The Computer-Based Intelligent Technology Lab

Peer-to-Peer Desktop Video Conferencing
Final Report — Phase I

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ABSTRACT

Personnel of the Utah Department of Transportation (UDOT) often find it necessary to work together on tasks from remote locations. Since this process adds costs to and reduces the efficiency of task completion, this research project investigated the practicality of desktop conferencing as a low-end telecommunications alternative to the Utah Educational Network (UEN) and traditional travel to and from meeting sights. To provide a low-end alternative, desktop conferencing technology uses personal computers, relatively inexpensive software, and either ISDN or Internet transmission lines. The criteria used for selecting desktop conferencing software includes the following items:

- ability to transmit by way of either the Internet or ISDN lines
- quality of audio and video
- capability for application sharing
- capacity for multipoint conferencing through ISDN lines
- conformity to T.120 and H.320 standards
- upgrade-ability and likelihood product will upscale to new and upcoming standards in a timely manner

On the basis of this criteria, Intel ProShare was selected as the desktop conferencing package for this project. To test the package, two stations were established, one at the UDOT Research Division in Salt Lake City and the other at the Utah Transportation Center in Logan. The tests revealed that desktop video provides an inexpensive and efficient means for a few people at remote locations to share data and ideas electronically. Recent tests have also revealed that the gap is closing between high and low end systems, as new technologies and faster transports become available at a lower cost.

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CHAPTER 1

INTRODUCTION

Since the Utah Department of Transportation (UDOT) often simultaneously uses personnel at different locations to work on the same project, there is a need to for an inexpensive means to share both data and ideas. Telecommunications over the Utah Education Network (UEN) is expensive and requires individuals to go to one of a few sites in the vicinity for conferencing. To increase the effectiveness and to reduce the costs of conferencing, the Utah Transportation Center and the Mountain Plains Consortium invested in a project to explore an alternative means of communication. As a result, research shows that the Intel ProShare desktop conferencing system may provide a suitable alternative.

In addition to lower costs, desktop conferencing has other advantages. Desktop conferencing uses technology common to most offices: personal computers, phone lines, and Internet access. The cost of this technology is small in comparison to UEN conferencing. When comparing the equipment costs of the two systems, desktop is usually termed a low-end system, whereas UEN is called high-end. To transmit data such as audio and video, desktop can use either the Internet, which is comprised of many types of transports, ranging from ether-wire to fiber, or a special type of digital phone line called ISDN. For now, most desktop conferencing makes use of the Internet while ISDN becomes more widely available. Use of the Internet for desktop conferencing does not require any additional costs. Therefore, the cost of transmission for desktop as compared to the Tel8 satellite is considerably less. UEN fiber transmission, however, provides the audio and video quality of a television program. With such high quality, images can be projected onto large screen, allowing large audiences to participate in the conference. UEN conferencing also allows groups at many different locations to participate.

Although desktop conferencing provides neither the quality of audio and video, nor the multi-location capability when using it over the Internet, it has a unique facet. Desktop allows two people (or more when used with ISDN lines), who are working on the same project to see each other, hear each other, and to work on the same document simultaneously. The quality of the image is reasonable and the audio is comparable to a telephone. It is the ability to type, draw, and edit documents simultaneously that makes desktop unique from UEN and satellite systems.

CHAPTER 2

PROJECT IMPLEMENTATION

The project involved a literature review to select a desktop conferencing package. Selection of a package involved such considerations as: transmission methods, audio and video quality, capability to share applications, ability to allow for conferencing at multiple sites, conformity to standards, and the products ability to stay main-stream. With this criteria in mind, Intel ProShare was selected for the following reasons:

- ability to transmit by way of either the Internet or ISDN lines
- multiple protocol support over Internet lines
- compatible with current networking card hardware
- quality of audio and video
- capability for application sharing
- capacity for multipoint conferencing through ISDN lines
- conformity to T.120 and H.320 standards
- highly refined, shrink wrapped product

Intel ProShare allows for data transmission by way of either the Internet or ISDN lines. The Internet is a public channel, meaning that its access is open to many users at the same time. On the other hand, ISDN limits use to only a small group, the sender and the receivers, just like a telephone line. It is a private channel. Intel provides an ISDN board as part of its software conferencing package. To use it, ISDN lines must be obtained and a phone company notified. All of the major phone companies provide this service. Use of the Internet does not require a special line. Rather it only requires access to the Internet through a direct line. Access does not work to a tolerable level with a modem.

Since the Internet is a public channel, whereas ISDN is private, the method of access requires consideration. Regardless of access method, Intel ProShare provides comparatively higher quality of

audio and video. The quality, however, remains dependent on transmission method. Since ISDN is a private channel, its ability to transmit quality audio and video efficiently is not affected by the number of users, and more importantly, is not affected by distance. Its bandwidth is limited only to the type of transmission line. Bandwidth is the amount of available space for data transmission and it corresponds to the speed at which information can flow. As a common everyday example, bandwidth is similar to road width. The width of a road limits the number of users; the number of users limit the speed at which each can travel. With the ISDN channel, other users do not have access to the channel and therefore, bandwidth relates only to the type of transmission line used. Optical fiber, for example, has a greater bandwidth than standard copper. Even with equivalent transmission lines, the Internet is normally a less efficient means of communication. It is a public channel and therefore, its bandwidth is affected by the number of users. When the Internet is heavily loaded, data transmission is considerably slower. To further complicate matters, the farther the other sight is from the local sight, the higher the likelihood that more uses will "merge" onto the highway and clog up the lines with more data, thus decreasing the chance that you will have a smooth, jerk-free conferencing session.

Despite its lack of efficiency, the Internet remains the preferred method for most users in Utah for two reasons: accessibility and cost. To use an ISDN channel, both the sender and receiver must be connected to an ISDN line. Currently, most people do not have an ISDN line to their homes or business. The cost of ISDN access in Utah can range from 50 dollars per month for educational institutions to 180 for businesses and home-owners. Therefore, most businesses cannot justify the cost of ISDN access. In many areas, ISDN may not even be available as the phone companies have not installed it due to lack of demand.

Eventually, as demand increases, the cost of ISDN access will be reduced, and at that time it will become important to have a desktop conferencing system that provides access to both channels, such as Intel ProShare. Furthermore, as more and more individuals are accessing the Internet, it is becoming less

preferential to use as its efficiency is decreasing. Video Conferencing, World Wide Web access, and other uses for the Internet all have served to slow the Internet down making long distance conferencing nearly impossible during peak times of the day. ISDN, and newer faster technologies (such as ATM), will serve to reduce this problem.

CHAPTER 3

QUALITY OF AUDIO AND VIDEO

Intel ProShare provides high quality audio and video. Video quality is a function of bandwidth. For this reason, bandwidth is labeled the bottleneck of video conferencing. When either an ISDN or an Internet (at times of low use) channel is employed, the quality of video for Intel ProShare approaches 24 frames per second. This frame rate is equivalent to that of a movie in your local movie theater (broadcast television operates at 30 frames per second. When the Internet is heavily loaded however, frame rate reduces to between seven and 15 frames per second. Due to the limited bandwidth associated with a heavy load, video appears disjointed rather than slower. The audio quality of Intel ProShare is 8 bit at 11 kilohertz. As a comparison, this quality of audio is the same as a telephone, where at 16 bit, 44 kilohertz, audio quality is at a CD level. Although audio quality is also dependent on bandwidth, however, it remains continuous even when the video is disjointed, and will only cut out after all other systems (video, data, etc) have been reduced to a minimum.

To limit the inconvenience of disjointed audio and video, Intel ProShare uses a compression scheme. As you can imagine, to transmit an entire image continuously requires an enormous amount of bandwidth. A compression scheme reduces transmission to only the parts of the image that move. For example, a person moves while speaking, but the background does not. Therefore, with a compression scheme, the camera transmits the background only once, and the moving portion of the person continuously. Compression also reduces bandwidth requirements for transmitting text. If, during a desktop conference, a person is typing a message, the compression scheme sends only the changing characters. This process, whether for transmitting images or text, is completed automatically by the software of Intel ProShare, which makes conferencing both convenient and efficient.

CHAPTER 4

SELECTED ADDITIONAL FEATURES REQUIRED FOR EFFECTIVE VIDEO CONFERENCING

Capability for Application Sharing

Intel ProShare is one of few vendors who provide the capability for full application sharing. This form of desktop conferencing allows two or more people at remote sites to work on the same document. The document can be from any application that runs under Microsoft Windows: Microsoft Word, Excel, Microstation, are some examples. In fact, even Windows itself can be shared via this system, so that remote users can access the local desktop. To share an application, one person initiates the desktop conference, and after connection is complete, loads the application to be shared. The procedure for loading an application during a desktop conference is the same as the one for routine use. Once running, the monitor shows both the image of the correspondents and the application layout. The layout includes all menus and toolbars associated with the application. Anyone involved in the conference can use these options to alter the appearance of the document. Anyone also can add or delete data.

The ability to work with a document is limited to one person at a time. As a result, the person who can work on a document is the one who has control of the mouse. For the person not in control of the mouse, the international "No" sign appears on the cursor. Once the mouse becomes idle, the no sign disappears, and control belongs to the first person to take advantage of it.

Anyone involved in the conference can use the mouse to complete tasks, such as opening a new document or printing the current one. This ability does not require users to have the application as part of their own system. In conferences between The CBIT Lab and UDOT, the computer at The CBIT Lab contains a full set of applications, whereas the one at UDOT has only Intel ProShare. Although the

computer at UDOT cannot run any applications of its own, while connected to The CBIT Lab computer, it can still perform all of the same tasks.

Although application sharing in itself makes Intel ProShare unique from the majority of other vendors, Intel also provides a whiteboard. A whiteboard works like a chalkboard. On it, conference users can write text and draw pictures. Just as with an open application, a whiteboard appears on the monitor next to the image of the correspondents. The whiteboard provides an easy way to exchange ideas and an interface for systems without any other available applications.

Capacity for Multipoint Conferencing Through ISDN Lines

Just like Tel8 satellite conferencing, Intel ProShare desktop provides the ability to connect several people at different locations. This capacity is called multipoint. The Intel package allows three or more remote locations to conference. Multipoint conferencing cannot occur using the Internet channel, but rather works only with ISDN. Therefore, each user must have access to the ISDN channel.

When multipoint conferencing occurs, each user sees an image of all the other people involved. Therefore, if five locations are involved in conferencing, each monitor shows four images. In addition to the images, each monitor shows either an application or the whiteboard, both of which can be manipulated. Control of the mouse however, becomes more chaotic with multipoint conferencing and, therefore, its users should establish a method for taking turns.

To make multipoint conferencing more efficient, phone companies provide a box called a multipoint communication unit (MCU). This box collects the incoming transmission signals from each of the ISDN lines, copies it, and sends it to each location. In order for the process to work, the desktop software package in use must conform to a standard. Otherwise, the computer cannot interpret the signal received from MCU.

Conformity to T.120 and H.320 Standards

Currently, there are only a select number of vendors who conform to the standards set for desktop conferencing. However, this number is growing rapidly. The T.120 standard ensures precise transmission signals between MCU and the computers used in multipoint conferencing. A vendor can offer *standard* multipoint conferencing if, and only if, their software conforms to the T.120 standard.

H.320 is a digital standard, which allows for communication between desktop conferencing packages of different vendors. For example, since both Picturetel and ProShare conform to this standard those two systems can communicate. It should be noted, however, that communication between any two systems is not yet perfect as the standards are still relatively immature. Since it will take some time to resolve the imperfections, it is recommended that, for now, each group that intends to take part in desktop conferencing purchase software from the same vendor.

CHAPTER 5

PURCHASE AND INSTALLATION OF A DESKTOP CONFERENCING PACKAGE

To install an Intel ProShare desktop conferencing package, the purchase of a computer with the following specifications is recommended :

- 486 microprocessor with 66 MHz processing speed minimum, 586 (Pentium) 60 MHz or better prefered.
- Microsoft Windows 95 with full network support and access to the Internet;
- 15- to 17-inch monitor. The larger the better, as you can do more on the screen with white-boards and application sharing while still viewing one or more conference windows.
- A video board which supports 256 colors or more. No less than 256 color support will do, as the color degradation of 16 color systems makes video conference intolerable if not impossible.
- For ISDN use : ISDN telephone service from local phone company including NT-1 adapter
- For LAN/WAN user: Network interface card with IPX, TCP/IP, or NetBIOS protocol support

The recommended software package is the latest version of Intel ProShare (at Version 2.0 as of this writing). This package provides everything needed for desktop conferencing: an ISDN board, sound board, video capture ability, a video camera, and a combination microphone and earphone. If conferencing is to occur using the Internet, the user must install a network board and have direct access to it. The cost of the Intel ProShare package averages $1,300 for businesses. Price reductions also are available for users who purchase ISDN.

CHAPTER 6

TESTING PHASE

Field Tests

Tests between Utah Department of Transportation and The CBIT Lab

The tests on the Intel ProShare desktop conferencing package involved six people — Doug Anderson, Dal Hawks, Joe Letham, Sam Musser, Thad Senti, and William Grenney. These people used Intel ProShare as a way to conference between Logan and Salt Lake City. For each of the tests, different settings for imaging and sound were used in an attempt to find ones that provided the greatest quality. Some of this testing involved use of speakers rather than microphones and placing the microphone on the table rather than attached to one person. A conference involving 20 people at one end also was organized to evaluate ProShare's ability to project quality images onto a large screen.

Logan to Salt Lake City: The Small Business Development Center

Another video conference link was established between the Small Business Development Center in Salt Lake City to test Intels ability with higher performance systems being run on both ends. A Dell Pentium 60 was operating at the Logan sight, while a Dell Pentium 90 was operating at the SBDC. Both normal and high quality networking options were tested, as well as heavy application sharing.

Logan To Provo: NOVELL, Inc.

Yet another video conference link was established between NOVELL, Inc., located in Provo, Utah, to further test longer distances, and ProShare's performance over a busy IPX/SPX network. This sight is used primarily for one-to-one video conferencing.

International Tests: Lisbon, Portugal

Also, to test ProShare's long range capability as well as to establish international relations, Thad Senti and Dr. Grenney setup a conference with colleagues in Lisbon, Portugal, who work for the New University. At present, only Internet was used, with poor results. A successful conference has not yet been established due to heavy loads and the extreme distance the information must travel. However, ISDN lines are now available in Lisbon, therefore, when they are available here, tests will be conducted over that transport. Thad Senti has witnessed successful demonstrations of ISDN use between Nevada and Hawaii, Utah and California, and between Utah and Australia.

InterCampus Tests (IPX/SPX only)

ProShare's performance also was tested where the two candidates were in close proximity to one another. At most, one router was between the two individuals participating in the conference. Typically, the sessions were separated by less than a mile of network wire, and were operating on a variety of transports including twisted pair, ether, and fiber networks. Due to the obviously short distance the data had to travel, this was the most successful use of the system.

Test Results

With UEN teleconferencing as a comparison, tests found that for larger groups, where a large screen is required, the Proshare image and sound transmission lacks quality. If only the monitor is used in a large group, it is highly unlikely that most individuals will be able to see the remote sight from their position in the room. To resolve the problem, the image was projected onto a large screen using an LCD plate or other scan converter system. This resolved the line-of-sight issue and made the remote sight visible to all. However, audio problems still persist. The audio problems experienced are the same that high end systems experience when dealing with large numbers of people. Intel ProShare, being designed

primarily for a one-on-one conference, has included a microphone system for that purpose. Because Intel has incorporated echo cancellation technology into their product, using this microphone for large groups with open speakers (i.e. not headphones) results in only half-duplex audio. This means that if the local sight is sending audio, they will not hear any audio being transmitted from the remote sight. The microphone system included with the ProShare product pipes the audio directly into the user's ear, effectively bypassing feedback problems where the audio might go back into the mic and be transmitted back to the sight that sent the audio. It is recommended that if users intend to use ProShare for room conferencing they should invest in "Push-To-Talk" audio systems where the mic is only open if an individual is speaking. Intel also offers full-room conferencing systems that are based on the ProShare technology.

Conferences with groups across seas using the Internet channel results in a poor reception. In this case, a continuous video transmission lasted for only a few minutes. The audio remained in tact longer, but only for a few additional minutes until the transmission was completely dropped. It is clear that the only feasible method for international conferencing will be through ISDN lines.

For a small group of people working together in remote locations throughout Utah, desktop conferencing with Intel ProShare serves its purpose extremely well. As for a continuous transmission, the only problem noted was an occasional halt in the video. Audio always provided quality comparable to a telephone. Finally, the data transmission for application sharing from one monitor to another occurred with accuracy and precision, although a Pentium computer of at least 90 MHz would provide for better response. The minimum requirement offered by Intel (a 486 66 Mhz) made the application sharing far too sluggish during heavy activity.

CHAPTER 7

CONCLUSION

As a result of testing, it was concluded that Intel ProShare works effectively for one-to-one conferencing and therefore, as suitable low-end alternative to UEN for certain applications. For larger groups, ProShare still works, but unless better audio "Push-To-Talk" systems are invested in, users will need to cooperate better so they do not cut each other's audio out during conversations.

Testing of Intel ProShare will continue for another year at both the current locations and three to five more UDOT facilities around the state of Utah. Further tests with ProShare will be performed and will involve an evaluation of the product as a design and management information system. As new vendors come to the market and employ the features that ProShare already has, those products will be investigated as well. The next year of testing will revolve around the use and capability of ISDN, as it is generally felt that the Internet is slowly becoming too populated to remain a tolerable alternative transport for video conferencing. It also has become apparent that the actual and intended use for the individual desktop video systems are different. Desktop systems are being used more for group activities than they are for one-to-one conversations. Therefore, it will be necessary to investigate the alternative systems that better integrate push-to-talk and wide angle camera systems, yet still operate on desktop systems. Discussions about implementing even lower-cost systems also has begun, where audio only, sharing only, typing and sharing only, and other variations are being considered as alternatives to full audio/video/sharing systems for use in large organizations.

