduling and starting meetings are extremely easy. There is no need for staff, training, menus, or manuals.

With dial-tone reliability and global connectivity, Cisco TelePresence provides far greater ROI than traditional video communications. You can “be” anywhere in the world at the touch of a button.
Go Anywhere the Network Goes, at the Speed of Light
Cisco TelePresence delivers rich, interpersonal interactions over the network. And it is just one way that Cisco continues to innovate, integrating valuable applications that empower users to collaborate like never before. Increased productivity, accelerated business transformations, and real, sustainable competitive advantages are just a few of the benefits gained with Cisco and the network.

Delivering the Cisco TelePresence Experience
Cisco offers you an advanced system, combined with a robust group of partners, so your enterprise can scale globally and benefit from an exceptional meeting experience. Our select partners quickly and effectively deliver the high-quality Cisco TelePresence experience and operational services, from installation to ongoing management. Cisco Certified Advanced Technology Partners (ATPs) and Cisco Certified TelePresence Connection carriers can help you implement, operate, and scale.
Developing an Inter-Company Telepresence & Visual Collaboration Program
Conference & Working Group
April 22nd, 2010 – Reston, Virginia

Conference
How to leverage your investment in telepresence and videoconferencing to connect with partners, vendors, and customers to reduce the shared costs of the relationships, improve productivity, and do business during a crisis.

Working Group
Don’t just come yourself. Bring your partners, vendors, and customers for highly productive private break-out sessions focused on setting up your own program.

Who Should Attend
Chief Collaboration Officers • Chief Productivity Officers
Telepresence Managers • Videoconferencing Managers
Corporate Travel Managers • Supply Chain Managers

Topics Include
Estimating, Measuring, and Tracking ROI
Connecting with Partners, Vendors, and Customers
Operational Best Practices
Collaborating on Data and Physical Objects
Understanding & Overcoming Technical Hurdles

About the Organizers
The Human Productivity Lab has consulted for Fortune 20 energy companies, international investment banks, and others on telepresence and literally wrote the book on inter-company telepresence and effective visual collaboration.

About the Venue
Hyatt Regency Reston
1800 Presidents Street,
Reston, Virginia, USA 20190
Tel: +1 703 709 1234    Fax: +1 703 925 8295
http://reston.hyatt.com

Cost
$595 Before February 28th, 2010
$750 After February 28th, 2010
Breakfast and Lunch on the 22nd,
Course Materials

www.TelepresenceOptions.com/conference
Human Productivity Lab Consultants & Contributors

Howard S. Lichtman is the founder and president of the Human Productivity Lab, the leading telepresence consulting firm to global Fortune 500 enterprises, as well as telepresence manufacturers, managed services, and network providers. Before founding the Human Productivity Lab in 2005, Mr. Lichtman was the Vice President of Business Development at TeleSuite, the world’s first commercially successful telepresence provider. Lichtman was the Co-founder, President, and Chief Product Officer at Powwow Networks, a telepresence start-up in 2000 dedicated to improving the human factors, reliability, and cost-effectiveness of both visual and data collaboration. Prior to his interest in telepresence, Mr. Lichtman launched and directed the financial vertical sales organization at Savvis Communications, a company that specialized in providing managed services and networking solutions for Wall Street trading floor technology, and market data applications.

He is the co-author of *Telepresence, Effective Visual Collaboration and the Future of Global Business at the Speed of Light* (2006), and was a contributing author to *Emerging Technologies for Teleconferencing and Telepresence* (2005). He is currently working on *Telepresence Options 2010*. Howard Lichtman is a frequent industry analyst whose commentary on telepresence and video conferencing has appeared in *U.S. News and World Report, Reuters, Pro AV Magazine, The Chicago Tribune, CXO Magazine, Killer App Magazine*, and *CFO Magazine*, among others.

