

THE INTEGRATED COLLABORATION ENVIRONMENT

*How Next-Generation Web
Conferencing Applications
Meet the Needs of the
Changing Enterprise
Workforce*



The Integrated Collaboration Environment

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Integrated collaboration environments allow enterprises to realize a number of competitive advantages by using their existing computers and network infrastructure for group and personal collaboration. These new fully-featured environments take the best features of both traditional videoconferencing and web collaboration and combine them to enable teams to work together interactively through a browser-based interface.

1. Web-Based Conferencing and Collaboration Today

Web-based conferencing technology offers organizations of all sizes unprecedented opportunities to communicate, coordinate, and collaborate not only internally, but with customers, suppliers, business partners, colleagues, and associates around the globe. In contrast to group videoconferencing, where participants typically congregate in a specially configured conference room equipped with expensive video and voice equipment, participants in a web-based conference normally remain at their own desks and access visual information through a web browser on their personal computers. Web meeting participants are connected to each other through IP-based local and wide area networks, including the Internet.

Web-based conferencing applications include desktop videoconferencing, instant messaging, browser-based collaboration and data sharing, and streaming.

Desktop videoconferencing is not just a little brother to group videoconferencing. Desktop videoconferencing is a different paradigm that centers on ad-hoc video calls in addition to scheduled and reserved meetings. Desktop videoconferencing is also more likely to be collaboration-focused than centered on “talking heads-only” video.

Instant messaging, due to the added value of presence detection, has become very popular in consumer communications with its support for both one-to-one and group text chats. The instant messaging paradigm is now beginning to make its way into the corporate world as a foundation for text, voice, and video communications. According to Jupiter/Media Metrix business usage of instant messaging has grown from 2.3 billion minutes in September 2000 to 4.9 billion minutes in September 2001¹.

Web conferencing facilitates easy group-data interaction with minimal equipment requirements - a telephone, a dial-up Internet connection, and a web browser. Web conference attendees point their web browsers to a specified page and are able to see slides or other interactive presentations that are shared by the meeting’s leader while audio is typically conducted over a voice conference call. A conferencing server is often used for both access control and for meeting management functions. Some web conferencing platforms are able to archive the visual information (slides, spreadsheets, etc.) on the central server for later viewing by conference attendees.

One developing trend in web conferencing is the ability to add video. In large meetings, it is sometimes helpful to see the presenter as visual information is shared and discussed. In smaller, more interactive meetings individuals often like to see those with whom they are conferencing. In either case, the primary value in a web conference is not in the video as much as it is in the ability to share PC-based computer applications; however, the video adds a sense of social presence that is useful when agreements are made or when it is important to observe body language to affirm

¹Source: Jupiter Media Metrix, Inc., “Total Time Spent Using Instant Messaging Jumps 110 Percent At Work And 48 Percent At Home Versus Last Year, Reports Jupiter Media Metrix”, http://www.jmm.com/xp/jmm/press/2001/pr_111401.xml.

understanding of important points. Whether you are conferencing with strangers or familiar colleagues, video helps to establish and nurture relationships.

Web conferencing is gaining momentum in the market. Wainhouse Research projects² the market for group videoconferencing to grow from \$400 million in 2001 to \$1.2 billion in 2006 yielding a compound annual growth rate of 24.4%. However, web conferencing is projected to grow at a much faster 47% annual rate from \$290 million to \$2.0 billion in the same time period!

Web-based conferencing technology offers organizations the following advantages:

- i. Conferencing reduces the need for business travel. Many enterprises have demonstrated, particularly following the events of September 11, 2001, that they can satisfactorily conduct many of their business activities remotely and can reduce travel significantly. Besides saving money, replacing some travel by web and videoconferencing saves wear and tear on the employees involved and increases personal efficiency by reducing the downtime spent going to and from the airport, waiting for planes, reading escape literature while traveling on the plane, etc. A report by Worldcom³ using actual data from large enterprises supports this claim. If four people travel to meet with a fifth person,
 - a) Average hard and soft costs were \$5,179 versus \$1,701 for a group videoconference. Using web conferencing or desktop videoconferencing would cost even less because there are no ISDN charges.
 - b) Average preparation and transit time for this five-party in-person meeting consumed 53 hours, 24 minutes – nearly three times what it was for a videoconference. These results would be similar for web-based conferencing.