At UDOT video conferences, where desktop conferencing was discussed and demonstrated, a great deal of enthusiasm surrounded this new technology. Video conferencing systems are popping up all over the country at an alarming rate, and The CBIT Lab is now getting calls into its video system from others who wish to try it out on a regular basis. The CBIT Lab recently conducted a demonstration where Thad Senti lead a conference from his desktop in Logan, with Utah Governor Mike Leavitte in

Salt Lake City, and demonstrated the effectiveness and capability of such systems. As leaders and large corporations begin to endorse this technology, its demand will rise, and the price of full systems will drop to a level where such systems can be employed on all machines in an organization.

APPENDIX A:

GLOSSARY OF USEFUL TERMS

Additional Primary Directory Number

If more than two terminals are connected to a digital subscriber loop, additional primary directory numbers are required. Included with each primary directory number is the standard set of voice and data features. Rates and charges are specified in the individual state offering and apply for each additional primary directory number.

Analog Call Appearance

This feature enables analog station users to share their call appearance on a Single Line ISDN Services user's terminal. The user's analog service must be provisioned from the same serving central office as the Single Line Service. One appearance, per number, per terminal is allowed. Some analog services are not compatible with Single Line ISDN Service.

CALC

Customer Access Line Charge (CALC). In the FCC tariff it is referred to as End User Common Line (EUCL) Charge. Also referred to sometimes as Subscriber Line Charge (SLC)

FCC Rules (69.104) EUCL defines as follows:

A charge that is expressed in dollars and cents per line per month shall be assessed upon end users that subscribe to local exchange telephone service, Centrex or semi-public coin telephone service to the extent they do not pay carrier common line charges. Such charge EUCL shall be assessed for each line between the premises of an end user and a Class 5 office that is or may be used for local exchange service transmissions.

Each Single Line Service is charged one CALC or EUCL. The amount varies by state.

Call Exclusion

This feature has two options:

- Automatic Exclusion
  This option allows a user to restrict other users that share a Directory Number from bridging onto an active or retrieving a held call. This option is automatically invoked whenever the user goes off-hook to receive or place a call.

- Manual Exclusion
  This option allows a user to restrict other users that share a Directory Number from bridging onto an active call or retrieving a held call. This option is activated by pressing a feature button before dialing or during the call.

Call Forwarding Busy Line-All Calls

This feature allows all calls to a busy Primary Directory Number to be forwarded to another number either within the same central office, for the same customer at the same location, outside the customer system within the same central office, or in a different central office.

Call Forwarding-Don't Answer

This feature allows all calls terminating to an idle Primary Directory Number to be forwarded to another number when the called Primary Directory Number does not answer after a predetermined number of seconds.

Call Forwarding Variable-All Calls

The user can forward all Primary Directory Number calls to another number by pressing the Call Forwarding-Variable feature button. The user must activate or deactivate the forwarding function by using either an access code or a feature button. The standard configuration provides for this feature button.

Call Forwarding Busy Line For Circuit-Switched Data

This feature permits all circuit-switched data calls, attempting to terminate to a busy primary directory number, to be redirected to another customer-specific directory number. A busy line condition exists when a circuit-switched data B-channel is available. This feature can either be assigned to the user on an active basis or it can be assigned to a feature button that can be activated or deactivated by the user. If the feature is assigned to a feature button, the forward-to directory number can be changed by dialing an access code and programming the new forward-to directory number.

Call Forwarding Don't Answer For Circuit-Switched Data

This feature permits all circuit-switched data calls, attempting to terminate to an idle primary directory number, to ring a specified number of seconds prior to being forwarded to a previously specified directory number. This feature can either be assigned to the user on an active basis or it can be assigned to a feature button that can be activated or deactivated by the user. If the feature is assigned to a feature button, the forward-to directory number can be changed by dialing an access code and programming the new forward-to number directory number.

Call Forwarding Variable-All Calls For Circuit-Switched Data

This feature allows circuit-switched data calls, attempting to terminate to a line, to be redirected to another specified line. The user must activate or deactivate the forwarding function by either using an access code or a feature button. If the feature is assigned to a feature button, the forward-to directory number can be changed by dialing an access code and programming the new forward-to directory number.

Call Hold

This feature allows the user to place a call on hold by depressing a button.

Call Pickup

This feature allows a user to answer a call at another station, even when the user's station does not have a call appearance for the called directory number. While the other station is ringing, the user goes off-hook and enters a call pickup code or presses a call pickup feature button to answer the call.

Call Rejection

This feature enables a customer to reject call attempts from up to 15 numbers of calling parties by dialing a code and the telephone numbers of calls to be rejected. Any call attempts to the customer from these numbers will be prevented from terminating to the customer and will instead be connected to an announcement informing the caller that the call is not presently being accepted by the called party.

Call Transfer

This feature enables the user to transfer a call to a third party by depressing a button.

Caller Identification Blocking - All Calls

This feature provides a permanent private indicator on a per station basis. Once the blocking is established on the station, the private status cannot be deactivated by the customer. Federal, state and local law enforcement agencies and non-profit domestic violence agencies may be provided additional arrangements for private status and/or all call blocking, on a per station basis at no charge. Stations that share appearances of a restricted station also must be restricted to avoid passing caller identification information.

Caller Identification Blocking - Per Call

This feature enables customers to control the disclosure of their name and/or Directory Number to a subscriber of Caller Identification (where technically feasible) by temporarily changing the public/private status indicator of the Directory Number. A customer must dial a code before each call to change the indicator from public to private. "Public status" allows delivery of the name and/or Directory Number. "Private status" prevents delivery of the name and/or Directory Number. Per Call Blocking is provided at no charge.

Calling Line Identification

Calling Line Identification is provided on both an incoming and outgoing basis.

- Incoming
  Calling Line Identification is provided on both an incoming and outgoing basis. This feature displays the call identification information and the calling party's Directory Number (including nonpublished and nonlisted directory numbers) prior to the call being answered.

Calling party's name is not available. Callers have the ability to inhibit the display of calling party information to the terminating number. Incoming calling identification is provided to the Primary Directory Number and to any associated Secondary Directory Number. Incoming calling line identification cannot just display to the Primary Directory Number when the number is shared.

- Outgoing
  This feature provides a user, who is originating a call, with information about the called party and the facility or destination.

Conference

This feature allows a user to establish a three-way conference call by depressing a button.

Continuous Redial

This feature allows a customer to dial a code that will cause the feature to automatically redial the last number the customer dialed. If the called number is busy, the feature will redial the called number for a limited period of time. A tone alerts the customer when the called number becomes available.

Digital Subscriber Loop

The ISDN basic rate interface loop from the central office to the customer's premises.

DID/DOD

Direct Inward Dial/Direct Outward Dial. These are special trunks in trunking network. As their name implies, direct inward provides for direct inward dialing and direct outward provides for direct outward dialing.

This allows station users to place or receive calls by-passing the attendant.

Display

This feature provides the ISDN terminal a display of the time and date, calling number, call appearance identification, called number, incoming call identifier and feature activation operation.

Drop

The Drop button allows the user to drop the last party added to a conference call or disconnect a two-party call.

Hunting

Hunting is available for circuit-switched data on primary directory numbers.

Hunting Service will affect the operation or availability of some other optional features on the hunting B channel. The features most often affected include forms of Call Forwarding, Speed Calling, and others, depending on the Service Configuration. Call Forwarding features will override the Hunting Services.

Hunting is done sequentially by terminal within the group. One or two B channels are associated with each terminal in the group. One begin-hunt telephone number must be assigned to the first terminal within a Regular or Circular group of sequentially ordered terminals that form a multiline hunt group. Telephone numbers may be assigned, in any sequence, to terminals within a multiline hunt group

Multiline Hunt Service provides a hunting sequence that attempts to complete a call to the first available B channel associated with the lead telephone number of the group. Busy tone is not sent to the caller unless all remaining B channels in the hunt group list have been busy. The call will be completed to the first available B channel.

Multiline hunt groups can be assigned two types of telephone numbers; begin hunt and non-hunting telephone numbers. The begin hunt telephone number has the multiline hunt feature and, when called, starts the hunting sequence associated with the hunt group. A multiline hunt group must have at least one begin hunt telephone number but can have essentially one per terminal in the group. Non-hunting telephone numbers can be assigned to terminals within a multiline hunt group; these terminals do not have multiline hunt feature. Incoming calls are terminated directly to the individual terminals.

Regular hunting starts when a begin hunt telephone number is called in a multiline hunt group. Hunting proceeds in ascending order through each subsequent terminal in the group until an idle terminal is reached or the last (highest numbered) terminal in the group is reached.

Circular hunting is provided optionally with regular hunting groups. Circular hunting occurs in these groups when the hunt for an idle terminal commences beyond the first terminal in the hunt group and finds all higher numbered terminals busy, the hunt returns to the first terminal in the group. The hunt ends with the terminal number preceding the terminal where the hunt in the group initially began.

This feature allows all terminals within a multiline hunt group to be tested for busy regardless of the point of entry into the group before returning busy tone.

Uniform call distribution is a hunting arrangement that provides uniform termination call assignment (distribution) to members of a multiline hunt group. Uniform call distribution does not include queuing or announcements.

Intra Wire Center

A wire center is the physical wires or facilities that extend from a central point and fan out in a tree-like manner into the serving areas - homes, businesses, etc. Intra wire center is within this network.

Intercom

Intercom service allows the user to establish a dedicated priority call to any other station that is a member of the same intercom group within the same central office. Special alerting, depending on

customer premises equipment is provided for an incoming intercom call. As part of the standard package the user can select either Auto Intercom or Dial Intercom.

Auto Intercom

This feature allows two members to be part of an intercom group, which enables intercom calls to be completed by pressing the feature button. Dialed digits are not required.

Dial Intercom

This feature allows the user to establish a call to any other station that is a member of the same intercom group. This is done by pressing the Intercom button and dialing one or more digits. Special alerting, depending on customer premises equipment, is provided for an incoming Intercom call.

Integrated Services Digital Network (ISDN)

ISDN stands for "Integrated Services Digital Network." It is a digital architecture that provides an integrated voice/data capability to the customer premises facility, utilizing the public switched network. ISDN distributes voice, data, video, image and facsimile by two standard methods of access: a

Basic Rate Service (BRS) or a Primary Rate Service (PRS). These are serving arrangements which conform to internationally developed, published and recognized standards generated by the International Telecommunications Union.

Basic Rate Service consists of up to three distinct channels on one pair of wires: one or two B (Bearer) Channels and one D (Delta) Channel. BRS is offered in a package offering referred to as US WEST Single Line Service.

The B channel carries circuit-switched voice and/or data communications at speeds up to 64 Kbps, from the customer's premises, over the loop facility to the central office.

Circuit switched data provides the capability of making data calls over the public switched network. Information is transmitted the same way as digitized voice. Like a voice call, a circuit switched data call ties up the network/system resources for the duration of the call. Similar to voice, Calling Line Identification is provided.

The D channel carries signaling and/or packet data information, at speeds up to 16 Kbps on BRS and signaling only information up to 64 Kbps for PRS, from the customer's premises to the central office. The D channel has both data and signaling functionality; it does not have voice capability.

PRS has a capacity of 1.544 megabits per second and has multiple channels: 23 B channels and one D channel and also is known as 23B + D access. The B channels carry voice calls, circuit switched data, and video, while the D channel handles signaling information.

Inter Wire Center

A wire center is the physical wires or facilities that extend from a central point and fan out in a tree-like manner into the serving areas - homes, businesses, etc. Inter wire center is within this network.

Kbps

Transmission speeds are most accurately measured in bits per second, or bps. Commonly used abbreviations are:

- Kbps
- Mbps
- Gbps
- Kilobits per second
- Megabits per second
- Gigabits per second
- Thousand bits per second
- Million bits per second
- Billion bits per second

The term bit is a contraction of binary digit, the smallest unit of digital information, either an on or off signal. The term byte is similar, but actually represents one full character, a letter, number or symbol of seven or eight bits, depending on the computer code used. The term baud is an older analog designation, and refers to the number of times per second the sine wave of an analog voice line can be successfully modified.

Although the terms bit, byte and baud are frequently interchanged, they are not the same. Speeds on these pages are consistently referenced in bits - kilobits, megabits and gigabits per second.

Last Call Return

This feature allows a customer to automatically redial the number of the last incoming call to that line, whether the call was answered or not. The customer does not have to know the number of the calling party. If the called number is busy, the feature will redial the called number for a limited period of time. A tone alerts the customer when the called line is available.

Loop Qualifications Requirements

US WEST Single Line Service is offered where ISDN compatible facilities and equipment are available. Service is generally considered available for loops 18,000 feet or less in length. Loops greater than 18,000 feet must meet ISDN extension technology design requirements and will be considered available if ISDN compatible pair gain systems are in place or planned to serve the area based on scheduled placement of compatible pair gain systems. If no pair gain system is in place or planned, loops greater than 18,000 feet in length also will be considered available if single line loop extension equipment can be deployed and the loop is within the design limitation of this type of extension equipment. There will be cases where it will be impossible to provide Single Line ISDN Service to a location immediately due to the inherent restrictions that must be met as part of the ISDN design

requirements. In other words because of the nature of the existing loop network some customers may not receive service.

One of the first steps in the ordering process is the determination of whether or not the local loop or the facility between the central office and the customer premises meets the design criteria for an ISDN loop. When special action is required the order interval may have to be lengthened in order to provide the service.

Mbps

Transmission speeds are most accurately measured in bits per second, or bps. Commonly used abbreviations are:

- Kbps
- Mbps
- Gbps
- Kilobits per second
- Megabits per second
- Gigabits per second
- Thousand bits per second
- Million bits per second
- Billion bits per second

The term bit is a contraction of binary digit, the smallest unit of digital information - either an on or off signal. The term byte is similar, but actually represents one full character - a letter, number or symbol - of seven or eight bits, depending on the computer code used. The term baud is an older analog designation, and refers to the number of times per second the sine wave of an analog voice line can be successfully modified.

Although the terms bit, byte and baud are frequently interchanged, they are not in fact the same. Speeds on these pages are consistently referenced in bits - kilobits, megabits and gigabits per second.

Measured Service (Usage)

In addition to the regular monthly charge for access to the local and toll network, local usage charges apply for outgoing calls completed on a local basis. The rates for usage vary by state and may be based on one or more of the following: the number of local messages, the duration (holding time) of each message, the distance between calling and called numbers, and the time of day the call is made. Chargeable time begins when connection is established between the calling station and the called station. Chargeable time ends when the calling station hangs up, thereby releasing the network connections. If the called station hangs up, but the calling station does not, chargeable time ends when the network connection is released by automatic timing equipment in the telephone network.

Message Waiting Indication

This feature is available on Primary Directory Number's and notifies the user of a message waiting by providing either an audible stuttered dial tone or visually by illuminating a light on the

customer's telephone set. Messages may be retrieved by calling the message service center or by accessing a voice mail system.

National ISDN - National Integrated Services Digital Network

Beginning in 1992, telephone companies like US WEST and network switching system manufactures committed to provide standard ISDN services. This commitment is called National ISDN. National ISDN specifies the way that telephones and computers - Customer Premises Equipment (CPE) - communicate with the ISDN network. The National ISDN agreements ensure that each central office switch operates in a standard way, providing a uniform interface to CPE. With National ISDN conformance, a phone (for example) will work on any type of National ISDN switch and will interwork with the analog public switched network.

For some customers without National ISDN, such as those who began using ISDN before 1993, there can be some minor variations in the service they receive, depending on the brand of central office switch that provides their service. These variations can effect CPE configurations, but generally, these customers can place ISDN calls to other ISDN customers, as well as to analog phones.

Stated a little differently, it is a set of standards defined in technical documents written by Bellcore in agreement among telephone companies, switch manufactures, and Customer Premises Equipment (CPE) vendors. This agreement allows consumer provided equipment to work across different telephone company switches using the Basic and Primary Rate Interfaces. CPE is the equipment after the point at which the telephone company terminates the line to the premises. This includes the Network Termination -1 (NT-1) device.

Non-Standard Configuration Group

This is a terminal arrangement, associating buttons of a terminal with a feature, which differs from the standard arrangement.

Packet Switch Network

Packet switching is a data transmission technique whereby user information is segmented and routed in discrete data envelopes called packets, each with its own appended control information for routing, sequencing, and error checking; allows a communication channel to be shared by many users, each using the circuit only for the time required to transmit a single packet. Packets are sent using a store-and-forward method across nodes in a network. Packet switching network then is a network that operates in this manner. A common use for this technology in the ISDN environment is for point of sale or credit card validation.

Packet Switching Usage Charges

Packet transport provides for the routing of data through the public packet switched network in both the originating and terminating directions. Usage charges are billed monthly based on the number of kilosegments transmitted through the public packet switched network for all types of access, and is rated on a per kilosegment basis. A segment consists of 64 octets of customer data. For example, a packet of 128 octets will be billed as 2 segments.

The Packet Usage rate provides a rate for day usage (6:00 a.m. - 6:00 p.m.) and a lower rate for night usage (after 6:00 p.m. and before 6:00 a.m.), as measured at the Signaling Network Control Center, Denver, CO. The rate period in effect at the time the packet segment originated will apply.

Packet Usage will be rounded up to the next whole kilosegment within the billing period. Day and night usage will not be combined. A call overlapping from Day Usage to Night Usage or vice versa will be billed at the appropriate rate for the time period.

PBX

Private Branch eXchange. Telephone switching equipment dedicated to one customer and connected to the public switched telephone network.

Primary Directory Number

Each ISDN terminal is assigned one Primary Directory Number. If more than two terminals are attached to a digital subscriber loop, an additional Primary Directory Number charge will apply.

Priority Call

This feature allows a customer to assign a maximum of 15 callers' telephone numbers to a special list. The customer will hear a distinctive ring at their location when calls are received from callers' telephone numbers on that list. The distinctive ring may be customer premises equipment.

Public Switched Telephone Network

The telephone network, called the Public Switched Telephone Network, is based on the principle of providing 2-wire analog circuits for voice transmission. The most common phone line, such as the one in your home, is the dial-up line, or switched circuit, which uses two wires to connect your phone jack to the phone network. Inside of the PSTN, you will find lots of digital gear. But at your home prior to Integrated Services Digital Network, it was all analog. Integrated Services Digital Network provides the capability for end-to-end digital connectivity.