About the Human Productivity Lab

HPL Consulting

The Human Productivity Lab is the leading telepresence consulting firm for global financial institutions, multinational telecommunications and pharmaceutical companies, and other Fortune 5000 corporations across a broad range of industry sectors. The Lab was founded by Howard S. Lichtman, a productivity-focused technologist who advises firms how to successfully deploy telepresence to enhance internal and external communications, cut costs and improve organizational productivity, and increase bottom line revenue.
HPL Publishing
With over 30,000-plus unique visitors a month from over 165-plus countries, HumanProductivityLab.com and TelepresenceOptions.com rank as the top destinations on the Internet for news, research, and analysis on the emerging telepresence industry.

Telepresence Options, the Lab’s annual multi-media overview of telepresence, has over 1,500 subscribers to the hard cover Telepresence Options Yearbook, while our newsletter, the Telepresence Options Telegraph, has over 2,900 subscribers to the representing the largest identifiable audience interested in telepresence and effective visual collaboration.

HPL Sales Force Training
Arming Telepresence Commission-Driven Mercenaries is the Lab’s competitive overview of the telepresence landscape for sales, marketing, and product management organizations. While maintaining confidentiality on forward-looking technology roadmaps, customers, and other sensitive information, the Lab offers a comprehensive “open source” overview of the various telepresence systems, managed services and inter-networking solutions providers. Employing our “no-holds barred” approach on the pros and cons of various offerings, the Lab provides teams with strategies that can shorten sales cycles. Many telepresence vendors serving the Fortune 500 have availed themselves of the Lab’s sales force training great success.

Although the Human Productivity Lab embraces the advances in individual and organizational productivity made possible by telepresence and effective visual collaboration, our mission is guided by an overarching respect for human values and interests.

“While Productivity is our Middle Name we always put the Human First.”
- Howard S. Lichtman
Peter Brockmann

is a frequent author and commentator on telepresence, video conferencing, mobile and business communications technologies. His insights are imbedded in Brockmann & Company, a high tech analyst and consulting company serving the needs of users, equipment vendors and service providers. Prior to forming Brockmann & Company, Brockmann was the Senior Vice President of Sales, Marketing and Business Development for FirstHand Technologies, an innovator in mobile VoIP software. Brockmann facilitated a rebranding, repositioning and refocusing of the company that led to a successful C round of investment by Canadian venture capitalists.

Brockmann also worked at 3Com where he was responsible for the product introduction of the 3Com Convergence Applications Suite as the Vice President, Enterprise Voice Solutions Marketing, was Vice President Marketing for bTrade and co-founder of A4 Networks Corporation, a startup focused on business-to-business process automation software.

Prior to 2001, Brockmann held various executive, product marketing, and business development positions at Nortel Networks in customer relationship management software, enterprise data products, and enterprise telephony businesses. In 1998 he served as an expert witness before the United States Department of Justice and the European Commission during inquiries into the Nortel acquisition of Bay Networks.

Brockmann is a Wikipedia contributor and a regular blogger for TMCnet.com where he writes the ‘Outside of The Box’. An accomplished pianist, Brockmann has an MBA from McMaster University in Hamilton, Canada, a Bachelor of Engineering Science from the University of Western Ontario in London, Canada, and a piano performance degree from the Western Ontario Conservatory of Music in London Canada.

About Brockmann & Company

Brockmann & Company is a consulting and advisory firm serving high tech equipment & application vendors and service providers. Clients accelerate growth through customer research & thought leadership. Our motto: “In God we trust, all others bring data.”

Customers Know Best

Where else can you get customer insights? We have always been a big fan of learning from and learning about customers. Just about any marketing challenge, positioning question can and must be considered from the customers’ viewpoint. That’s a perspective you can’t learn in business school, but only from customers themselves.
This is much more than anecdotal recitation. We provide statistical analysis and believe that data about the user experience is a most powerful of all customer insights. Our motto from Dr W. Edwards Deming: In God we trust, all others bring data.

User Organization Services
Brockmann & Company offers services to provide fact-based implementation consulting services for global user organizations. Our practical ideas for implementing corporate goals addressing:

- Unified communications or video conferencing consumption in lieu of business travel
- Improving Green performance
- Accelerating mobile applications while overcoming regional cultural challenges are based on sound team-based problem solving skills first learned two decades ago as a Quality Circle facilitator and honed with experience as a process engineer, marketing executive and change agent. These skills enable higher business performance as proven with the Brockmann & Company research program.