Furthermore, this WorldCom study also revealed that 73% of business managers feel significant stress when away from home and family while 64% are concerned with work piling up while they are away.

While web-based conferencing cannot be a substitute for all travel, it can offer some financial and stress relief for enterprises and individuals who need to meet face-to-face regularly.

- ii. Conferencing improves communications between project team members by enabling them to meet more frequently with fewer complications involved in getting to the meeting, and fewer distractions once the meeting has begun. Web conferencing allows individuals and teams to work on project concepts, drawings, documents, and training interactively in real-time. By working in a collaborative environment, many organizations have reported shorter project times, quicker time-to-market, reduced training costs, faster hiring cycles, and better organizational efficiency.

In the same Worldcom study⁴, “79% of the respondents who had used videoconferencing exclusively in a conference room indicated that they would use videoconferencing more if they could do it from their desktop computer or PC laptop. This preference held true across all segments we tested.” Millions of business people and consumers are using instant

² “Conferencing Markets and Strategies 2001, The Services Industry”, Wainhouse Research LLC, December 2001.

³ “Meetings In America”, Worldcom, 1998,
<http://e-meetings.wcom.com/meetingsinamerica/uswhitepaper.php3>.

⁴ Ibid.

messaging to collaborate from their desktop today, and they will move to voice and video as these tools are integrated into instant messaging collaboration environments.

- iii. Conferencing enables business decisions to be reached more rapidly. A recent Wainhouse Research survey⁵ showed that among those responding, improving the internal decision-making process was just as important as saving travel dollars when considering desktop conferencing purchases. Respondents chose the following factors as their primary motivation for desktop conferencing:

27%	Save money on travel
27%	Improve internal decision-making processes (speed/quality)
13%	Improve relationships with customers and vendors
11%	Deliver services not otherwise possible
9%	Provide similar functionality to room systems but at much lower cost
13%	Other

- iv. Conferencing enhances communication with customers and business partners. This same Wainhouse Research survey⁶ indicated that the third most important reason for implementing desktop conferencing was to improve relationships with customers and vendors. Furthermore, a November 2001 Wainhouse Research conferencing survey⁷ found that, surprisingly, 88.6% of those who use videoconferencing call people outside their own organization, underlying the value of video in building relationships through body language and facial expressions, regardless of where the participants may be physically located.

2. Web-Based Conferencing Driving Forces

Web-based conferencing usage is being accelerated by a number of forces including i) advancing PC technology, ii) improving PC/desktop video cameras, iii) improved broadband availability, iv) Windows Messenger and instant messaging, and v) Internet evolution.

i. More Powerful PC Technology

Computer technology continues to improve dramatically. As recently as 1998, using a PC to compress video was nearly unthinkable. Today with 2.2 GHz and faster processors, high-quality, software-based video compression, which enables wide-scale deployment of video-enabled applications, is within reach for most business users.

These faster PCs are being used, not just to do faster word processing or spreadsheet calculations, but also to do rich media processing including high quality video and CD quality audio.

⁵ Wainhouse Research, LLC, "Desktop Videoconferencing Redux: A Reflective Study on the Desktop Videoconferencing Market and the Possibility of a Near Term Breakout Scenario", July 1999, December 2001.

⁶ Ibid.

⁷ "Videoconferencing End User Survey", Wainhouse Research LLC, November 2001.