Rate Stabilized Contract

This plan is for customers who are willing to commit to a specific number of ISDN Single Line Service lines over an extended period. Because of this commitment the customer enjoys a discount and stable price.

Ringing Options

Ringing options allow ISDN station users to establish flexible call handling arrangements for answering incoming calls that terminate on the shared call appearances of a directory number. The ringing options available on a per station basis for a shared directory number are:

Abbreviated Ringing

Ringing begins immediately for an incoming call and stops ringing after a number of seconds.

Delayed Ringing

Ringing for an incoming call is delayed for a number of seconds, however, the call appearance indicator or "status" lamp begins flashing immediately.

No Ringing

There is no ringing for an incoming call that terminates on a call appearance of that directory number.

Normal Ringing

Ringing begins immediately for an incoming call and continues until the call is forwarded, answered, or abandoned.

Second Directory Number

A second directory number is any directory number other than the primary directory number assigned to an ISDN terminal. If more than one secondary directory number is assigned to a terminal, additional charges will apply.

Selective Call Forwarding

This feature allows a customer to specify a special list of a maximum of 15 telephone numbers. Incoming calls placed to the customer from telephone numbers on that list will automatically be forwarded to a predefined telephone number. All other calls will be handled normally.

Shared Call Appearance

This allows several users to share one or more call appearances for a particular directory number. Origination of and termination of calls on one terminal will affect all terminals sharing the call appearance. All secondary call appearances must be provisioned from the same serving central office. If more than two secondary call appearances are assigned to a terminal, additional charges will apply.

Single Line ISDN Service

Single Line ISDN Service (SLS) is a platform-based switched digital service offering fast, flexible, highly reliable, and digitally clear connections with the simplicity of dialing a telephone. Based upon international communications standards, ISDN provides users access to the powerful capabilities of today's Public Telephone Network for communicating across town, or around the world. With Single Line ISDN Service, the same pair of wires that now delivers one communication at-a-time basic phone service to business or residence customers provides two primary, high speed (64 Kbps) communications channels that can be used simultaneously and independently to carry any combination of data, image,

video, or voice calls. By combining these channels, data transfer at up to 128 Kbps may be achieved. Single Line ISDN Service also provides a third, auxiliary channel for low to moderate speed data communications, which is ideal for point of sale, remote monitoring or telemetry applications.

No special handling is required when voice calls are made between ISDN phones and conventional telephones — the network manages the necessary conversions. When conducting data calls to utilize the B Channels for digital communications, ISDN based equipment is required at both ends of the communications path; as is the case with conventional modem connections or fax machine transmissions. Certain ISDN equipment also allows for modem-to-modem communications, providing the ISDN subscriber the best of both worlds.

Single Line ISDN Service is the US WEST name for Basic Rate Service and includes a comprehensive 2B + D package. Contained in the standard package are numerous voice and data features. The standard features and functions support two terminals per basic rate service. Within the standard package there is limited flexibility for customization and various optional features can be added. Single Line ISDN Service does not offer B channel packet service capability.

Six Call Appearances

Call Appearances are the positions on a terminal to which directory numbers are assigned. A Primary Directory Number (PDN) can be shared by more than one ISDN terminal. The quantity and/or position of PDNs, Secondary Directory Numbers (ISDN) Analog Call Appearance (ACA) and Shared Call Appearances are limited by the standard configuration developed for the Customer Premises Equipment. The standard package has six call appearances.

The six call appearances will include one Primary Directory Number and five call appearances, on consecutive buttons, made up of the following:

- Maximum of five call appearances of the Primary Directory Number
- Maximum of one Secondary Director Number
- Maximum of four call appearances of the Secondary Directory Number
- Maximum of one Analog Call Appearance
- Maximum of two shared Directory Numbers
- Intercom call appearances do not count against the standard.

Six-Way Conference

This feature allows the user to sequentially add additional parties (up to five), and add them together to make a six-way call.

64CCC

US WEST offers 64 Kbps Unrestricted (transport of voice and data - rated adapted up to 64 Kbps) Clear Channel Capability (64CCC) data connectivity. Customers will be connected to an ISDN interoffice communication using the Common Channel Signaling - Signaling System 7 Network in accordance with Bellcore Technical Reference TR-NWT-000444.

64k Clear Channel Capability

US WEST offers 64 Kbps Unrestricted (transport of voice and data - rated adapted up to 64 Kbps) Clear Channel Capability (64CCC) data connectivity. Customers will be connected to an ISDN interoffice communication using the Common Channel Signaling - Signaling System 7 Network in accordance with Bellcore Technical Reference TR-NWT-000444.

Speed Calling

Speed calling permits the user to dial pre-programmed numbers using fewer digits than normally required. A speed call list allows for up to 30 preprogrammed numbers per terminal.

Speed Calling 8

This feature permits the user to dial pre-programmed numbers using fewer digits than normally required. It allows the customer to change speed calling lists directly from their terminal.

Standard Configuration Group

The standard arrangement which associates a button of an ISDN station to a feature.

T1 Facility

This element is the digital facility transmitting at a rate of 1.544 Mbps. The T1 signal provided to the customer's premises will have a loss not greater than 16.5 dB. The T1 facility may be provided, at the customers request, via fiber optic facility between the US WEST central office and the customer's premises.

Transaction Initiation Charge

A transaction initiation charge is defined as any action taken that leads to a call of acceptance by the called party. A transaction initiation charge will apply for each originating or terminating call connected to a network address. This charge does not apply for unsuccessful call attempts.

23B+D

PRS has a capacity of 1.544 megabits per second and has multiple channels: 23 B channels and one D channel and is also known as 23B + D access. The B channels carry voice calls, circuit switched data, and video, while the D channel handles signaling information.

US WEST Centrex Plus Service

Centrex Plus is a family name for business communications systems furnished from US WEST Stored Program Control central offices - both analog and digital. It is offered with the intention of grandparenting all previous Centron and Centrex services. Centrex Plus does require special central office equipment and consequently is offered subject to the availability of facilities and applicable generic feature programs as determined by US WEST.

A Centrex Plus system is defined by dedicated central office software called a common block. The common block identifies dialing patterns, code access dialing plans, restrictions and system and station features - much of which can be changed through software programming changes administered by the telephone company or by the customer using their Centrex Management System.

The common block is connected to the customer's premises by station lines. Station lines may be terminated at one location or combined from different locations so long as they all originate in the same central office. They are used by the Centrex Plus customer to place and receive calls, to access special facilities and to access/activate special features. In general, outgoing calls are placed by first dialing "9". Centrex Plus offers customers a wide variety of standard and optional features, allowing their systems to be tailored to meet specific and unique requirements.

Usage Allowance

The tariffs for Single Line ISDN Service include an option with an outgoing call usage allowance. This allowance includes up to 200 hours per month of aggregate usage for B channel circuit-switched voice and circuit-switched data. Additional usage in excess of the 200 hours in a monthly billing period will incur usage charges as specified in the individual state Basic Local Exchange Tariff.

Usage Charge

In addition to the regular monthly charge for access to the local and toll network, local usage charges apply for outgoing calls completed on a local basis. The rates for usage vary by state and may be based on one or more of the following: the number of local messages, the duration (holding time) of each message, the distance between calling and called numbers, and the time of day the call is made. Chargeable time begins when connection is established between the calling station and the called station. Chargeable time ends when the calling station hangs up, thereby releasing the network connections. If the called station hangs up, but the calling station does not, chargeable time ends when the network connection is released by automatic timing equipment in the telephone network.

X.25 Fast Select

Fast Select is a function of the customer premises equipment and is used on a per call basis allowing the user to send up to 128 octets in the user data field of the call request packet to a terminal with Fast Select Acceptance.

X.25 Fast Select Acceptance

This packet feature authorizes incoming packets from a sending data terminal equipped with Fast Select.

X.25 Flow Control Parameter Negotiation

This packet feature permits negotiation on a per-call basis of the flow control parameters associated with a given virtual call, such as packet size and window size for each direction of data transfer. The data window size and the maximum packet size is negotiated automatically during an X.25 data call.

X.25 Logical Channels

Virtual circuits rather than physical circuits are used to establish packet switch calls. When a virtual circuit is established, a logical channel is assigned at the customer premises equipment and the switch for the duration of the call. A virtual circuit does not use any capacity of the facility unless data is actually being transferred. Two logical channels are provided per digital subscriber loop.

X.25 Reverse Charging

This packet feature allows a user to assign billing to the called data telephone number on a per call basis.

X.25 Reverse Charging Acceptance

This packet feature authorizes transmission of incoming calls identified as Reverse Charge calls.

X.25 Throughput Class Negotiation

This packet feature permits negotiation on a per call basis of the throughput class for each direction of data transfer associated with a virtual call. The data terminal can negotiate the throughput class for X.25 data call.

X.75 Gateway

Packet switching networks use protocols that are internationally sanctioned by the International Telecommunications Union. The two prime protocols are X.25 and X.75. For a packet switching ISDN user to transmit data outside their serving central office, an X.75' link must be available between the serving office and a packet switching network. A user wishing to send packet switching traffic InterLATA must do so via a packet switching interexchange carrier. This link is referred to as an X.75' gateway.

APPENDIX B:

ALPHABETICAL LISTING OF DESKTOP VIDEOCONFERENCING PRODUCTS

AEON AVShare

Version: 1.0D

Provider: Aeontech International Co., Ltd.

Description: Audio/Video tools over Internet, LAN/WAN and analog phone lines

Platforms: PC

Requirements: 486DX-33MHz or higher, 4MB RAM, 4MB disk space, Windows 3.1+, Windows NT, or Windows compatible LAN, WAN, TCP/IP network

Price: US $560.00/kit includes AVShare software, video capture board, 28.8K DSVD modem, and Color CCD Camera.

Contact Info: Ms. Arlene Lin /Aeontech International Co., Ltd./ 6F-1, No. 94, Pao Chung Road/ Hsin Tien City Taipei Hsien Taiwan R. O C. phone: 886 2 914 6677 fax: 886 2 914 6688 e-mail: aeontech@tpts1.seed.net.tw

LAN Protocols:

Audio Encoding: transmitted over analog phone line

Video Encoding: proprietary

Interoperability Standard Support:

Multipoint: on LAN/WAN

Collaboration Features: whiteboard and image sharing

Notes:

Survey Info Updated: 25-Apr-96

Avistar Conference

Provider: Avistar

Description: client/server solution for desktop videoconferencing over LANS.

Platforms: PC, Mac, Sun

Requirements:

Price:

Contact Info: Avistar Systems, 555 Hamilton Avenue, Palo Alto CA 94301, USA, +1.415.617.1350, fax: +1.415.617.1351, info@avistar.com.

LAN Protocols:

Audio Encoding:

Video Encoding:

Interoperability Standard Support:

Multipoint: Up to 4 simultaneous participants.

Collaboration Features: Shared window with annotation capability.

Notes:

Survey Info Updated: 29-June-95

BeingThere

Version: 2.0

Provider: Intelligence at Large

Description: Video/Audio/Tools over LAN (Ethernet, Token Ring, LocalTalk) and WAN (analog dial-up, ISDN and other switched/dedicated digital telephone lines).

Platforms: Mac

Requirements: Mac 68040 or Power Mac, Mac OS 7.1 or later, 8 MB RAM, 3.5 MB disk space, QuickTime video capture, video input (S-VHS, NTSC, PAL, SECAM), audio input. ISDN use requires an ISDN card and BRI ISDN service (2 B channels), Modem use requires 28.8 kbps for audio, video and collaboration (9.6 kbps sufficient for collaboration only).

Price: $299 for Standard, $599 for PRO, $149 for Starter kit, includes 2 versions of Standard. Limit 1 Starter Kit per site.

Contact Info: Intelligence at Large, Inc., 3508 Market Street, Suite 230, Philadelphia, PA 19104, USA, phone: +1.215.387.6002, 1-800-425-7638, fax: +1.215.387.9215, info@beingthere.com.

LAN Protocols: Appletalk and ARA, TCP/IP.

Audio Encoding: QuickTime

Video Encoding: Quicktime, National Semiconductor Video Codec

Interoperability Standard Support:

Multipoint: Yes (Pro version), 4 with sound/video; 10 collaboration only. ISDN and modem are point to point only.

Collaboration Features: Full document window sharing, real-time updates of shared documents, whiteboard, drag and drop interface for file transer, file and clipboard transfer, object based whiteboard mark-up tools.

Notes: Free upgrade to QuickTime Conferencing compatibility from Apple Computer will be available soon after QuickTime Conferencing ships. Free demonstration version available via FTP. Send an email request to info@beingthere.com.

Survey Info Updated: 06-June-95

BVCS (Bitfield Video Communication System)

Version: 2.1

Provider: Bitfield Oy

Description: Video/Audio over ISDN (single/multi BRI, PRI), LAN (TCP/IP, NetBIOS), T1/E1 and other networks.

Platforms: PC

Requirements: Microsoft Windows 3.1+, video overlay board or external monitor.

Price:

Contact Info: info@bitfield.fi, phone: +358-0-5024 220, fax: +358-0-455 2240, Bitfield Oy, Ukonvaaja 2, 02130 Espoo, Finland.

LAN Protocols: TCP/IP, NetBIOS

Audio Encoding: G.711, G.722, G.728

Video Encoding: H.261

Interoperability Standard Support: H.320

Multipoint: Yes

Collaboration Features:

Notes:

Survey Info Updated: 08-Mar-95

CLI's Desktop 1000/2000

Version:

Provider: Compression Labs, Inc.

Description: Video/Audio/Collaboration Tools over ISDN

Platforms: PC

Requirements: Windows3.1 and Windows95

Price:

Contact Info: Compression Labs, Inc. 2860 Junction Ave., San Jose, CA, 95134, USA, phone: +1.408.435.3000, toll free: 1-800-CALL_CLI.

LAN Protocols:

Audio Encoding: G.711, G.728, G.722

Video Encoding: H.261

Interoperability Standard Support: H.320

Multipoint: Yes through multipoint bridge

Collaboration Features: shared whiteboard, file transfer, (optional features)

Notes: support for Intel ProShare Premier, support for dual video input. Difference in 1000/2000 systems is 1000 offers 15fps in FCIF and 2000 offers 22fps. Data transfer rate for 1000 is 56-128 and 56-384 for 2000

Survey Info Updated: 20-May-96

C-Phone

Provider: Target Technologies, Inc.

Description: Windows Desktop Video Conferencing System over LAN, ISDN, fractional T1, or Switched-56 digital lines.

Platforms: PC

Requirements: Windows 3.1+, 386SX or higher, 4MB RAM, VGA or better display, graphics board with feature connector.

Price: $1,995 (for LAN user)

Contact Info: Target Technologies, Inc., 6714 Netherlands Dr., Wilmington NC, USA, 28405. Phone: +1.910.395.6100. Fax: +1.910.395.6108

LAN Protocols: IPX/SPX, TCP/IP, NETBIOS

Audio Encoding: LAN - 20Hz - 15kHz; WAN - G.711, G.722, G.728

Video Encoding: LAN - 30 FPS TV Quality; WAN - H.261

Interoperability Standard Support: H.320

Multipoint: Yes

Collaboration Features: High speed file transfer, document camera (optional), and video playback.

Notes: Full screen TV quality video, Operates on existing PCs

Survey Info Updated: 30-Oct-95

Cameo Personal Video System

Provider: Compression Labs Inc.

Description: Video over Switched 56, ISDN, and Ethernet. Audio requires separate ISDN or Analog phone line.

Platforms: Macintosh

Requirements: System 7 or higher, QuickTime, ISDN card for ISDN use, video card (RasterOps 24STV, 24LTV), Analog telephone or speakerphone.

Price: $1,595 without camera, $2,095 with camera.

Contact Info: Compression Labs Inc., 2860 Junction Ave., San Jose CA, 95134, USA, phone: +1.408.435.3000, toll free: 1-800-CALL-CLI.

LAN Protocols:

Audio Encoding: Proprietary CLI PV2 compression algorithm

Video Encoding: Proprietary CLI PV2 compression algorithm

Interoperability Standard Support:

Multipoint: No

Collaboration Features: File Transfer.

Notes:

Survey Info Updated:

CineVideo/Direct

Version: 1.09

Provider: CINECOM Corporation

Description: Desktop Videoconferencing over 28.8 modems. Cinevideo offers audio and video in B&W or color. Works with the QuickCam and any MSVIDEO compliant device. TCP/IP based support with text window to boot.

Platforms: PC

Requirements: 8 MB RAM, MS Windows 3.1, 3.11, 95, and NT, VGA and 1 MB disk storage

Price: $39.95 - CineVideo/Direct, $149.00 Bundle Package includes: CineVideo/Direct, Microphone and a QuickCam

Contact Info: Annie Potter, CINECOM Corporation 15621 Neath Drive, Woodbridge VA 22193, phone: 703-680-4733, fax: 703-680-1697

LAN Protocols: TCP

Audio Encoding: CINECOM AUDIO Compression

Video Encoding: CINECOM VIDEO Compresstion

Interoperability Standard Support: H.324 (future)

Mulitpoint: Yes

Collaboration Features: Works with Intel ProShare

Notes:

Survey Info Updated: 8-Mar-96

CoCoWin (Desktop Video Conferencing Collaboration System on Windows)

Version: 1.0

Provider: ITRI/CCL, Taiwan

Description: Video/Audio/Tools over LAN/WAN (Including Ethernet, 100VG-AnyLAN, FDDI,...etc.)

Platforms: PC (IBM Compatible)

Requirements: 486 or faster, Microsoft Windows 3.1 or Windows 95 or higher, 8 MB RAM

Price: Engine Library-Individual Contact, Full Product - Individual Contact

Contact Info: Fengmin@panda.ccl.itri.org.tw or Jesfa@ccl.itri.org.tw Fax: 886-35-820240, 886-35-820462

LAN Protocols: TCP/IP, UDP/IP, IPX

Audio Encoding: PCM

Video Encoding: Indo or Motion JPEG

Interoperability Standard Support: No.

Multipoint: No.