Customer Insight Research Goals & Topics
The Brockmann & Company research agenda is centered around investigating user challenges in communications equipment, services and applications especially inter-company telepresence, mobility and unified communications. Our vendor clients support our research program to create customer-education content and to learn from the experiences of their customers and their competitors’ customers. Our blinded research methodology assures the highest quality research and quality consulting. The Brockmann & Company can also conduct blinded private studies.

Customer Insight Services
Brockmann & Company delivers four services for our clients:

- Advisory services provides access to the analysts, access to the data and periodic strategy briefings on the market and competition.
- Research services provides customer insights gained from statistical analysis and both online and telephone market research.
- Consulting services allows Brockmann & Company staff to engage in the execution of strategy, marketing or business development as appropriate. Assignments can be to provide the thought leadership to launch a new product, or to provide the channel development plan and materials to support a new product, or as a strategic assessor of a merger candidate for example.
- Marketing services leverages the network of services known to Brockmann & Company to generate leads and reach users. Content for web site optimizations or reports hosted through various partner web sites may be a component of this service portfolio. We allow the marketing executive the opportunity to gain unbiased customer insight with which to improve the effectiveness of the marketing effort and therefore the productivity of the sales organization.

Learn more: www.brockmann.com.
The Human Productivity Lab is the leading consulting firm focused on telepresence and effective visual collaboration. Since 2005 we have helped Fortune 20 energy companies, international investment banks, and international standards bodies understand their telepresence options and future proof their telepresence investments.

On the investor side, we have worked with investment banks, institutional investors, and hedge funds to help them rapidly understand the telepresence and video conferencing landscape. We have an outstanding track record of success in predicting the technology, geopolitical, and economic trends that shape the market for visual collaboration solutions.

Consulting Services Include:
ROI Modeling and Cost Justification
Telepresence Solutions Design
RFP / RFI Development
Acquisition Consulting

Consulting Services Include:
Investor Due Diligence
Evaluation of Value & Risks
Review of technology, marketplace, competitors, future products and services, exit strategy and goals, etc.

The Human Productivity Lab publishes Telepresence Options the #1 publication and website on the internet following telepresence technologies, telepresence managed services, and inter-networking telepresence.
Telepresence Exchange is a new class of service that brings carriers and enterprise telepresence and video conferencing networks together, overcoming challenges in DiffServ classifications, addressing, performance and security practices. Services for directory, bridging and ISDN gateways are often readily available. Exchanges are the missing link in maximizing the utility and value of telepresence and video conference investments since they can easily and automatically connect enterprises with their customers, partners and suppliers.

The Inter-Company Telepresence and Video Conferencing Exchange Review is the first comprehensive report on the leading service provider operations and technologies at the heart of the industry’s fastest growth segment.

“Inter-company telepresence and video conferencing reduces the cost of doing business, improves productivity and assures business continuity whenever business travel becomes more dangerous, more costly or more inconvenient.”

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You will be billed $1,400.00 if received before January 31, 2010. Regular price is $1,750.00.

This report is a collaboration of Human Productivity Lab and Brockmann & Company.
Now with 50% more Holodeck!

Powwow Virtual is the Human Productivity Lab’s business model for publicly available telepresence done right. The Powwow model has evolved from over five years of research into telepresence, effective visual collaboration and publicly available conferencing.

Powwow has a CXO level team, the designs, the initial locations, the advisory board, the relationships, the right business model, and the drive to get 10 to 50+ publicly available telepresence facilities up and profitably operating Globally before the competition figures out how to spell telepresence.

**A Business Opportunity**

If you are a telepresence provider looking to establish “the standard” in inter-company collaboration, dramatically reduce your cost of sales, improve the utility of your offering, and establish a global network of demonstration facilities that pay for themselves...

OR

If you are a private investor looking for a business with the true potential for exponential growth...

Then we would like to invite you to the Silicon Plantation of Northern Virginia to Powwow with our team.