Typical Computer Characteristics		
	1998 Computer	2002 Computer
Processor	Pentium II	Pentium 4
Clock Speed	300 MHz	2.2 GHz
Disk Drive Capacity	8 GB	60 GB
Optical Disc	CD	CD-RW/DVD-RW
Modem	56 kbps	56 kbps
Network Card	Yes	Yes – Many wireless
USB Ports	1-2 ports	2-4 ports
Camera	No	Yes/USB
Speakers/Headsets	Speakers	Speakers and Headset
Price	\$3,000	\$1,500

ii. Better Video Technology

Video peripherals have higher video quality, are much less expensive, and they are easy to install and use, thanks to the Universal Serial Bus (USB). USB version 2 and FireWire, which are now shipping with most computer OEMs, enable much faster data transfers and much higher video quality. Thirty frames per second video is now possible on a PC.

The demand for desktop video is enormous. In 2001, Logitech alone sold over 4 million cameras, and according to InfoTrends⁸, by 2004 approximately 50% of the PCs sold will have cameras attached to them, much like a mouse is now a standard peripheral, and as many as 40% of these cameras will be used for web conferencing and videoconferencing.

iii. Improved Internet and Broadband Availability

In a 1999 Worldcom survey⁹, an overwhelming majority of employees had access to the Internet and they were encouraged to use it. Interestingly, smaller companies (< 1,000 employees) encouraged Internet use more than the mid- to large-sized companies.

Accompanying widespread Internet access is increasingly pervasive broadband availability. Jupiter Media Metrix¹⁰ estimates that over 20 million people in the U.S. have broadband connections at work and that by 2005 there will be over 50 million enterprise broadband users. Similarly, in the U.S. home market, where there are 5.2 million broadband connections today, by 2006 this number will increase to 35.1 million¹¹.

⁸ Source: InfoTrends Research Group, Inc., 1999 PC Camera Forecast North America, <http://www.infotrends-rgi.com/press/1999122048305.html>

⁹ “The Internet’s Impact on Business Productivity and Individual Work Habits, 1999 *Meetings in America* Study of Trends Impacting Business”, <http://e-meetings.wcom.com/meetingsinamerica/newwhite.php3#introduction> .

¹⁰ Raymond James and Associates, “Future Developments In Electronic Conferencing”,

¹¹ Jupiter Media Metrix, Press Release October 17, 2001, “Over 40 Percent Of US Online Households To Connect Via Broadband By 2006, Reports Jupiter Media Metrix”, http://www.jmm.com/xp/jmm/press/2001/pr_101701.xml .

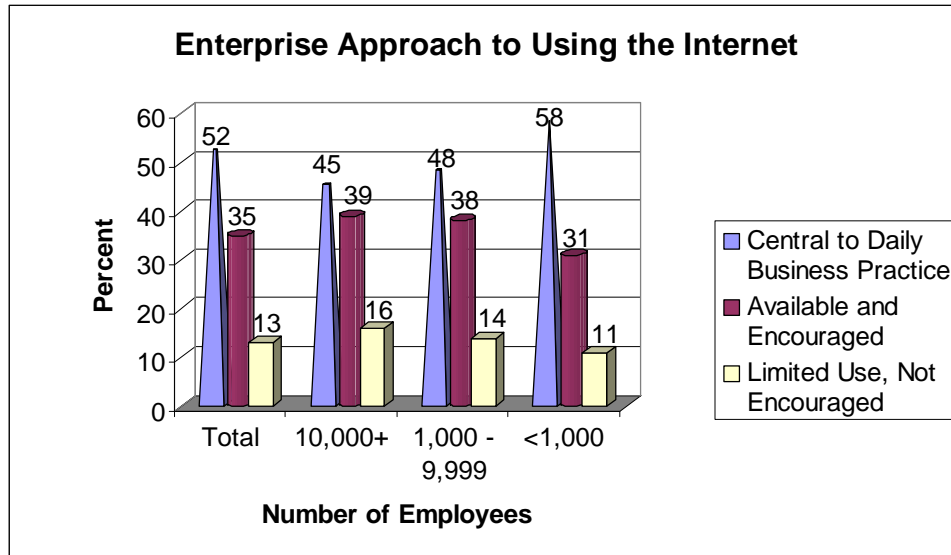


Figure 1: How large and small enterprises approach employee use of the Internet. Note that small companies tend to encourage more widespread Internet use than larger ones.