Collaboration Features: Includes Shared White Board, Share Text Editor, and File Transfer

Notes: Video/Audio/Tools over Modem, ISDN, and ATM under development

Survey Info Updated: 14-Mar-96

CollabOrator System 4000

Provider: Creative Software Technologies

Description: Fully integrated simultaneous video, audio, and data conferencing PC upgrade kit supporting interconnection via ISDN and LAN/WAN

Platforms: PC

Requirements: i486 33MHz or higher ISA bus PC, Microsoft Windows 3.1 or Windows for Workgroups 3.11, SVGA or VGA Monitor, 8 Mb RAM, 5 Mb disk space, One expansion slot for H.320 codec card, ISDN or LAN/WAN support

Price: To be confirmed. Includes:

●H.320 codec card ●External peripheral connector box ●Video camera, cabling and connectors ●Headset, cabling and connectors

Contact Info: Alan Steel at CST Inc. on (802) 326-4215, fax: (802) 326-4488 or email: mediaway@interserv.com

LAN Protocols:

Audio Encoding:

Video Encoding:

Interoperability Standard Support: H.320

Multipoint: Yes with the System 9000 which is a software-only MCU server for multipoint CollabOrator over TCP/IP networks. Right now, it provides multipoint data, switched audio and slow motion JPEG video. Later releases it will support simultaneous T.120 data and H.320 video/audio in conjunction with hardware.

Collaboration Features: Application sharing (Microsoft Windows applications), file transfer, shared whiteboard, textual dialogue

Notes:

Survey Info Updated: 2-Nov-95

CommunicatorIII

Version: 3.0

Provider: EyeTel Communications Inc.

Description: Video/Audio/Tools over Switched 56, ISDN, T1, Ethernet, or Token Ring.

Platforms: PC

Requirements: Novell Netware 3.11+, 386SX or higher, 4 MB RAM, Super VGA w/256 colors and feature connector, Microsoft Windows 3.1+, audio input/output, 5 MB hard disk space.

Price: $6,995, includes camera, microphone, speakers, CODEC and video capture board. Optional motion estimation board $995.

Contact Info: EyeTel Communications Inc., #206 - 267 W. Esplanade, N. Vancouver, B.C., Canada, V7M1A5, phone: +1.604.984.2522, toll free: 1-800-736-3236, fax: +1.604.984.3566.

LAN Protocols: NetBIOS, TCP/IP, IPX.

Audio Encoding:G.711, G.722, G.728

Video Encoding:H.261

Interoperability Standard Support: H.320

Multipoint: Yes

Collaboration Features: Whiteboard, File transfer.

Notes:

Survey Info Updated:

Communique!

Provider: InSoft, Inc.

Description: Integrates real-time digital video technology with fully interactive, real time collaborative tools, such as application sharing, shared whiteboard, chat, audio, text and graphics tools.

Platforms:

Sun	SunOS 4.1.3, 4.1.4
Sun	Solaris 2.3, 2.4
HP	HP-UX 9.0.3, 9.0.5, 10.0
IBM	AIX 3.2.5, 4.1.1
DEC	Digital Unix
SGI	IRIX 5.3
Intel PC	Windows 3.1, 3.11, 95, NT

Requirements: Video card and camera.

Price: Based on supportive platforms.

Contact Info: InSoft, Executive Park West 1, 4718 Old Gettysburg Rd., Mechanicsburg PA, 17055, USA, phone: +1.717.730.9501, fax: +1.717.730.9504, info@insoft.com.

LAN Protocols: Packet/Cell/Telephony Networks

Audio Encoding: G.7xx

Video Encoding: CellB, JPEG, H.261, DVE, Indeo.

Interoperability Standard Support: H.320

Multipoint: Yes

Collaboration Features: Video/Audio/Real Time Collaborative Tools.

Notes:

Survey Info Updated: 1-Dec-95

Connect 918

Provider: Nuts Technologies

Description: Video/Audio/Tools over Analog, Switched 56, ISDN, or Ethernet.

Platforms: Mac

Requirements:

Price: $3,000-$5,000 depending on ISDN or LAN options.

Contact Info: Nuts Technologies, 2374 Walsh Ave., Santa Clara CA, 95051 USA, phone: +1.408.980.7800, Applelink: NUTS.USA.

LAN Protocols:

Audio Encoding: G.711, G.722, G.728

Video Encoding: H.261

Interoperability Standard Support:H.320

Multipoint: No

Collaboration Features: Whiteboard, Screen sharing.

Notes: Reported not to be fully H.320 compliant yet (though product literature claims they are). PC version in the works.

Survey Info Updated: 26-Apr-95

Connectix VideoPhone

Version: v1.1

Provider: Connectix Corporation

Description: Low-cost software based audio/vido and whiteboard conferencing application for both Windows and MacOS. Available as a software-only product or bundled with their digital camera, the Connectix QuickCam.

Platforms: PC and Mac

Requirements: Pentium or faster processor, Windows v3.x or Windows95, WindowsNT. MacOS, Centris, Quadras, and PowerMacs.

Price: Connectix Videophone Software: SRP - 99.00 USD, Street Price - ~59.00USD Connectix Videophone with QuickCam: SRP - 199.00 USD, Street Price - ~169.00USD

Contact Info: Connectix Corporation, 2655 Campus Drive, San Mateo, CA 94403, USA. phone: +1.415.571.5100 toll free: 1-800-950-5880 fax: +1.415.571.5195

LAN Protocols: TCP/IP; Novell IPX

Audio Encoding: PCM, ADPCM, GSM, TrueSpeech

Video Encoding: VIDEC, Indeo, NSVideo, H.261

Interoperability Standard Support: No.

Multipoint: Yes.

Collaboration Features: Whiteboard

Notes: Connectix QuickCam digital camera plugs into a PC's parallel port or into a Mac's printer port. Since the QuickCam plugs directly into alread available ports, there is no need for additional hardware.

Survey Info Updated: 21-May-96

ConXion

Version:

Provider: Imaging Business Systems

Description: Audio/Video tools over the Internet and POTS

Platforms: PC

Requirements: minimum: 386/33 Processor, 4MB RAM, 12MB free space, Windows 3.1 or later, 14.4kbps modem; recommended: 486/50 Processor, 8MB RAM, 40MB free space, 28.8kps modem

Price: $499

Contact Info: conxion@webex.com

LAN Protocols:

Audio Encoding:

Video Encoding: proprietary

Interoperability Standard Support: No.

Multipoint: No.

Collaboration Features: whiteboard, file transfer, and application sharing

Notes:

Survey Info Updated: 21-May-96

CorelVIDEO

Version: 1.0

Provider: Corel

Description: CorelVIDEO is a video PBX, providing high resolution, full-motion video to the desktop. Includes data sharing and many other workgroup features.

Platforms: PC, Mac

Requirements: Windows 95/NT (now), Win3.11, or OS/2. Macintosh. External camera, external/internal NTSC/PAL video monitor, one spare pair of UTP per desk.

Price: $499.00 per seat excluding camera

Contact Info: Faxback 1-613-728-0826 ext 3080 doc#1081 or catherinej@corel.com

LAN Protocols: IPX, TCP/IP, NETBEUI

Audio Encoding: internal: n/a, external H.320/G.711/G.728

Video Encoding: internal: n/a, external H.320, G.261

Interoperability Standard Support: H.320

Multipoint: internal: available as an option, external: compatible with H.320

Collaboration Features: video: broadcasts, multipoint. data: text messaging, shared screen, shared document, file transfer

Notes: Survey Info Updated: 18-Mar-96

CU-SeeMe / Cornell

CU-SeeMe / White Pine

Version: 83b3 (Macintosh), 64a4 (PC).

Provider: Cornell University and White Pine

Description: Video/Audio over the Internet. (PC version is receive-only for the audio).

Platforms: Macintosh, PC.

Requirements: Video camera. Mac: 68020 or higher, System 7 or higher, 16-level-grayscale display, MacTCP, video hardware (Video Spigot hardware or AV Mac), audio hardware, Quicktime. PC: 386DX or higher, Microsoft Windows 3.1+, Windows Sockets compliant TCP/IP, 8 bit video driver, video hardware supporting Microsoft Video For Windows.

Price: Free, by anonymous ftp from ftp://gated.cornell.edu/pub/CU-SeeMe/.

Contact Info: Dick Cogger, R.Cogger@cornell.edu, phone: +1.607.255.7566.

LAN Protocols: UDP/IP, IP Multicast.

Audio Encoding:

Video Encoding: Non-standard

Interoperability Standard Support:

Multipoint: Yes, using Unix reflector software.

Collaboration Features: None

Notes: PC runs on both Windows and Windows 95

Survey Info Updated: 9-Nov-95

CU-SeeMe (Enhanced)

Version: 2.0 (PC), 2.0 (Mac in beta)

Provider: White Pine Software

Description: Desktop Video Conferencing software for person to person or group conferencing. Enhanced CU-SeeMe can be used over the Internet or any TCP/IP network. Enhanced CU-SeeMe is a software only solution and is crossplatform supporting all Windows and Macintosh platforms.

Platforms: PC and Mac

Requirements: Video camera.

PC

486 or Pentium processor, 8MB RAM, Windows 3.1+, Windows95, Windows/NT, TCP/IP - Winsock compliant.

MAC

68020, 030, 040, Power Macintosh, 4MB RAM, System 7.0 or greater, TCP/IP - MacTCP included, Open Transport in System 7.5.2. Macintosh PowerPC and Macintosh 68K

Price: $99 Retail, $69 electronic version only purchased over the Internet

Contact Info: White Pine Software, Inc. 40 Simon Street, Nashua, NH 03060-3043 phone: 603-886-9050, fax: 503-886-9051, email: info@cu-seeme.com

LAN Protocols: TCP/IP

Audio Encoding: 2.4k Voxware, 8.5k Digitalk, 16K Delta-mod

Video Encoding: White Pine 24-bit True Color, CU-SeeMe Grey

Interoperability Standard Support:

Multipoint: Yes - White Pine Reflector - Unlimited

Collaboration Features: WhitePineBoard - Object oriented, color, multiuser with text draw objects. Copy, paste, and full editing for information sharing. Chat Window - for non-audio conversations using text entry from keyboard. Filtering for selection of individual conversations.

Notes: CU-SeeMe offers a total Internet video conferencing software only solution. It can be used as an Internet phone over a low bandwidth 14.4 modem or as a video and audio conferencing solution over a 28.8 modem or higher bandwidth connection. When used with the White Pine Reflector, Enhanced CU-SeeMe supports group conferencing and video for "cybercasting" to large audiences. Enhanced CU-SeeMe can be downloaded for 30 day evaluation from our web site at: www.cu-seeme.com

Survey Info Updated: 8-Apr-96

DECspin

Version:

Provider: DEC

Description: Audio/Video Tools over TCP/IP,DECnet,ISDN

Platforms: DEC 3000 Alpha AXP workstation

Requirements: OSF/1 AXP v1.3, video camera, headset, microphone

Price:

Contact Info:

LAN Protocols: TCP/IP, DECnet

Audio Encoding: G.725

Video Encoding: JPEG

Interoperability Standard Support: No.

Multipoint: Yes - up to 6 users

Collaboration Features: No.

Notes:

Survey Info Updated: 21-May-96

digitel 2000

Version: 2.01

Provider: Digivision Milano Italy

Description: Video/audio/data and application sharing over standard telephone lines at 28.8kbaud. The digitel 2000 kit includes everything needed to turn your PC into a videoconferencing workstation

Platforms: PC

Requirements: Windows 3.11 or Windows95, PCI BUS

Price: Italian liras = 2,600,000 US dollars = $1,600. Kit inlcudes a 28.8kbaud modem, camera (ccd toshiba), video capture board, software

Contact Info: digivision srl Via carlo Poerio 29 - 20129 Milano Italy. phone: ++39, 2, 2951, 3323 fax: ++39, 2, 2951, 3466 e-mail: dgvision@micronet.it

LAN Protocols:

Audio Encoding: propietary

Video Encoding: propietary

Interoperability Standard Support: future

Multipoint: future

Collaboration Features: document conferencing, shared application, remote control functions, telephone and fax functions

Notes: Audio is sent at 4.4kbaud leaving the rest for video, data, images. The modem and related software is able to distinguish between an incoming fax, data transfer, or voice messaging. It can handle fax on demand and voice messges

Survey Info Updated: 16-Apr-96

DV100

Version: v1.2

Provider: Mosaic Information Technologies

Description: PC-LAN based videoconferencing. Single board codec with SoundBlaster drivers for PC multimedia functionality during non-videoconferencing use.

Platforms: PC

Requirements: i486DX33 with 8MB RAM (16MB if Windows for Workgroups), TCP/IP software, high performance LAN Network Card (Ethernet, Token Righ, FDDI, ATM, etc)

Price: $2995, including hardware, software, camera, speakers and microphone

Contact Info: Mosaic Information Technologies, 130 Fifth Avenue, New York, NY 1011. phone: (212)604-9630, fax: (212)604-9640, email: sales@videoconferencing.com

LAN Protocols: TCP/IP, Winsock Compliant

Audio Encoding: ADPCM, 8KHz uLab up to 22 KHz PCM Stereo

Video Encoding: JPEG, 320 x 240 or 160 x 120

Interoperabiltiy Standard Support: Optional Gateway product which converts (real time) from JPEG over TCP/IP to H.320 over ISDN or Switched-56

Multipoint: inherent in software

Collaborative Features: bundled with SMART 2000 groupware package, which includes whiteboard and application sharing functionality

Notes: The bandwidth is approximately 300Kbps and has up to 30fps, depending on network equipment and network traffic. DV200: has same specifications but is an external black box which enables multiplatform videoconferencing. Optional Utiltiy Manager provides additional functionality, including: inventory control, privacy protection, access usage by groups, automatic population of global call list, participation notification, prioritization of users, auto redial and call back, software distribution, call control, call accounting, auditing and reporting, receptionist functions and auto synch of global databases.

Survey Info Updated: 16-January-96

DV100R

Version: v1.2

Provider: Mosaic Information Technologies

Description: PC-WAN based videoconferencing. Single board codec with additional ISDN or Switched-56 communications board. This does not use ISA bus to transfer audio and video which enables the PC to run more efficiently for other applications running simultaneously to videoconferencing.

Platforms: PC

Requirements: i486DX33 with 8MB RAM (16MB if Windows for Workgroups)

Price: $5995, including hardware, software, camera, speakers and microphone

Contact Info: Mosaic Information Technologies, 130 Fifth Avenue, New York, NY 10011. phone: (212)604-9630, fax: (212)604-9640, email: sales@videoconferencing.com

WAN Protocols: ISDN or Switched-56

Audio Encoding: H.320 (Audio-G's)

Video Encoding: H.320 (H.261), CIF = 352x288, QCIF = 176x144

Interoperabiltiy Standard Support: H.320

Multipoint: Yes. Certified with AT&T GBVS in Atlanta

Collaborative Features: bundled with SMART 2000 groupware package, which includes whiteboard and application sharing functionality.

Notes: Uses a bandwidth of 128 Kbps up to 1.544Mbps and runs at 15fps in CIF and 30fps in QCIF. DV200R: same specifications but is an external black box which enables multiplatform videoconferencing. Optional Utility Manager provides additional functionality, including: inventory control, privacy protection, access uasage by groups, automatic population of global call list, participation notification, prioritization of users, auto redial and call back, software distribution, call control, call accounting, auditing and reporting, receptionist functions and auto synch of global databases.

Survey Info Updated: 16-January-96

DVTCS-3000 ULTRA

Version:

Provider: SYSTEMS of Excellence

Description: The DVTCS-3000 ULTRA is a cross-platform (PC, MAC, UNIX), 30fps desktop video teleconferencing system. SOEI provides for multipoint, continuous presence audio and video as well as file and aplication sharing. Additional features include analog transmission over UTP in a LAN/Campus envieronment and standards based wide area transmission at 30fps. Multiple "seats" are simultaneously transmitted (4, 8, 16, 32, etc.) in all conferences. Video on demand ad-hoc connectivity are standard features.

Platforms: PC, MAC, UNIX

Requirements: 286 or above

Price: List price $5,999. plus requisite infrastructure.

Contact Info: Fred M. Raumer/Vice President of Sales and Marketing/Systems of Excellence/1420 Springhill Road, Suite 155/McLean, VA 22102 phone: (703) 734-9200 fax: (703) 883-1434

LAN Protocols: NetBios, TCP/IP, Novell

Audio Encoding:

Video Encoding:

Interoperability Standard Support: H.320, T.120, G.721

Multipoint: Yes.

Collaboration Features: Yes.

Notes:

Survey Info Updated: 17-Apr-96

DynoVision

Provider: DynoVision, Inc.

Description: DynoVision is an Audio / Video system that has been designed to operate over standard analog telephone lines or various network situations. The system focuses on utilizing a wide range of Macintosh platforms in order to provide a user with a suitable system to meet his/her needs.

Platforms: Macintosh

Requirements: 68020 or higher, 2Mb RAM for DynoVision, Mac OS 7.1 or higher with MacTCP 2.0.4 & Sound Manager, 1.7 Mb HD, 9.6 K modem for 1-way video. 14.4 K modem required for two-way video and 19.2 K modem or higher required for audio and video.

Price: $199.95 for one unit or $329.95 for a set. DynoVision includes: one or two cameras, software, User's manual, and cables.

Contact Info: DynoVision, Inc., Toll free: 1-800-800-9292, email: dyno@dynacs.com

LAN Protocols: UDP/IP, IP multicast

Audio Encoding: N/A

Video Encoding: N/A

Interoperabiltiy Standard Support: Point-to-point modem connections allow any Internet application to run while using video services (Fetch, FTPd, MacHTTP, etc.). PC compatible for dial up modem connects, for those wanting to share Mac/PC resources.

Multipoint: Yes - with the aid of a CU-SeeMe video reflector.

Collaboration Features: N/A

Notes: System is cost effective and is Mac or PC CU-SeeMe application and video reflector compatible.

Survey Info Updated: 15-January-96

Eris Visual Communications System

Provider: RSI Systems Incorporated

Description: Video/Audio/Tools over ISDN.

Platforms: PC, Mac, Unix

Requirements: PC running Windows 3.1 or later / Macintosh running System 7.0 or later / SUN workstations

Price: $3,995 includes desktop unit (with integrated speakerphone), cables, software and documentation.

Contact Info: RSI Systems Incorporated, One Corporate Plaza, 7400 Metro Blvd., Suite 475, Edina, MN, 55439 USA, +1.612.896.3020, toll free: 1-800-496-4304, fax: +1.612.896.3030.

LAN Protocols: N/A

Audio Encoding: G.728, G.711

Video Encoding: H.261 (QCIF,CIF)

Interoperability Standard Support: H.320

Multipoint: Yes.

Collaboration Features: Real-time sharing of any document window (cross-platform) and file transfer capability (cross-platform).

Notes: Eris is a self-contained SCSI or PCMCIA peripheral (requires no board installation). It can be easily moved between systems.

Survey Info Updated: 21-May-96

ES+F2F (Electronic Studio's Face 2 Face)

Version: 1.0

Provider: Electronic Studio

Description: Video/Tools over ISDN, Analog, Ethernet. Audio requires ISDN or Analog phone line.

Platforms: Macintosh

Requirements: Apple Communications Toolbox, video capture board.

Price: $995 video, $995 text and image exchange, $1,495 both.

Contact Info: The Electronic Studio, 7 Fitzroy Square, London, W1P 6HJ, Great Britain, phone: +1.408.974.0784, toll free: 1-800-377-8681.

LAN Protocols: Appletalk

Audio Encoding:

Video Encoding:

Interoperability Standard Support:

Multipoint: No

Collaboration Features: Text and image exchange.

Notes:

Survey Info Updated:

Focus PC

Version:

Provider: GPT Video Systems

Description: Audio/Video tools over ISDN

Platforms: PC

Requirements: Windows3.x, Windows 95, Windows NT

Price: $5,850

Contact Info: Mr. Chris Arnold phone: +01635 550660 fax: +01635 521268

LAN Protocols: n/a

Audio Encoding: G.711, G.728

Video Encoding: H.261 (CIF and QCIF)

Interoperability Standard Support: H.320

Multipoint: yes.

Collaboration Features: whiteboard, file transfer

Notes:

Survey Info Updated: 21-May-96

FreeVue

Version: 1.03

Provider: AMS

Description: Audio and video conferencing software for the PC. Internet based, allows both point to point, multi-point, and broadcasting

Platforms: PC

Requirements: 486 or better, 4MB RAM, 14.4K or better internet connection.

Price: Currently free at web site

Contact Info: feedback@freevue.com

LAN Protocols: TCP/IP

Audio Encoding: Proprietary

Video Encoding: Proprietary

Interoperability Standard Support: None yet.

Multipoint: yes

Collaboration Features: Audio, video, text chat

Notes: No compression hardware required - works with any video for windows device

Survey Info Updated: 23-Feb-96

Global Phone Visual Communication System

Version: 1.5

Provider: VIC Hi-Tech Corporation

Description: The Global Phone Visual Communication System is a full-featured videoconferencing system that works on a desktop PC and runs over regular POTS phone lines, ISDN, TCP/IP LAN, and the Internet.

Platforms: PC

Requirements: Windows 3.1+, Windows NT, Windows 95. 486DX 25+ PC, 8MB RAM, video for windows compliant video capture card 9600 Kbps modem, ISDN modem, TCP/IP LAN, or Internet

Price: $99 for software, $1,299 for software, color video camera, 28.8 Kbps DSVD modem, video capture board

Contact Info: sales@vic-corp.com, phone: 310-643-5193, fax: 310-643-7572

LAN Protocols: TCP/IP

Audio Encoding: DSVD modem

Video Encoding: JPEG (proprietary)

Interoperabiltiy Standard Support: No.

Multipoint: up to 8 multipoint over LAN and Internet

Collaboration Features: real-time shared high-resolution whiteboard with shared color editing tools. File transfer.

Notes: Global Phone 1.5 offers local and remote Pan/Tilt/Zoom controls for the Canon VC-C1 P/T/Z camera. Global Phone offers local and remote snapshots, contact phone book, local and remote controls for video size, source, and quality, and TWAIN device support. Global Phone also features a Tele-type box for on-screen communication and a voice-to-data switch that allows users to switch back and forth between the videoconference and a regular phone call. Allows document and image sharing, selectable video window sizes (up to full screen).

Survey Info Updated: 18-Mar-96

ICU Video Services

Version: 2.0.6

Provider: Uni-Data and Communications, Inc.

Description: Audio/Video/Tools over LAN/WAN.

Platforms: PC, SUN, DEC

Requirements: TCP/IP LAN and/or WAN for call setup. Cat 3 UTP for video within a premise; ISDN, SW56, ATM or private circuits for video transmission between premises. Motif (Solaris/Ultrix) or Windows 3.1 with Winsock-compliant TCP/IP.

Price:

Contact Info: 65-11, 174th Street, Flushing, NY 11365, USA, phone: +1-718-445-5600, fax: +1-718-445-5604; 2/9, Mason's Avenue, London, EC2V 5BT, England, phone: +44-171-600-4124, fax: +44-171-600-5412.

LAN Protocols: TCP/IP

Audio Encoding:

Video Encoding: H.261

Interoperability Standard Support: H.320

Multipoint: 4-, 9-, 16-way viewing with all participants simultaneously displayed and audible.

Collaboration Features: White Pages, On-Line directory services, text messaging, frame grabbing.

Notes: TV-quality desktop and room video conferencing and broadcast distribution over unshielded twisted pair up to 300 meters within a premise and via WAN between premises. No impact on LAN throughput. Works with any analog video camera or monitor/video board. Non-clocking video switch guarantees that every call will complete successfully. Complete call control from every desktop. Feature set includes: caller ID, call roaming, speed dialling, detailed billing and usage reports. Operable within a single premise or throughout a global enterprise. Distributed architecture allows for multiple video switches to be interlinked to provide end-to-end calling capability from any desktop. Can distribute VCR, CATV, broadcast TV, stored video.

Survey Info Updated: 14-May-95

Incite Conversational Multimedia Network

Provider: Incite

Version:

Description: "Incite Conversational Media is actually several products, including multimedia hubs, WAN hubs, cameras, software and servers that constitute a multimedia, voice, data and video over isoEthernet technology"

Platforms: PC

Requirements:

Desktop PC's:

●486DX2-66mHz or better ●8M of RAM (16 recommended) ●30M of available hard disk space ●Windows 3.1/3.11 (Windows 95 recommended) ●Amplified Speakers or Telephone Headset ●Two full-size 16-bit bus slots available ●SVGA Windows-supported Graphics Monitor (256+ colors)

Incite Server **Requirements:**

●486DX2-66MHz or better ●32M of RAM ●70M of available hard disk space ●Windows NT v3.5.1 ●10BaseT Network Interface Card

Price: $450 per port (estimated). Base Package - $25,400 which includes: One Incite WAN Hub, One Incite Multimedia Hub, Four Desktop Multimedia Packages, Four User Software License

Contact Info: Incite, a division of Intecom, Liberty Plaza II 5057 Keller Springs Rd., Dallas, TX 75248. phone: +214-448-8200 fax: +214-447-8205 or toll free: +1-800-9INCITE. email: info@incite.com

LAN Protocols:

Audio Encoding: G.711, G.728

Video Encoding:

Interoperability Standard Support: H.320

Multipoint: Yes.

Collaboration Features: whiteboard, on-line image editing

Notes: Runs over existing LAN, WAN, and PBX links. It uses Isochronous Ethernet (isoEthernet), which adds a 6-Mbps circuit-switched channel on top of the existing 10-Mbps 10BaseT Ethernet channel. It can run with any network operating system and supports any video codec algorithm.

Survey Info Up-dated: 14-Nov-95

InPerson

Provider: Silicon Graphics

Version: 2.0 (April 1995)

Description: Video/Audio/Tools over ISDN, T1, Ethernet, FDDI. A conference includes a shared whiteboard and a "shared shelf" for visual file transfer.

Platforms: InPerson runs on any SGI platform with graphics. The SGI Indy comes bundled with all the audio/video hardware/software you need. For machines without video hardware, a static image is used instead of live video. For machines without audio hardware, the InPerson whiteboard can be used with an analog phone line for voice.

The InPerson whiteboard is available on Windows from NetManage (+1-408-973-7171, sales@netmanage.com).

InPerson is now running on Windows PC (486+ with Windows 3.x, Windows 95, Windows NT) as a videoconferencing tool as well as a whiteboard.

Internezzo Technologies (+1.415.561.5171) plans to provide InPerson on Suns and HPs by Dec. 1995.

Requirements: IRIX 5.3 system software. No additional hardware needed on Indy.

Price: $495 U.S. list

Contact Info: US toll free: 1-800-800-7441, inperson@sgi.com

More info and evaluation copy available from www.sgi.com.

LAN Protocols: Audio and video data is sent using UDP/IP. IP multicast is used for all conferences with more than two participants. The whiteboard uses TCP/IP.

Audio Encoding: InPerson supports several standard audio compression formats:

Intel/IMA DVI ADPCM	16 kHz	64 kbps(default)
Intel/IMA DVI ADPCM	8 kHz	32 kbps
CCITT/ITU-T G.711u-law PCM	8 kHz	64 kbps
GSM 06.10 RTE/LTP	8 kHz	13 kbps
uncompressed mono	44.1 kHz	706 kbps
CCITT/ITU-T G.728	8 kHz	16 kbps with optional hardware

Video Encoding: H.261, RGB8, HDCC (video compression algorithm developed at SGI)

Interoperability Standard Support:

Multipoint: Yes

Collaboration Features: Text, image, 3D model sharing. Whiteboard can include graphics, as well as text and images. Whiteboard in version 2.0 supports sharing 3D models among participants. InPerson also includes a "shared shelf" for visual file transfer between participants in a call.

InPerson is part of Silicon Graphics' MindShare(TM) collaborative environment. This environment includes:

- interactive discussion of text, images, 3D models.

- software tools for digital media capture, creation, edit and playback.

- interactive presentation and authoring tool.

- store and forward of digital media and 3D documents.

- 3D support among all collaboration tools.

Notes: Optional hardware board for Indy provides G.728 audio compression and acoustic echo cancellation. InPerson and MindShare are trademarks of SGI.

Survey Info Updated: 18-July-95

InSight 100

Version: 3.5

Provider: EyeTel Technologies, Inc.

Description: Simple to use, highly otimized software based videophone program that is ideal for use by means of modem connections over regular phone lines or cellular phone connections. Chat.

Platforms: PC

Requirements: 486-80 or faster (Pentium recommended), 8 MB RAM, 6 MB hard disk space, one free PCI or ISA slot, VGA card with 256 color support or better, 9600 to 28.8 modem (28.8 recommended), MS Windows 3.x

Price: $129 software only, $369 - software and video card

Contact Info: Sales and Marketing: EyeTel Technologies, Inc./ 501 Goodlette Rd., N., Suite D306/Naples, FL, 33940 phone: (941) 435-1079 fax: (941) 434-7613 Contact: Bill Follin or Will Gibbs

Research & Development/Technical Sales: EyeTel Technologies, Inc./ #734 - 4720 Kingsway/ Burnaby, BC, V5H 4N2 Canada phone: (604) 451-3352 fax: (604) 451-3346 Contact: Robert Calis

Executive Office: EyeTel Technologies, Inc./ 11933 North Ogden Point Rd./Syracuse, IN 33940 phone: (219) 457-8200 fax: (219) 457-8635 Contact: Chuck Madlock

email: jose@panamnet.net

LAN Protocols:

Audio Encoding: CELP (4.8 Kbps)

Video Encoding: H.261

Interoperability Standard Support: Proprietary

Multipoint: No

Collaboration Features: Chat box, phone book

Notes:

Survey Info Updated: 17-Apr-96

InSight 300

Version: 3.5

Provider: EyeTel Technologies, Inc.

Description: H.320, full motion videoconferencing that operate over a variety of LANs and WANs including ISDN & SW56

Platforms: PC

Requirements: 486-50 or better, *MB RAM, 10 MB hard disk space, 3 available ISA slots, VGA graphics card, 256 colors or better, MS Windows 3.1 or 3.11, NetBios or Windows Socket compliant TCP/IP stack for LAN connectivity

Price: starts at $5,495.00

Contact Info: See information under InSight 100

LAN Protocols: NetBui, TCP/IP, Net Bios

Audio Encoding: G.711, G.728, G.722

Video Encoding: H.261

Interoperability Standard Support: H.320

Multipoint: Yes.

Collaboration Features: Application sharing, create OLE documents, whiteboard with unlimited document capacity, chat window, full clipboard support, real time interactive and simultaneous annotation.

Notes:

Survey Info Updated: 17-Apr-96

Interact

Provider: Applied Communication Concepts Inc.

Description: Windows Desktop Video Conferencing System over ISDN line or RS-449 interface.

Platforms: PC

Requirements: Windows 3.1+, Intel 386SX or higher based computer system, 4MB RAM, VGA or better display and graphics board.

Price: $5,995 includes variable-focus proprietary person and document camera with built in speakerphone/handset.

Contact Info: Applied Communication Concepts Inc., Research Traingle Park NC, USA, +1.919.549.0874.

LAN Protocols:

Audio Encoding: G.711, G.722, G.728

Video Encoding: H.261

Interoperability Standard Support: H.320

Multipoint: Yes (maximum of eight participants, can only display up to two remote participants at a time).

Collaboration Features: Shared drawing areas, shared clipboards, file transfer, OLE links, document camera, video playback, and other collaborative tools.

Notes: This system allows remote control of others' cameras and can record full-motion audio/video broadcasts. Bandwidth: 56k to 128k bits per second. Frame speed: up to 15 frames per second.

Survey Info Updated:

INTERVu

Provider: Zydacron, Inc.

Description: Video/Audio/Data over IsoEthernet (802.9), ISDN, Switched 56, or V.35/RS366.

Platforms: PC

Requirements: 386 or higher, Microsoft Windows 3.1 or higher.

Price:

Contact Info: Zydacron, Inc., 670 Commercial St., Manchester NH, 03101, USA, phone: +1.603.647.1000.

LAN Protocols:

Audio Encoding: G.711u/a, G.722, G.725, G.728

Video Encoding: H.261 (QCIF,CIF)

Interoperability Standard Support: H.320

Multipoint: Yes

Collaboration Features: File Transfer, runs most collaborative software already on the market (i.e. talkshow, vis-a-vis, person to person, farsite, terminal, carbon copy, proshare, etc.)

Notes: Operates at fixed frame rates of 15fps @FCIF and 30fps @QCIF without sacrificing clarity. INTERVu is completely CPU independent. Future plans to come out with a multiplatform product capable of 20(fixed) fps @ Full CIF.

Survey Info Updated:

InVision

Version: 3.0

Provider: InVision Systems Corp.

Description: Video/Audio/Tools over LAN/WAN (including Ethernet, Token Ring, FDDI, Frame Relay, ATM, ISDN, etc.) Also V.32 or faster modem.

Platforms: PC

Requirements: 486/33 or faster, Microsoft Windows 3.1+, 8MB RAM, 3MB hard disk space, high density 3.5" disk drive, 256 color VGA or SVGA - local bus recommended, Windows-compatible mouse or pointing device, Wave compatible sound card, Video for Windows compatible compression board, camera and microphone.

Price: $595, includes software only.

Contact Info: InVision Systems Corp., 317 S. Main Mall, Suite 310, Tulsa OK, 74103, USA, toll free: 1-800-847-1662, phone: +1.918.584.7772, fax: +1.918.584.7775, Internet: info@invision.com, Compuserve: 72002,1677.

LAN Protocols: TCP/IP, IPX

Audio Encoding:

Video Encoding: DVI (ActionMedia II or MediaShare Mambo)

Interoperability Standard Support:

Multipoint: Video is point to point, document conferencing up to 12 users.

Collaboration Features: Includes VisionGraphics document sharing software which includes a whiteboard and supports OLE.

Notes: H.261, H.320, MPEG under development.

Survey Info Updated:

IVS (INRIA Videoconferencing System)

Version: 3.5

Provider: RODEO Project, INRIA Sophia Antipolis, France.

Description: Video/Audio over the Internet.

Platforms: Various Unix platforms (see Requirements section).

Requirements: A workstation with a 1, 4, 8 or 24 bit screen depth. Multi-host conferences require kernel support for multicast IP extensions (RFC 1112). Video frame grabbers supported are:

SPARC stations with Parallax, SunVideo, VideoPix and the new Vigrapix

Silicon Graphic stations with IndigoVideo, GalileoVideo and VinoVideo

PC/Linux with SCREENMACHINE II

DEC 5000 stations with VIDEOTX

DEC ALPHA stations without video capture

PC/FreeBSD2.0 stations without video capture.

HP stations with VideoLive

No special hardware apart from the workstation's build-in audio hardware is required for audio. Requires a camera compatible with the video board.

Price: Free, by anonymous ftp from ftp://zenon.inria.fr/rodeo/ivs.

Contact Info: Thierry Turletti, Thierry.Turletti@sophia.inria.fr.

LAN Protocols: UDP/IP, IP Multicast.

Audio Encoding: PCM, ADPCM, VADPCM

Video Encoding: H.261

Interoperability Standard Support:

Survey Info Updated: **Multipoint:** Yes

Collaboration Features: None

Notes:

Survey Info Updated: 28-May-95

jointX

Version: 2.1

Provider: Sietec Systemtechnik (subsidary of Siemens-Nixdorf)

Description: Multipoint desktop conferencing system that supports X11 application sharing with simultaneous videoconferencing.

Platforms:

●SUN SunOS 4.3 ●SUN Solaris 2.x ●SGI IRIX 4.x and 5.x ●HP HP-UX 9.x ●SNI RM Sinix-5.4 ●IBM AIX 3.x

Requirements: Sietec's SC320 video module for H.320 based videoconferencing, Parallax PowerVideo board (for JPEG), SunVideo board (for CellB)

Price: Call for prices.