iv. Windows XP and Instant Messaging

Microsoft’s newest operating system, Windows XP, takes a giant leap into the telecommunications foray with its SIP¹²-based web conferencing capability. With millions of registered users and the ability to see who is online at any time via presence protocol, Windows Messenger for XP’s “Start talking” and “Start camera” icons will literally have millions of people trying out web-based voice and videoconferencing features. Coupled with competitive products like Yahoo who offers voice and video and AOL who offers voice in their instant messenger clients, additional millions of users will be investing in and using voice- and video-enabled instant messaging applications.

v. Internet Evolution

The Internet is undergoing continual transformation with increased Internet backbone bandwidth being added all the time. Furthermore, some Internet carriers are beginning to offer differentiated quality of service, some of which is suitable for real-time high quality video and voice transmission. Where the Internet was once used mainly for email and text chat, it is rapidly evolving into a rich media content delivery and communications network.

3. Characteristics of an Integrated Collaboration Environment

An integrated collaboration environment is a web-based service that provides individuals and groups within the enterprise access to a variety of rich media conferencing tools integrated into a single application. Integrated conferencing environments merge the best of web-based conferencing and collaboration, desktop videoconferencing, and instant messaging into a single,

¹² SIP is an abbreviation for Session Initiation Protocol, which is emerging as a standard for voice and video over IP.

easy-to-use, intuitive environment that also includes streaming in real-time and archived modes. These next generation conferencing environments have many of the following characteristics:

i. International Standards Support

Integrated collaboration environments need to be standards-based so that they will work with a variety of vendor's equipment. This is particularly true for environments supporting desktop videoconferencing. They may support H.323, SIP, or both, along with integration with the latest instant messenger clients.

ii. Integrated with Workflow Tools. (IM and Microsoft Outlook)

For web and videoconferencing to become part of an organization's daily fabric, these applications must be integrated to the everyday work tools people use. For example, a number of people use instant messaging to communicate with business colleagues. Also, many people use Microsoft Outlook or Lotus Notes as their calendar, email client, and contact manager. Integrated collaboration environments need to be well-integrated with these kinds of workflow tools to allow ad hoc meetings, meeting scheduling and notification, and directory services using the tools people already know and use every day.