Contact Info: Sietec Systemtechnik GmbH & Co. OHG, Nonnendammallee 101, D-13629 Berlin

Mr. Carsten Kruschel, Product Manager - phone: +49 30 386-28148, fax: +49 30 386-23780, email: carsten.kruschel@sietec.de

LAN Protocols: TCP/IP (UDP)

Audio Encoding: G.711, PCM

Video Encoding: JPEG, CellB, H.261

Interoperablitity Standard Support: H.320

Mulitpoint: yes, H.320 with MCU

Collaboration Features: X11 application sharing, shared group filestore, chatbox, and shared whiteboard

Notes: The videoconferencing modules support H.320/ISDN, JPEG/UDP and SUN-CellB/UDP based video. jointX enables several physically remote people to work simultaneously on networked, heterogeneous UnIX hosts within the framework of a group. The group work is based on an X-application(e.g. a CAD-application, a DTP-application). jointX normally supports all X-applications if they don't use X-extensions. jointX allows the members of a work group to use X-applications jointly and to save data centerally in order to avoid version conflicts.

Survey-Info Updated: 23-Feb-96

Mediafone/Fonewatch

Provider: Fiber & Wireless

Description: Audio/Video/Tools over analog/digital phone lines and LAN/WANs. Audio can be sent over the same analog phone line with the proper modem (available from Fiber & Wireless).

Platforms: PC

Requirements: For desktop PC upgrade kit: 486DX-33MHz or higher, 4Mb RAM, 256k external cache, 12Mb hard disk space, high density floppy drive, 14,400bps or higher modem, camera.

Price: PC upgrade kit includes Mediafone/Fonewatch software, video capture and VGA board, feature connector and AV/VGA cable. Other configurations are available including a software only package, a complete portable system and a software only laptop kit.

Contact Info: Fiber & Wireless Inc., 2200 Amapola Court #102, Torrance, CA 90501, USA, phone: +1.310.787.7097, fax: +1.310.787.7099, Mediaphone: +1.310.787.1745.

LAN Protocols:

Audio Encoding:

Video Encoding:

Interoperability Standard Support:

Multipoint: LAN/WAN operation appears to support multipoint.

Collaboration Features: Whiteboard, application sharing.

Notes:

Survey Info Updated: 29-Mar-95.

Meet-Me

Version: 1.0

Provider: SAT usa/Sagem

Description: Video/Audio/Collaboration Tools over LAN (using ISO ethernet) or ISDN.

Platforms: Mac, PC

Requirements: Mac - Mac AV or PowerMac AV (except 660AV and 6100AV). Provides ISDN "S/T" interface, NT-1 Bundled with product. 1 Nubus slot.

PC: 386 SX 25. ISA slot 8MB of RAM

Price: Mac - $3,000 includes:

●H.320 Nubus Codec 1 slot ●Telephone handset ●Camera ●no speakers though

PC - $4,495 includes:

●H.320 ISA - format codec with built-in ISDN interface (one slot) ●Telephone handset ●Color camera with integrated microphone ●Camera connector and power supply ●External speakers

Contact Info: SAT–SAGEM, Dominique Schraen, 20370 Town Center Lane #255, Cupertino, CA, 95014, USA, phone: +1.408.446.8690, fax: +1.408.446.9766.

LAN Protocols: Mac - AppleTalk

Audio Encoding: G.711, G.722, and G .728

Video Encoding: H.261

Interoperability Standard Support: H.320

Multipoint:

Collaboration Features: file transfer, shared whiteboard

Notes: Communications interfaces: ISDN (Both B ch.s and ISO ethernet.) H.320 codec with Planet ISDN daughterboard for 1 Nubus connection. ISDN (2B+D): 2x64kb/s or 2x56 kb/s. H.320 components for quicktime conferencing.

Integrated ISDN card not dedicated to videoconferencing allowing use for all ISDN purposes including access to the Internet. Windows API is available to developers of applications for this product. Due to the MVIP connector, Meet-Me PC is an open platform allowing for transfer rate of up to 384kbps.

Meet-Me PC and Meet-Me are cross platform compatible.

Survey Info Updated: 6-Nov-95

MegaConference

Version:

Provider: Alpha Systems Lab

Description: Video/Audio Tools over POTS

Platforms: PC

Requirements: Windows3.x, Windows 95, Windows NT

Price: $1,195

Contact Info: Alpha Systems Lab / 2361 McGaw Ave. / Irvine, CA 92714 USA phone: +1.714.622.0688 toll-free: 1-800-576-4275

LAN Protocols:

Audio Encoding:

Video Encoding: M-JPEG

Interoperability Standard Support: No.

Multipoint: No.

Collaboration Features: whiteboard, file transfer

Notes:

Survey Info Updated: 21-May-96

MINX - Network Video System

Provider: Datapoint Corp.

Description: Local and Wide Area Video Conferencing System - Utilizes existing available wiring in building including: unused twisted pair in your 10baseT LAN wiring or any available unshielded twisted pair (UTP) in your building - Cat. 2 UTP, Cat. 3 UTP, Cat. 4 UTP or Cat. 5 UTP, or shielded twisted pair (STP), or COAX, or Fiber Optics for local connections. For long distance digital video communications the system supports ISDN line rates from BRI to PRI, Switched Digital line rates from 56Kbps to 2Mbps(E1) with additional support for ATM, Satellite, Microwave, and Digital Fiber Optics connectivity.

Platforms:

PC - Any PC(386, 486, Pentium) supporting Windows 3.1, Windows 95, Windows NT, or OS/2 for Windows 2.11 with ISA bus and VGA or RGB display monitor supporting video overlay card (WinTV).

MAC - Any MAC AV system or any MAC that supports a MAC running any version of the MAC OS that supports a video overlay card for the RGB display.

SUN - Any SUN Workstation running SUN OS or Solaris that is Video Enabled with SUN Video card or other video overlay card (SlicVideo, RasterVideo, Parallax).

Other UNIX workstations - Any UNIX workstation or X-Terminal that is video enabled or supports a video overlay interface that accepts standard NTSC or PAL (Composite Video) input.

Standard NTSC and PAL Display Devices - Any video display devices/monitors that support standard NTSC or PAL video input(such as Televisions).

Requirements: See above.

Price: PC version - $1,750 at desktop includes camera, microphone, speakers, video overlay card and MINX interface card. 8 Port Server - $7,450 (32 port, 64 port and 128 port servers available). Standards (ITU H.320) based CODEC supporting up to 384Kbps - $12,990. DTC Desktop Collaborative Computing Application for PC - $99

Contact Info: Datapoint Corp., 8400 Datapoint Drive, San Antonio, Texas, USA, 78299, Tel. 1-210-593-7900, Toll free: 1-800-378-6469

LAN Protocols: IP, IPX (also modem support) for Collaborative Computing Software on PC

Audio Encoding: G.711, G.722, G.728

Video Encoding: H.261

Interoperability Standard Support: H.320

Multipoint: Yes this is a standard feature. Datapoint's patented video follows voice technology automatically switches view to current speaker. More than 1,100 parties may be engaged in video conferencing within a Local Area of Interest (LAI) or campus environment. This system supports more than 550 two-way calls simultaneously or any combination of multiple parties (3, 10, 20, 100, etc. up to 1,100 simultaneous users) on a single call. For wide area or long distant calls, the Datapoint Servers and

SuperHubs can support any number of codecs, which can be running at the same or different line rates. The Datapoint system handles the rate adaptation between different line speeds. This allows a remote desktop running at 128Kbps (ISDN BRI) to participate in a multipoint call with parties on the local video network and remote room systems and/or rollabouts that may be running at higher line rates such as 384Kbps and/or 768Kbps. No other MCU is capable of this rate adaptation function. A Continuous Presence Option (Hollywood Squares) is also available and can work in conjunction with the system's standard multipoint functions.

Collaboration Features: Shared Whiteboard, Real-time interactive document manipulation (up to 128 users working on same document at same time), file transfer, document camera support, shared video resources (VCRs, cameras, TV tuners, etc.) and support of other third party collaboration tools.

Notes: Software on the Server and/or SuperHubs automatically changes remote view to the current speaker. Software on the Personal Computer can capture video. Datapoint standards based codec supports line rate from 56Kbps to 2Mbps and can handle Switched Digital Service and/or ISDN Services. Frame rates for wide area calls vary based on line rates from 15FPS CIF to 30FPS CIF. Local video is full motion standard TV quality NTSC or PAL video. In addition to supporting our standards based codecs on the network the MINX networked Video System also supports propietary codecs such as PictureTel and CLI codecs, as well as, high speed DS3 codecs such as Grass Valley that support line rates of 45Mbps.

Survey Info Updated: 9-Nov-95

MMC (MultiMedia Collaboration)

Provider: Technical University of Berlin and Hewlett Packard

Description: Video/Audio/Application Sharing over LAN

Platforms: HP9000/7xx (Sun, SGI, DEC, PCs and Apple Macintosh)

Requirements: HP9000/7xx, Parallax PowerVideo700 or Conference Cam, Camera, Headset, HP-UX 9.01 or above, MPower

Price:

Contact Info: Nicolai Leymann, Technical University of Berlin, nicolai@prz.tu-berlin.de

LAN Protocols: IP

Audio Encoding: G.711

Video Encoding: M-JPEG, H.261

Interoperability Standard Support:

Mulitpoint: Yes

Collaboration Features: Application Sharing

Notes:

Survey Info Updated: 29-Jan-96

Ntv

Provider: Peregrine Systems

Description: Video/Audio/Tools over Ethernet and Token Ring.

Platforms: PC

Requirements: 386 DX/25 or higher, 4MB RAM, Microsoft Windows 3.1+ or Windows for Workgroups, Network connection, Video capture board, Audio capture board, Camera, Microphone, Speakers.

Price:

Contact Info: Peregrine Systems, Inc., 1959 Palomar Oaks Way, Carlsbad CA, 92009, USA, phone: +1.619.431.2400, toll free: 1-800-638-5231, fax: +1.619.431.0696, info@www.peregrine.com.

LAN Protocols:

Audio Encoding:

Video Encoding:

Interoperability Standard Support:

Multipoint: Yes

Collaboration Features: Application sharing of Windows-based applications.

Notes:

Survey Info Updated:

nv (Network Video)

Version: 3.3 (beta)

Provider: Xerox/PARC

Description: nv provides unicast and multicast video over the Internet. It is commonly supplemented with vat (Visual Audio Tool) and wb (Whiteboard) for full-featured video/audio conferencing and collaboration.

Platforms: Sun SPARCstation, DECstation 5000 and Alpha, SGI, HP9000, IBM RS6000.

Requirements: Receivers need no special hardware - just an X display. Senders require a camera that is compatible with the video capture hardware: Sun/SunOS 4: Parallax, PARCVideo, VideoPix, X11. Sun/SunOS 5: SunVideo, VideoPix, X11. DEC 5000/Ultrix: PIP, X11; DEC Alpha/OSF 1: J300,X11; SGI/Irix 5: SGI VL (Indy, Galileo), X11. HP9000/HPUX: VideoLive, X11. RS6000/AIX: IBM VCA, X11.

Price: Free, available at ftp://parcftp.xerox.com/pub/net-research

Contact Info: Ron Frederick, frederick@parc.xerox.com

LAN Protocols: UDP/IP, IP Multicast.

Audio Encoding: N/A

Video Encoding: Native NV, CU-SeeMe, Sun CellB

Interoperability Standard Support:

Multipoint: Yes

Collaboration Features: None

Notes: nv, vat, and wb are tools commonly used with MBone. vat and wb are available at ftp://ftp.ee.lbl.gov/conferencing/. An on-line paper about nv is available.

Survey Info Updated: 26-May-95

Audio Encoding:

Video Encoding:

Interoperability Standard Support:

Multipoint: Yes

Collaboration Features: Application sharing of Windows-based applications.

Notes:

Survey Info Updated:

Personal Communication Computer

Version: 2.5

Provider: Ing. C. Olivetti & C.

Description: Video/Audio/Data communications over ISDN

Platforms: PC (ISA)

Requirements: 20 MHz 386 PC (486 recommended), 8 MB RAM, 1 ISA slot, VGA or SVGA monitor, Microsoft Windows 3.1+

Price: 2,200 UK pounds includes:

●PCC Software Services Rel 2.2 ●ISA card featuring on board ISDN controller, H.320 audio-video codecs and video overlay. ●NTSC or PAL camera. ●Telephone set with keypad and hands free operation. ●Telephone set works (voice calls) also when is PC is switched off. ●Connection unit for auxiliary audio-video input-output. ●AC/DC adaptor.

Contact Info: Ing. C. Olivetti & C. Via Jervis 77 Ivrea, Italy. Gabriele Cottura, PCC Marketing Manager, fax: +39 125 523124, gcottura@dss.ico.olivetti.it

LAN Protocols:

Audio Encoding: G.711, G.722, G.728

Video Encoding: H.261 (QCIF moving images, CIF image capture)

Interoperability Standard Support: H.320

Multipoint: Yes (only audio/video H.242)

Collaboration Features: Application Sharing, Whiteboard, File Transfer, Cooperative Form Filling

Notes:

Survey Info Updated: 10-Jun-96

Phonoscope

Version: 5.0

Provider: Neosoft

Description: Phonoscope desktop uses a switched network television quality video and audio operated over fiber optic cabling. This system is non-compressed, non-digitized baseband video and audio. Phonoscope users simply dial up other subscribers or use the codec pool or Internet based video for long distance connections. The desktop version supports point-to-point, or four way multidrop with all microphones and pictures active and present during the conference.

Platforms: Macintosh

Requirements: Operates on AV Macintosh

Price: Less than $2,700 per station

Contact Info: Phonoscope Communications/910 Travis #2017/Houston, TX 77002

LAN Protocols: None

Audio Encoding: None

Video Encoding: None

Interoperability Standard Support: As required H.320 up to 768Kbps switched

Multipoint: Yes. Full duplex - up to four-way.

Collaboration Features: Compatible with any desktop collaborative software

Notes:

Survey Info Updated: 17-Apr-96

PICFON

Version: 1.0

Provider: Specom Technologies

Description: Video/Audio over Analog and ISDN phone lines.

Platforms: PC

Requirements: 386 or higher, 4MB RAM, 40MB hard disk, DOS 5.0 or higher, camera.

Price:

Contact Info: Specom Technologies Corp., 2322 Walsh Ave., Santa Clara CA, 95051, USA, phone: +1.408.982.1880, fax: +1.408.982.1883.

LAN Protocols:

Audio Encoding:

Video Encoding:

Interoperability Standard Support:

Multipoint: Yes (maximum of three parties).

Collaboration Features: Still-image sharing.

Notes: Not sure if this is still available. See Specom's new product, TelePro.

Survey Info Updated:

PictureTel Live 200 Series

Version: 1.6

Provider: PictureTel

Description: Single board solution for Video/Audio/Collaborative Tools over ISDN

Platforms: PC

Requirements: Windows95, 16MB RAM, 20MB disk space

Price: $1,495 includes: single videoconferencing board, camera, headset, LiveWare collaborative software

Contact Info: PictureTel Corp., The Tower at Northwoods, 222 Rosewood Dr., Danvers MA, 01923, USA, phone: +1.508.762.5000, toll free: 1-800-716-6000, fax: +1.508.762.5245

LAN Protocols:

Audio Encoding: G.711, G.728, G.722

Video Encoding: H.261 (CIF, QCIF)

Interoperability Standard Support: H.320

Multipoint:

Collaboration Features: shared whiteboard, shared clipboard, windows application sharing, drag-and-drop file transfer

Notes: Live200p is add-on solution for PCI bus PC's; Live200i is add-on solution for ISA (or EISA) bus PC's, comes complete with VMC graphics controller.

Survey Info Updated: 20-May-96

PictureTel Live PCS 100

Provider: PictureTel

Description: Video/Audio/Tools over Switched 56, ISDN.

Platforms: PC

Requirements: 386 or higher, 2 ISA slots, Microsoft Windows 3.1+.

Price: $4,995

Contact Info: PictureTel Corp., The Tower at Northwoods, 222 Rosewood Dr., Danvers MA, 01923, USA, phone: +1.508.762.5000, toll free: 1-800-716-6000, fax: +1.508.762.5245.

LAN Protocols:

Audio Encoding: G.721, G.722, G.728, PT 724 proprietary algorithm

Video Encoding: H.261

Interoperability Standard Support: H.320

Multipoint: Yes (maximum of 16 parties).

Collaboration Features: Whiteboard, File Transfer, Screen sharing, Application Sharing.

Notes: Supports network speeds up to 384kbps.

Survey Info Updated: 20-Feb-95

PictureTel Live PCS 50

Provider: PictureTel

Description: Video/Audio/Tools over ISDN.

Platforms: PC

Requirements: 386 or higher, 1 ISA slot, Microsoft Windows 3.1+, VAFC graphics connection (available from PictureTel).

Price: $2,495

Contact Info: PictureTel Corp., The Tower at Northwoods, 222 Rosewood Dr., Danvers MA, 01923, USA, phone: +1.508.762.5000, toll free: 1-800-716-6000, fax: +1.508.762.5245.

LAN Protocols:

Audio Encoding: G.721, G.722, G.728, PT 724 proprietary algorithm

Video Encoding: H.261

Interoperability Standard Support: H.320

Multipoint: Yes (maximum of 16 parties).

Collaboration Features: Whiteboard, File Transfer, Screen sharing, Application Sharing.

Notes: A version of PCS-50 complete with camera, speakerphone, and software will be included in the Zenith Data Systems Z-STATION GT 575 VC, a 75Mhz Pentium based system.

Survey Info Updated: 27-June-95

PictureTel LiveLAN

Provider: PictureTel

Description: Video/Audio/Tools over Local Area Network.

Platforms: PC

Requirements: 486-66+, video capture card, Microsoft Windows 3.1+, camera, audio card, speakers, microphone.

Price: $395

Contact Info: PictureTel Corp., The Tower at Northwoods, 222 Rosewood Dr., Danvers MA, 01923, USA, phone: +1.508.762.5000, toll free: 1-800-716-6000, fax: +1.508.762.5245.

LAN Protocols: IPX

Audio Encoding: Proprietary

Video Encoding: Proprietary

Interoperability Standard Support:

Multipoint: No.

Collaboration Features: Application Sharing.

Notes:

Survey Info Updated: 20-Feb-95

PictureWindow

Version: 1.4

Provider: BBN

Description: Video/Audio over the Internet.

Platforms: Sun SPARCstation.

Requirements: Sun SPARCstation (1,1+,2,IPX,10), 8 bit color or grayscale frame buffer, 24MB memory, SunOS 4.1.1 or later with IPC_SHMEM option, OpenWindows 2.0 or higher or X11 R4 or higher with an 8-bit PseudoColor visual, VideoPix card.

Price: $495 software only, $1,495 with VideoPix and camera.

Contact Info: BBN, 150 Cambridge Park Drive, Cambridge MA, 02140, USA, +1.617.873.2000, toll free: 1-800-422-2359, fax: +1.617.873.5011, picwin-sales@bbn.com.

LAN Protocols: UDP/IP, TCP/IP.

Audio Encoding:

Video Encoding:

Interoperability Standard Support:

Multipoint: Yes

Collaboration Features: None

Notes: A receive-only demo is available through ftp @ picwin.bbn.com (login as "picwin").

Survey Info Updated:

Plug & See

Version:

Provider: Matra Communication (Lagardere Group)

Description: Audio/Video/Collaboration tools over ISDN

Platforms: PC

Requirements: 386 or higher, 1 ISA slot, Microsoft Windows 3.1+

Price: $4,000

Contact Info: Matra Communication, Rue JP Timbaud, 78392 Bois d'Arcy Cedex, France. Phone : +33 (1) 34 60 78 58

LAN Protocols:

Audio Encoding: G.721, G.722, G.728

Video Encoding: H.261

Interoperability Standard Support:H.320

Multipoint: Yes

Collaboration Features: Whiteboard, File Transfer, Screen Sharing, Application Sharing.

Notes: a LAN version is being developed (available since June 96)

Survey Info Updated: 26-Oct-95

Pronto

Version: 1.0

Provider: Cybermarche Inc.

Description: Pronto is a personal desktop video conferencing system that supports real-time audio, video, text and Graphics. It supports application-sharing (X-window applications) and whiteboards. It supports multiple audio and video formats and hardware. It works on IP-based networks as well as ISDN lines. It provides an integrated address book and has a user-friendly interface for controlling various audio and video parameters.

Platforms: Unix, PC

Requirements: 486 or better running Windows 95 or Windows NT, SparcStations, DEC 5000, SGI Indy, 16MB RAM. Video Hardware: Parallax, SunVideo, VideoPix, Connectix QuckCam, and any video for Windows compatible device. Audio Hardware: Any SoundBlaster compatible device, and any mu-law or GSM device. Supports CellB, JPEG, MPEG, and others.

Price: Contact Representative

Contact Info: Ms. Michal Cleetus/Marketing Manager/Cybermarche Inc./Suite 412, 235 High Street/Morgantown, WV 26505. phone/fax: (304) 296-1113 e-mail: michal@cybermarche.dmssoft.com

LAN Protocols: IP, Novell

Audio Encoding: mu-law, GSM

Video Encoding: Vfw, Quicktime, JPEG, CellB

Interoperability Standard Support: future

Multipoint: Yes

Collaboration Features: Application sharing (X-windows only)

Notes: Provides Unix and Windows interoperability. Supports digital cameras which eliminate the need for hardware framegrabbers and hence a very low-cost videoconferencing system.

Survey Info Updated: 17-Apr-96

ProShare Video System 150

Version: Video System 150

Provider: Intel

Description: Video/Audio/Tools over LAN

Platforms: PC

Requirements: PC with Intel486(tm) 33 MHz CPU minimum, IntelDX2(tm) 66 MHz processor or Pentium(tm) processor recommended. Windows 3.1 or 3.11. 8 MB RAM minimum, 16 MB RAM recommended, plus 16 MB hard disk space (minimum). VGA display with 256 colors or higher (no feature connector required). Network interface card. 1 full-length ISA slot. Supported protocol stacks, at least one of:

IPX: Novell VIPX, version 1.11, 1.17, 1.18

TCP/IP: FTP PC/TCP, version 2.31, FTP OnNet, version 1.1

Novell LAN WorkPlace for DOS, version 4.12

NetBIOS:Microsoft Windows for Workgroups, version 3.11

LANDesk Personal Conferencing Manager software installed on your LAN

Price: $1,499, includes software, one full length ISA card, color CCD camera, headset/microphone unit.

Contact Info: Intel Corp., 2200 Mission College Blvd., P.O. Box 58199, Santa Clara CA, 95052-8119, USA, phone: +1.503.629.7354, toll free: 1-800-538-3373, fax: 1-800-525-3019.

LAN Protocols: NetBIOS, TCP/IP, IPX (LAN physical layer independent: Ethernet, Token Ring, FDDI, T-1, Frame Relay)

Audio Encoding: GSM

Video Encoding: Indeo.

Interoperability Standard Support:

Multipoint:

Collaboration Features: Whiteboard, application sharing.

Notes:

Survey Info Updated: 18-May-95

ProShare Video System 200

Version: Video System 200

Provider: Intel

Description: Video/Audio/Tools over LAN/WAN/ISDN.

Platforms: PC

Requirements: PC with Intel486(tm) 33 MHz CPU minimum. IntelDX2(tm) 66 MHz or Pentium(tm) processor recommended. Windows 3.1 or 3.11. 8 MB RAM minimum, 16 MB RAM recommended, plus 17 MB hard disk space (minimum). VGA display with 256 colors or higher (no feature connector required). 2 full-length ISA slots.

For ISDN use

NT-1 adapter I

SDN telephone service from local phone company

For LAN/WAN use

Network interface card

Supported protocol stacks, at least one of:

IPX: Novell VIPX, version 1.11, 1.17, 1.18

TCP/IP: FTP PC/TCP, version 2.31, FTP OnNet, version 1.1

Novell LAN WorkPlace for DOS, version 4.12

NetBIOS: Microsoft Windows for Workgroups, version 3.11

LANDesk(tm) Personal Conferencing Manager software installed on LAN

Price: $1,999, when user purchases either local ISDN Service from a participating LEC or long distance ISDN Service from an IXC, the price drops to $1,499. When purchasing *both* local and long distance ISDN service from participating carriers, the price drops to $999). Includes software, 2 full length ISA cards, color CCD camera, headset/microphone unit.

Contact Info: Intel Corp., 2200 Mission College Blvd., P.O. Box 58199, Santa Clara CA, 95052-8119, USA, phone: +1.503.629.7354, toll free: 1-800-538-3373, fax: 1-800-525-3019.

LAN Protocols: NetBIOS, TCP/IP, and IPX

Audio Encoding: GSM, G.711

Video Encoding: Indeo., QCIF H.261

Interoperability Standard Support: H.320

Multipoint: Yes, using H.320-compatible bridges.

Collaboration Features: Whiteboard, application sharing.

Notes: You can now purchase ProShare packaged with a complete workstation.TeamStation is shipped with a 120 MHz Pentium based PC with ProShare VS 200 preinstalled and a Diamond Viper Pro graphics card to provide full screen video with ProShare. It also comes with a 37-inch monitor, a software controlled pan-tilt-zoom camera, and a high end room echo canceller.

Survey Info Updated: 18-May-95

QuickTime Conferencing

Version: 1.0.3

Provider: Apple Computer, Inc.

Description: Apple's affordable videoconferencing and collaboration software lets up to nine Macintosh users at once get connected worldwide over Ethernet or the Internet with network connection sppeds of 112K or greater. Conferences can be recorded and played back as QuickTime movies. Shared window lets users share graphics, text, sounds, and QuickTime movies

Platforms: Macintosh. Windows interoperability planned for 5/96

Requirements: Any Macintosh AV model, Power Macintosh 7500, or Power Macintosh 8500. 16MB RAM, System 7.5 or greater; ISDN Kit **Requirements:** NuBus-based Mac, PCI-based Mac support planned for 5/96, Power Mac 7100AV or 8100AV.

Price: QuickTime Conferencing $59.95; QuickTime Conferencing Kit under $300 includes: software and a high resolution color camera; QuickTime Conferencing ISDN Kit under $1,800.

Contact Info: QuickTime Conferencing is downloadable online at the QuickTime Conferencing WWW site. It also is available through Apple Authorized Resellers

LAN Protocols: AppleTalk, TCP/IP

Audio Encoding: MACE, ISDN Kit: G.711, G.722, G.728

Video Encoding: H.261, JPEG, Apple Video, ISDN Kit: H.261 video codec

Interoperability Standard Support: pending - Available with ISDN kit! - H.320 and T.120 (pending)

Multipoint: Yes - up to nine users; ISDN Kit: No.

Collaboration Features: Users can share graphics, text, sounds, QuickTime movies. "Capture Screen" lets users share a picture of anything on their screen. Shared whiteboards can be saved for later viewing.

Notes: Network protection features include flow control for real-time media, multicast media distribution, low bit-rate video coding algorithms, and bandwidth monitoring and control via a Simple Network Management Protocol (SNMP) station

Survey Info Updated: 17-Apr-96

ShareVIDEO

Version: 2.1

Provider: Zen Multimedia Pte Ltd

Description: Video Conferencing using POTS. Low cost, affordable video conferencing solution. Support DSVD modem

Platforms: PC

Requirements: MS Windows 3.11 and Windows 95, 486DX2-66 System and above, 8MB RAM, 120MB HDD, VL/PCI based Windows Accelerator

Price: Please call. Video conferencing kit includes: ShareVideo software, camera, video capture card, fax/modem

Contact Info: Zen Multimedia Pte Ltd / 527 Serangoon Road / Singapore 218161 phone: 65-292-1413 fax: 65-292-1751 email: zenmm@singnet.com.sg

LAN Protocols:

Audio Encoding:

Video Encoding:

Interoperability Standard Support:

Multipoint:

Collaboration Features: Electronic whiteboard. Application sharing via thier ShareWORK product.

Notes:

Survey Info Updated: 25-Apr-96

ShareVision Mac 3000

Provider: Creative Labs

Description: Audio/Video/Tools over Analog phone line.

Platforms: Macintosh

Requirements:

Contact Info: Creative Labs, Inc., 1901 McCarthy Boulevard, Milpitas CA, 95035, USA, phone: +1.408.428.6600, toll-free: 1-800-998-1000, fax: +1.408.428.6611, AppleLink: SHAREVIS.MKT.

Price: $1,299

LAN Protocols:

Audio Encoding:

Video Encoding:

Interoperability Standard Support: Future versions will support the ITU-T H.324 standards, which are expected to be ratified in November 1995.

Multipoint:

Collaboration Features:

Notes: Interoperable with ShareVision PC product.

Survey Info Updated: 06-June-95

ShareVision PC 3000

Provider: Creative Labs

Description: Audio/Video/Tools over Analog phone line.

Platforms: PC

Requirements: 486SX/33MHz (486DX/66MHz recommended), 2 available 16-bit ISA bus slots, 8MB RAM, 6MB hard disk space, Windows 3.1, VGA or SVGA display (16-bit or 24-bit VGA display card recommended).

Price: $1,599, includes software, two boards (Video Blaster RT300 video capture/compression card and ShareVision PC Audio card), color CCD camera, fax/modem, headset/microphone.

Contact Info: Creative Labs, Inc., 1901 McCarthy Boulevard, Milpitas CA, 95035, USA, phone: +1.408.428.6600, toll-free: 1-800-998-1000, fax: +1.408.428.6611.

LAN Protocols:

Audio Encoding: VATP

Video Encoding: VATP

Interoperability Standard Support: Future versions will support the ITU-T H.324 standards that were expected to be ratified in November 1995.

Multipoint: No.

Collaboration Features: Application sharing, Whiteboard, Document sharing, File transfer.

Notes: Interoperable with ShareVision Mac product.

Survey Info Updated: 06-June-95

ShowMe

Version: 2.0.1

Provider: Sun Microsystems

Description: Video/Audio/Tools over the Internet.

Platforms: Sun SPARCstation

Requirements: Solaris 2.3 or later, X11 R5, OpenWindows 3, one SBUS slot, SunVideo board, SunMicrophone.

Price: $3,270, including SunVideo board and camera. Educational discount available.

Contact Info: sunsol-www@sunsolutions.eng.sun.com, toll free: 1-800-873-7869.

LAN Protocols: UDP/IP, TCP/IP, IP Multicast, RTP.

Audio Encoding: G.711 (uncompressed 8-bit, 8 KHz audio bit stream at 64 Kilobits per second)

Video Encoding: CellB

Interoperability Standard Support: No

Multipoint: Yes, with and without IP Multicast.

Collaboration Features: Whiteboard, Application Sharing for X11 R4/R5-based applications and Wabi 1.0 supported MS Windows applications.

Notes:

Survey Info Updated: 26-Apr-95

Simplicity

Version:

Provider: Paradise Software, Inc.

Description: Audio/Video/Tools over ISDN, Ethernet, ATM

Platforms: Sun SPARCstation, HP 9000/700, IBM PowerPC

Requirements: Sun: SunOS 4.1.3.U1 +, Solaris 2.4+, and OpenWindows 3.x or X11R5/Motif1.2; HP: HPUX 9.0.3+, X11R5/Motif1.2; IBM PowerPC: PowerPC 40P hardware, AIX 4.1, X11R5/Motif 1.2

Price:

Contact Info: Paradise Software, Inc., 7 Centre Drive, Suite 9, Jamesburg NJ, 08831, USA; phone: +1.609.655.0016, fax: +1.609.655.0045, support@paradise.com

LAN Protocols: TCP/IP

Audio Encoding:

Video Encoding: M-JPEG

Interoperability Standard Support:

Multipoint: Yes.

Collaboration Features: Whiteboard, VideoMail, Screen Capture

Notes: Videoconferencing capabilities come from Paradise Software's previous product PSVC.

Survey Info Updated: 21-May-96

TeamVISION

Provider:ICL Networking Business

Description: Uses VC8000 video telephony and Fujitsu's DeskTop Conferencing data conferencing integrated under TeamVISION's simple to use graphical interface.

Platforms: PC

Requirements: Recommended PC configuration: 486SX 33MHz 100% ISA compatible PC, 15" SVGA screen, 16MB memory, 170MB Fixed disk, Microsoft MS-DOS 5.0+, plus Windows 3.1, Basic rate ISDN2 connection

Price:

Contact Info: Tony Sherwood on +44-(0)1344-472195 or Sue Dorgan on +44-(0)1344-472501 at ICL in Bracknell.

LAN Protocols:

Audio Encoding:

Video Encoding: H.261 (QCIF moving images, CIF image capture)

Interoperability Standard Support: H.320

Multipoint:

Collaboration Features: Share applications, file transfer, shared whiteboard

Notes:

Survey Info Updated: 2-Nov-95

TelePro with VisionTime

Provider: Specom Technologies Corp.

Description: Video/Audio/Tools over WAN (Analog phone lines and ISDN).

Platforms: PC

Requirements: 386 PC, 8MB RAM, 8MB disk space, Windows 3.1+, high-color VGA card with 64K true colors, video capture card with Video for Windows drivers, camera.

Price: $995, includes software, frame grabber card, voice/data modem, handset.

Contact Info: Specom Technologies Corp., 2322 Walsh Ave., Santa Clara CA, 95051, USA, phone: +1.408.982.1880, fax: +1.408.982.1883.

LAN Protocols:

Audio Encoding:

Video Encoding:

Interoperability Standard Support:

Multipoint: Optional, up to 64 simultaneous users.

Collaboration Features: Document sharing of Windows applications, supports Windows application sharing through OLE.

Notes:

Survey Info Updated:

TeleView 1000C

Provider: VCC (Video Conferencing Communications, Inc.)

Description: Video over Analog phone lines.

Platforms: PC

Requirements:

Price: $3,995 includes boards and software.

Contact Info: Video Conferencing Communications, Robert Medrano, phone: +1.714.452.0800.

LAN Protocols:

Audio Encoding:

Video Encoding:

Interoperability Standard Support:

Multipoint:

Collaboration Features:

Notes:

Survey Info Updated:

VC8000

Provider: BT (British Telecommunications plc)

Description: ISA PC multimedia communications card. Software applications packages from IBM, ICL or Olivetti provide the user-interface. Allow Audio/Video/Tools over ISDN.

Platforms: PC

Requirements: 20 MHz IBM PC 386 (486 recommended), 8MB RAM, 10-15MB hard disk space, full length ISA expansion slot, VGA, SVGA or XGA monitor (non-interlaced), ISDN2, Microsoft Windows 3.1 or higher, DOS 5.0 or higher, BT partner application software.

Price: approximately 2,700 UK pounds (excluding PC software), includes ISA card, NTSC or PAL camera, audio unit, connection unit, AC/DC adaptor, associated leads and accessory pack.

Contact Info:

USA/Canada Inquiries: BT Visual Images, 360 Herndon Parkway, Suite 2200,

Herndon, Virginia 22070-4820,

Tel. (800) 778-4820

Fax. (703) 709-4231 for attention of John Taylor

Email: taylor@vaherndon1.btna.com

Rest of the world: BT Visual Systems, PP1.1, Ambassador House,

75-77 St. Michaels Street, London, England, W2 1QS.

Tel. +44 171 298 4194

Fax. +44 171 298 4325 for attention of Kim Britten

Email: 100627.3617@compuserve.com,

ATTN: Simon Grumbt or Kim Britten

Technical Information: iain@empire.bt.co.uk (technical questions only please).

LAN Protocols:

Audio Encoding: G.711, G.722, G.728

Video Encoding: H.261 (QCIF moving images, CIF image capture)

Interoperability Standard Support: H.320

Multipoint: Yes (H.242)

Collaboration Features: Application sharing, file transfer, chalkboard.