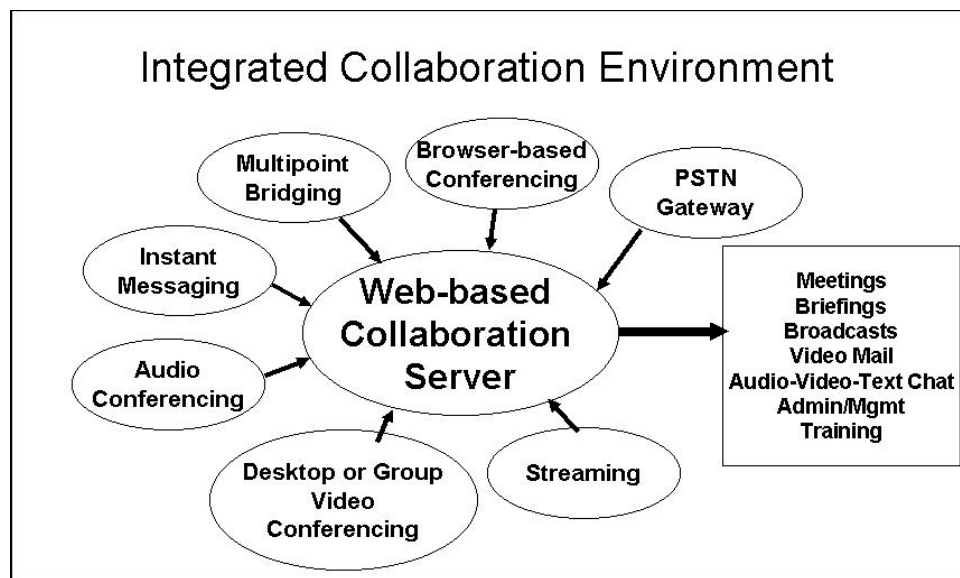


Figure 2: Integrated collaboration environments provide enterprise users with a variety of conferencing mechanisms accessible through standard workflow environments such as the web, calendaring and email applications, and instant messaging.

iii. Viral in Nature

One of the difficulties with desktop conferencing has been a lack of deployment. An integrated conferencing environment is able to overcome this limitation by checking a user's computer configuration and automatically downloading a standards-based software videoconferencing client on-the-fly should one be needed. Integrated directories also inform users who is available for conferencing and make the process of contacting as simple as a mouse click.

iv. Easy to Install and Use

Conferencing is done most easily when the conferencing capabilities are inherent within tools people already use. Browser-based plug-ins for conferencing need to be easily downloaded and require no additional configuration on the part of the user.

v. Support Automatic and Seamless Multipoint Bridging

When individuals or groups engage in instant messaging voice or video chats, or when they want to use voice with web conferencing, integrated collaboration environments can connect all participants to a multipoint bridge automatically instead of requiring all participants to remember some complex dialing mechanism.

vi. Overcomes Network Barriers

Network address translation devices and firewalls are not friendly to H.323 and SIP traffic. The collaboration environment must be able to provide other methods to connect voice and video should these standards-based methods fail. Many organizations will not open up their firewalls to H.323 or SIP traffic, but they are already open to HTTP; consequently, the integrated collaboration environment should detect network transmission error conditions and use alternative “best effort” methods to still complete a connection between users.

vii. Network Management

Integrated collaboration environments are able to communicate with all devices on the collaboration network and provide different levels of management capability from a central location. This includes being able to detect if a device is functioning properly, being able to route calls to these devices, and detecting if the network is becoming congested and applying mechanisms to reduce congestion.

4. Example of an Integrated Collaboration Environment

A number of companies have pieces of this environment already constructed; however, one company, First Virtual Communications, has a very compelling integrated collaboration environment already on the market. Branded as Click to Meet™, this integrated web-centric conferencing solution has been designed to integrate many of the functions and management tools individuals and enterprises are clamoring for. The Click to Meet solution can be integrated in three paradigms that are widely accepted and used today including Microsoft Exchange and Outlook, Windows Messenger, or in a web page. In these configurations, end users are familiar with the rich media web conferencing environment that Click to Meet provides.

i. Integration with Common Workflow Tools

Click to Meet is fully integrated with Microsoft Exchange and Outlook. Not only can people schedule videoconference meetings and web conferences just like any other meeting using Outlook, but Click to Meet is smart enough to know when special resources, such as MCUs (multipoint control units), are needed and automatically reserves them. As with other meetings, Outlook automatically checks people and resource availability and prevents overbooking or scheduling conflicts. For those enterprises that do not use Outlook, Click to Meet provides a browser-based scheduling, directory, and conference management interface.

To schedule a meeting in Outlook, users select the names of those persons with whom they want to meet along with a Click to Meet conferencing resource. Conferencing resources are essentially predefined templates that define the parameters for the web-based meeting, including whether or not the meeting supports voice, video, data sharing and presentations, as well as collaborative browsing. Conferencing resources can be created by the system administrator and greatly simplify the use and management of conference rooms and conferencing systems.

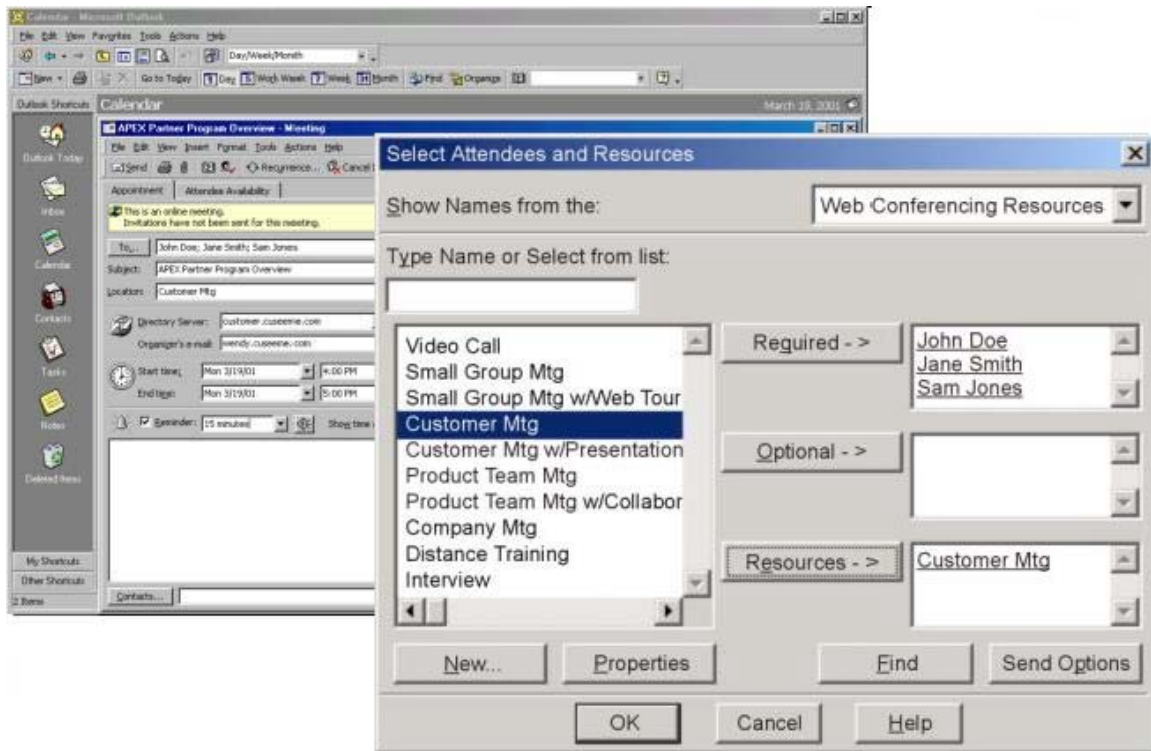


Figure 3: Click to Meet can be fully integrated with Microsoft Outlook; to schedule a videoconference, simply click on the names of the persons with whom you want to conference, add a Click to Meet meeting resource and the videoconference is scheduled, including multipoint bridge capability.

When it is time for a meeting to begin, Click to Meet automatically dials participants using First Virtual's web-based client, a third-party H.323 desktop client or group videoconferencing units, freeing the attendees from worrying about how to establish the conference. Those using First Virtual's web-based client are automatically connected when they click on the email sent by Outlook or when they click on the link in their calendars.

Click to Meet can also be fully integrated with Windows Messenger. Using the standard Messenger interface, users can invite one or more people for an ad hoc voice and/or videoconference. Click to Meet takes care of all the details behind the scenes, such as connecting a multiparty call to an MCU. In this case Click to Meet does not require Microsoft Exchange and Outlook integration.

Because Click to Meet's web endpoint is based on Active-X, web designers can develop custom web pages and place video windows on the page wherever it makes the most sense. Thus, Click to Meet can be integrated into a customized web page creating varied rich media web conferencing layouts that fulfill most any need.

In any integrated environment, be it Exchange and Outlook, Windows Messenger, Active-X in a web page, Click to Meet supports T.120 data sharing. T.120 allows any web page to become a visual collaboration page, and it allows the sharing of any application on the desktop with others in a conference. During the application session voice, video, and electronic white boarding can be integrated.

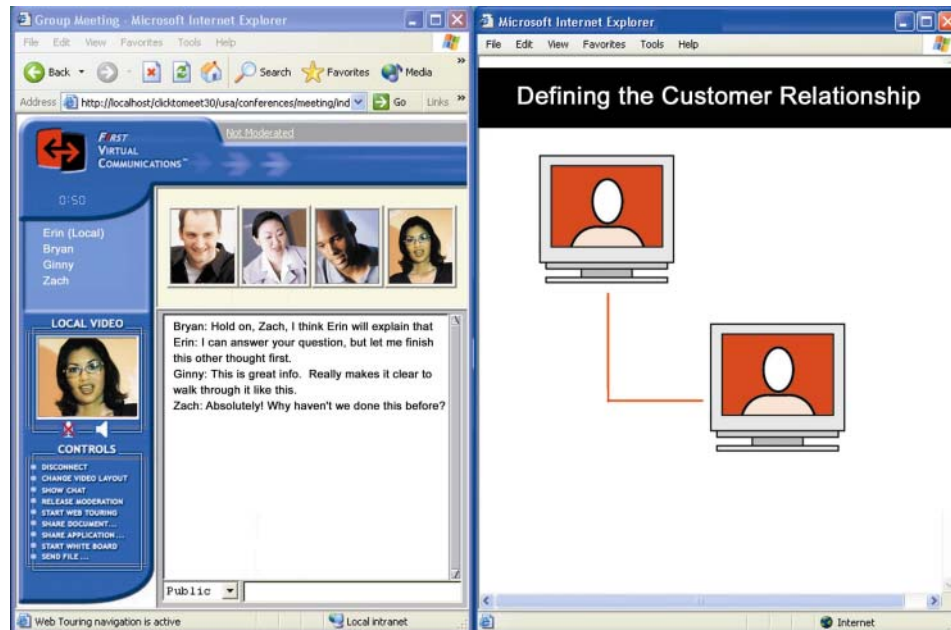


Figure 4: Collaboration using a web browser is enabled through Click to Meet's software web browser endpoint. Web designers can put the video windows anywhere on the page and can easily implement interactive data sharing on the same page.

ii. Viral Endpoint Propagation

Suppose you want to meet with someone who does not have a videoconferencing endpoint? Click to Meet responds to this situation gracefully. As part of Outlook's scheduling capability, a reminder message is displayed on the PC of those invited to the meeting. When the individual clicks on the reminder message indicating that he or she wants to enter the conference, Click to Meet checks the PC to find out whether or not there is a videoconferencing endpoint installed. If an endpoint is not installed, Click to Meet automatically downloads, installs and configures the Click to Meet web-based software client. If the computer does not have a video camera attached, attendees will still be able to see and hear other meeting participants. And, if the computer has a microphone attached, attendees can participate in the meeting with voice and full collaboration capability. Additionally, if an end user does not use Outlook, they can simply click on a link inside an email to join the conference.

iii. On-Demand Bridging

Adding parties to video calls is easy and transparent with Click to Meet. In Outlook, one of the people in a call simply clicks a button to bring up his contact manager and then clicks on the name or names of the persons to be added to the call. Click to Meet instantly adds the additional parties to the call. New attendees seamlessly join those in the original conference. Most other systems require the original call to be dropped and everyone has to redial into the MCU to have a multiparty meeting.

The procedure is similar using Windows Messenger or Click to Meet for the web. In Messenger, one of the people in a video chat session simply invites one or more additional persons into the chat using Messenger's invite function. Calls are automatically rerouted to the MCU.

iv. Streaming

Mixing interactive participants and view-only participants in a single meeting is simple using Click to Meet. Click to Meet supports streaming with Microsoft's Windows Media, Real Network's Real streaming technologies, as well as First Virtual's I-Studio. Within Click to Meet, a meeting organizer simply distinguishes who is an interactive meeting participant and who is a "view only" participant. Participants then simply click a link that is either in their Outlook Calendar or their email inbox if they are not using Outlook. To complete the meeting setup, the meeting organizer would also select two resources: one for the conference, and the other for the live stream¹³. Click to Meet would then automatically stream the meeting to these "view-only" participants.

5. The Technology behind Click to Meet

At the heart of the Click to Meet product is an application server that acts as the control center for all conferencing and collaboration activities. All functions including web conferencing, videoconferencing, streaming, multipoint bridging, and gateway calling are controlled by the Click to Meet server.

Click to Meet also includes a fully featured H.323 gatekeeper that controls user access, bandwidth usage, and voice and video call routing. Also embedded are all the network management functions that automatically connect endpoints and monitor network congestion.

Because Click to Meet is standards-based, it interoperates with H.323 equipment from other vendors, including H.323 endpoints, MCUs, and gateways. Click to Meet includes a browser-based plug-in that is a fully featured H.323 software endpoint for videoconferencing as well as a software MCU that runs on a Windows 2000, Solaris or Linux server.

Conducting web-based presentations in Click to Meet is an additional feature of the environment. Presenters develop their content using standard tools like MS PowerPoint or Word, and upload

¹³ Conferences and streaming resources are set up by the IT manager and included in Outlook. Conference resources typically contain information on call parameters, such as desired bandwidth, image size, and so forth. Streaming resources contain information on which player is to be used, the target bit rate, which compression codecs to use, etc.

these documents to the Click to Meet server for viewing on all other meeting attendees' web browsers. Moderator control of the presentation can be passed to other meeting participants.

H.323 and SIP are not firewall and NAT friendly. Many times people using products based on these standards have difficulty communicating with persons outside their organization's firewall. Click to Meet handles this situation elegantly. By monitoring the status of a collaboration session, Click to Meet knows if a conference has not connected properly. If it appears that the conference's audio and video is blocked by the firewall or NAT, Click to Meet automatically attempts to initiate the call using several alternative, more firewall friendly mechanisms.

Click to Meet also offers network managers a simple, single control interface to all IP conferencing endpoints and infrastructure equipment. From the Click to Meet interface, IT managers are able to monitor whether IP videoconferencing devices are online and functioning properly. The Conference Server component of Click to Meet also monitors packet loss and adjusts conference parameters as appropriate to enable the highest quality voice and video experience using available bandwidth.

The Click to Meet management software also includes network policy management tools that allow network managers to control who can use video over the network and how much bandwidth each user is able to consume. Furthermore, embedded within the Click to Meet architecture is a gatekeeper that can control total network bandwidth used by all videoconferencing endpoints across the entire network.

6. Conclusion

Integrated collaboration environments running over IP networks offer enterprises an unprecedented opportunity for increasing productivity among individuals and dispersed work groups. Survey data clearly shows that web-based conferencing is a money saver and a stress reducer for employees. People have also plainly stated that they would prefer to conference from their desktop if the capability, functionality, and quality were there.

Integrated collaboration environments allow organizations to take advantage of technological advances in computer processing power and video technology while maintaining backward compatibility with existing standards-based hardware conferencing equipment. Software based web endpoints allow collaboration capabilities to become widespread and virally deployed.

By integrating with commonly used workflow tools like the web browser, personal scheduling and contact management software, and instant messaging clients, integrated collaboration environments reduce the learning curve for collaboration applications and increase the adoption rate. Furthermore, web-based clients can take on customized user interfaces, enabling developers to create applications that meet a variety of collaboration client needs.

Wainhouse Research believes that web-based integrated collaborative environments are a key driving force for the wide-scale deployment of rich media communications applications.

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