Notes: Basic rate ISDN (I420) S-Interface. ISDN code supports AT&T, Northern Telecom, and Siemens implementations of US National ISDN 1, Euro-ISDN, Australia, Japan. 56 and 64 Kbits/s long distance connections are supported. Full interworking between country variants. CIF resolution for image capture, QCIF resolution for moving images. T.120 data support soon. Has own 'telephone' which remains operational for audio calls (loudspeaking or handset) when the PC is powered down. Card software for audio and video coding and ISDN is down-loadable from the host PC. All processing is done on the card. Hardware and software are available and approved for connection to public telecommunications networks in the USA, Canada, UK, Australia, Japan, Austria, Denmark, Eire, France, Germany, Holland,Belgium, Sweden, Finland, Norway, Switzerland, Spain, and Luxembourg. PC applications are available from IBM (ScreenCall and P2P), Olivetti (PCC), and ICL/Fujitsu (TeamVision), offering various group working features on top of the videophone. A connection box with ports for external cameras, monitors microphones and speakers (or a VCR) is provided.

Survey Info Updated: 31-July-95

VCON ARMADA Cruiser 50 System

Version: 2.21

Provider: VCON, Inc.

Description: Video/Audio/Data Collaboration Tools over ISDN/IsoEthernet/ATM

Platforms: PC

Requirements: 586, 1 PCI slot, PCI VGA Card w/DCI support, Microsoft Windows 3.1+, Win95, NT1

Price: $1,395

Contact Info: VCON, Inc., 5000 Quorum Drive Suite 700, Dallas, TX 75240, USA, phone: +1.214.774.3890, fax: +1.214.774.3893, email: mikecl@vcon.com

LAN Protocols: IsoEthernet, SDK Independent

Audio Encoding: G.728, G.722, G.711

Video Encoding: H.261

Interoperability Standard Supported: H.320, T.120, MPEG

Multipoint: Yes.

Collaboration Features: Whiteboard, File Transfer, OLE

Notes: ISDN on board to support 2B up to 128kbpsSoftware upgrades available for Application sharing and T.120 application. SDK allows users to develop their own application based on Visual C++. Supports data rates up to 384kbps, delivering high video quality. VCON's post processing algorithms increase the frame rate up to 30fps and remove block artifacts to achieve TV-quality video.

Survey Info Updated: 30-Jan-96

VCON ARMADA Cruiser 100 System

Version: 2.21

Provider: VCON, Inc.

Description: Video/Audio/Data Collaboration Tools over ISDN/IsoEthernet/ATM

Platforms: PC

Requirements: 586, 1 PCI slot, PCI VGA Card w/DCI support, Microsoft Windows 3.1+, Win95, NT1

Price: $1,595

Contact Info: VCON, Inc., 5000 Quorum Drive Suite 700, Dallas, TX 75240, USA, phone: +1.214.774.3890, fax: +1.214.774.3893, email: mikecl@vcon.com

LAN Protocols: IsoEthernet, SDK Independent

Audio Encoding: G.728, G.722, G.711

Video Encoding: H.261

Interoperability Standard Supported: H.320, T.120, MPEG

Multipoint: Yes.

Collaboration Features: Whiteboard, File Transfer, OLE

Notes: ISDN on board for 2B call has MVIP to support up to 284kbps, Software upgrades available for Application sharing and T.120 application. SDK allows users to develop their own application based on Visual C++. Supports data rates up to 384kbps, delivering high video quality. VCON's post processing algorithms increase the frame rate up to 30fps and remove block artifacts to achieve TV-quality video.

VCON ARMADA Cruiser 100 system includes all the Escort functionality as option.

Survey Info Updated: 30-Jan-96

VCON ARMADA Escort

Version: 2.22

Provider: VCON, Inc.

Description: Video/Audio/Data Collaboration Tools over LAN/WAN

Platforms: PC

Requirements: 586, one PCI slot, PCI VGA Card w/DCI support, Microsoft Windows 3.1+, Win95, NT1, plus any LAN card

Price: $1,395. Package contents: Armada Escort codec, digital video camera, telephone handset VCON's Win2Win video and data conferencing software.

Contact Info: VCON, Inc., 5000 Quorum Drive Suite 700, Dallas, TX 75240, USA, phone: +1.214.774.3890, fax: +1.214.774.3893, email: haimb@vcon.co.il

LAN Protocols: TCP-IP

Audio Encoding: G.728, G.722, G.711

Video Encoding: H.261

Interoperability Standard Supported: H.320, T.120, MPEG

Multipoint: No.

Collaboration Features: File transfer, whiteboard

Notes: H.323 support - Q3-4/96 - depending on standard availabilty. Supports data rates up to 384kbps, delivering high video quality. VCON's post processing algorithms increase the frame rate up to 30fps and remove block artifacts to achieve TV-quality video.

Survey Info Updated: 30-Jan-96

VDOPhone

Version: 0.1.0B

Provider: VDOnet

Description: Video/Audio tools over the Internet - direct and modem connections (14.4kps +)

Platforms: PC

Requirements: Pentium 90 or higher recommended, Windows 95, 8MB RAM, sound card, microphone, video capture capability (for sending video only)

Price: free beta download

Contact Info: geisips@vdolive.com

LAN Protocols: TCP/IP

Audio Encoding: Proprietary

Video Encoding: Proprietary - VDO wavelets

Interoperability Standard Support: No.

Multipoint: No.

Collaboration Features: Chat, quick note

Notes:

Survey Info Updated: 21-May-96

VidCall

Provider: MRA Associates Inc.

Description: Video/Tools over Analog, ISDN, Ethernet, Token Ring. Audio requires separate phone line or voice/data modem to send voice and video over one telephone line.

Platforms: PC

Requirements: 386/33 (486 recommended), 2 MB disk space, 4MB RAM, VGA graphics, Microsoft Windows 3.1+ or Windows NT, Microsoft mouse, video capture board (compatible with many boards including Video For Windows compatible boards), MNP/V.42 modem (14.4+) or Windows compatible LAN, WAN, TCP/IP network, still or motion camera.

Price: $99, includes software for two stations and documentation.

Contact Info: MRA Associates Inc., 2102B Gallows Rd., Vienna VA, 22182, USA, phone: +1.703.448.5373, fax: +1.703.734.9825, BBS: +1.703.448.5931.

LAN Protocols:

Audio Encoding: Audio transmitted on analog phone line.

Video Encoding: Proprietary video encoding routines.

Interoperability Standard Support: No

Multipoint: Point-to-point modem operations, Multi-point LAN/WAN operations.

Collaboration Features: Whiteboard, Image sharing and annotation, application sharing via OLE.

Notes: Demo available from WWW page.

Survey Info Updated: 13-Mar-95

VideoVu

Provider: Future Communications Systems, Inc.

Description: Audio/Video/Tools over modem, LAN, or Internet

Platforms: PC

Requirements:

Price: $74.95, VideoVu Two Pak $129.95, VideoVu Complete Kit $325 (two copies of VideoVu with the Video Logic Captivator PRO capture board)

Contact Info: Future Communications Systems, Inc., P.O. Box 244, Syosset N.Y. 11791 USA, phone: +1.516.496.7121, fax: +1.516.496.7121, future@i-2000.com.

LAN Protocols:

Audio Encoding:

Video Encoding:

Interoperability Standard Support:

Multipoint: Yes (LAN/WAN only, up to eight participants)

Collaboration Features:

Notes: Demo disk available (info on WWW page)

Survey Info Updated: 26-May-95

VideoWare 1000

Version: 1.0

Provider: VideoWare

Description: Videophone software/hardware to send and receive live or recorded audio and color video using regular phone lines.

Platforms: PC.

Requirements: 486 DX, 80MHz or Pentium, 8MB RAM, Super VGA - 256 colors, 4M disk space, 28.8 modem, Sound card/speakers/microphone (optional to send/receive audio), PCI bus slot (optional to send video)

Price: $139.99 for software, $389.99 for software and PCI video capture board

Contact Info: jose@videoware.com or jose@panamnet.net

LAN Protocols:

Audio Encoding:

Video Encoding: Proprietary algorithm

Interoperabiltiy Standard Support:

Multipoint: No.

Collaboration Features:

Notes:

Survey Info Updated: 8-Apr-96

ViewPoint FamilyFone

Version: 1.0

Provider: Multimedia Access Corp.

Description: Designed to keep families close! Standards-based, real-time videoconferencing, Viewpoint FamilyFone (co-branded with Boca Research) is priced low for families.

Platforms: PC

Requirements: 486 DX66, Win 95, 8 MB RAM, 1.3MB Harddisk, 1 PCI slot, 28.8 modem

Price: $550 w/NTSC compatible camera

Contact Info: Dan Dodson - VP Marketing, 2665 Villa Creek Dr., Suite 100, Dallas, TX 75234, phone: 214-488-7200, fax: 214-243-0635, email: info@mmac.com(general information/sales) or dand@dfw.mmac.com(webmaster)

LAN Protocols: NA

Audio Encoding: G.723 (G.728 software upgrade)

Video Encoding: H.263 (H.261 software upgrade)

Interoperability Standard Support: H.324 (H.320, H.323 upgrades)

Multipoint: Third party MCU

Collaboration Features: File transfer.

Notes: Simple consumer oriented interface. Co-developed/Co-branded with Boca Research. Based on Lucent AVP chip.

Survey Info Updated: 18-Jun-96

ViewPoint-PRO

Version:

Provider: Multimedia Access Corp.

Description: Full-featured desktop videoconferencing for your existing LAN/WAN. Communicate visually with your associates or customers across the city or across the country while simultaneously sharing files/images from windows on your screen.

Platforms: PC

Requirements: 486/66, Win 3.1+, 8MB RAM, 1MB Harddisk, 1 ISA slot. Requires: Ethernet.

Price: $995 (Includes viewer only site license)

Contact Info: Todd Trenasty / Sales Manager, 2665 Villa Creek Dr., Suite 100, Dallas, TX 75234, phone: 214-243-0635, email: info@mmac.com (general information and sales) or dand@dfw.mmac.com (webmaster)

LAN Protocols: TCP/IP

Audio Encoding:

Video Encoding:

Interoperability Standard Support:

Multipoint: Five-way multipoint supported (No MCU required)

Collaboration Features: Yes. Databeam.

Notes: LAN based videoconferencing product. Variable bandwidth from 56Kbps to 640Kbps. Software site license allows single Viewpoint Pro to multicast to unlimited software enabled workstations

Survey Info Updated: 18-JUN-96

VISIT

Version: 2.0

Provider: Northern Telecom Inc.

Description: Video/Tools over ISDN or Switched 56. Audio requires separate ISDN or Analog phone line.

Platforms: PC, Macintosh.

Requirements: PC: 386 minimum and hard drive, Microsoft Windows 3.1+, AT-bus expansion slot, DOS 5.0 or greater, 8MB RAM (12 MB RAM max on ISA PC, 16MB or more possible on EISA w/ memory re-mapping), 256-color VGA board and color monitor (Super VGA w/ thousands of colors support recommended). Mac: Macintosh II family or other NuBus-equipped Apple computer, NuBus expansion slot, System 7 or greater, 8MB RAM, Color monitor. Camera included with product.

Price: $5,319

Contact Info: Northern Telecom Inc., 2221 Lakeside Blvd., Richardson TX, 75082, USA, +1.214.684.5930, toll free: 1-800-667-8437, fax: +1.214.684.3866.

LAN Protocols:

Audio Encoding:

Video Encoding: H.261

Interoperability Standard Support: Future versions promise H.320 compliance.

Multipoint: No

Collaboration Features: Whiteboard, File transfer.

Notes:

Survey Info Updated: 31-July-95

VISTACOM VCI-10

Provider: VistaCom, Inc.

Description: OEM video codec up to 384 kbps with composite and Y/C input/output, option: video overlay piggyback of 1024 X 768 pixels, three freely sizeable windows, MVIP interface

Platforms: PC

Requirements: 486/33Mhz or higher, Windows 3.1 or higher, 1 ISA slot

Price: $2,950, video overlay option: $495

Contact Info: VistaCom, Inc 20431 Stevens Creek Blvd., Suite 240, Cuptertino, CA 95014 phone:(408)253-5165, Fax: (408)253-5170

LAN Protocols: API functions allow HOST and LAN access to video, audio, data channel and muxed H.221 data

Audio Encoding: G.711, G.722, G.728

Video Encoding: H.261

Interoperability Standard Support: H.320, T.120

Multipoint: Yes

Collaboration Features: T.123 (for interfacing with third party T.120 software packages)

Notes: For OEM customers the following options are available: SDK with API and sample source code; a program for customized codecs; manufacturing and software licensing policy

Survey Info Updated: 15-Jan-96

VISTACOM VCI-100

Provider: VistaCom, Inc.

Description: High end OEM video codec up to T1 and 2 Mbps / 30fps with composite and Y/C input/output, MVIP interface, V.35, RS-449/V.11, E1, T1(limited)

Platforms: PC

Requirements: 386/33Mhz or higher, Windows 3.1 or higher, 1 ISA slot

Price: $5,500

Contact Info: VistaCom, Inc., 20431 Stevens Creek Blvd. , Suite 240, Cupertino, CA 95014, phone: (408) 253-5165, fax: (408)253-5170

LAN Protocols: (customized only)

Audio Encoding: G.711, G.722, G.728

Video Encoding: H.261

Interoperability Standard Support: H.320, T.120

Multipoint: Yes.

Collaboration Features: T.123 (for interfacing with third party T.120 software packages)

Notes: For OEM customers the following options are available: SDK with API and sample source code; a program for customized codecs; manufacturing and licensing policy.

Survey Info Updated: 15-Jan-96

Vivo320

Provider: Vivo Software, Inc.

Description: Video/Audio/Tools over ISDN.

Platforms: PC

Requirements: 486 66-MHz PC, 8MB memory, A PC display adapter using the PC's local bus (either VESA or PCI), Two free ISA or EISA slots, not necessarily adjacent, in your PC, Microsoft Windows 3.1.

Price: $1,495 for new product Telework-5 includes Vivo320 plus additional features to take full advantage of the ISDN interfact. This includes remote lan access, internet access, faxing, etc.

Vivo320 includes:

Vivo320 software application

Logitech VideoMan digital video camera and microphone

Monitor-top and desktop stands for the VideoMan camera

Speaker for hands-free operation and an earpiece for privacy

Logitech MovieMan ISA-bus video capture card

The IBM WaveRunner ISA-bus ISDN terminal adapter card and associated driver software

Software installation kit including device drivers

Documentation and technical support

Contact Info: Vivo Software, Inc., info@vivo.com, phone: +1.617.899.8900, toll-free: 1-800-848-6411, fax: +1.617.899.1400.

LAN Protocols:

Audio Encoding: send and receive audio using either the G.711 toll-quality audio standard, or the G.722 7KHz high-band audio standard.

Video Encoding: transmits QCIF (176x144), receives CIF (352x288) and QCIF

Interoperability Standard Support: H.320

Multipoint: Yes, using H.320 compliant MCU (Multi-point Conferencing Unit).

Collaboration Features: Document Sharing (Databeam's FarSite 2.0 collaboration software included), Image Presentation and markup.

Notes: all audio/video coding done in software

Vivo TeleWork-5 is a comprehensive visual and data communications suite. It includes Vivo320 and capabilities for high-speed wide-area-network data applications and file sharing. Includes: Vivo320v1.5,

IBM's WaveRunner board, Logitech's VideoMan digital camera, MovieMan video capture card, DataBeam's FarSite data collaboration application, speakers, and an earpiece.

Survey Info Updated: 21-May-96

VS1000

Provider: Mentec International Ltd.

Description: Video/Audio

Platforms: PC

Requirements: Microsoft Windows.

Price:

Contact Info: Mentec International Ltd., Mentec House, 520 Birchwood Boulevard, Birchwood, Warrington, WA3 7QX, Great Britain, phone: +44 925 830000.

LAN Protocols:

Audio Encoding: G.711

Video Encoding: H.261

Interoperability Standard Support:

Multipoint:

Collaboration Features:

Notes:

Survey Info Updated:

VTEL Personal Collaborator

Version: 1.0

Provider: VTEL Corporation

Description: This cost-effective, single-board solution turns any ordinary Windows 95-based PC into a full-featured desktop conferencing and communicatins tool. The new VTEL Personal Collaborator combines all the hardware and software you need into one, easy- to-install package. It includes VTEL's exclusive AppsView(tm) graphical conference-control interface, which exploits the power of Windows 95 to make operating your entire system incredibly easy and intuitive. Personal Collaborator shares a consistent look and feel with the entire VTEL Enterprise Series product line.

Platforms: PC

Requirements: Windows 95 PC with free ISA slot.

Price: $2,495 MSRP

Contact Info: VTEL Corporation/ 108 Wild Basin Rd./Austin, TX 78746 phone: 1-800-856-VTEL

LAN Protocols:

Audio Encoding: G.728, G.711, G.722

Video Encoding: H.320, standards only, FCIF full-screen capable, with PIP

Interoperability Standard Support: H.320

Multipoint: Yes, via a multipoint controller

Collaboration Features: Application sharing via Intel's ProShare, VTEL's ObjectShare, drag-and-drop file send and local and remote screen capture

Notes:

Survey Info Updated: 17-Apr-96

APPENDIX C:

REFERENCES

Glossary of Terms referenced from the U.S. West ISDN Home Page, (c) Copyright 1995 U S WEST, Inc. All rights reserved, http://www.uswest.com

Appendix B, Survey of Products referenced from author: Kathy Hewitt's Web Page, klhewitt@eos.ncsu.edu

Contact: klhewitt@eos.ncsu.edu, http://www3.ncsu.edu/dox/video/products.html

Technical Report Documentation Page

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16. Abstract

Personnel of the Utah Department of Transportation (UDOT) often find it necessary to work together on tasks from remote locations. Since this process adds costs to and reduces the efficiency of task completion, this research project investigated the practicality of desktop conferencing as a low-end telecommunications alternative to the Utah Educational Network (UEN) and traditional travel to and from meeting sights. To provide a low-end alternative, desktop conferencing technology uses personal computers, relatively inexpensive software, and either ISDN or Internet transmission lines. The criteria used for selecting desktop conferencing software included the following items: ability to transmit by way of either the Internet or ISDN lines; quality of audio and video; capability for application sharing; capacity for multipoint conferencing through ISDN lines; conformity to T.120 and H.320 standards; and upgrade-ability and likelihood product will upscale to new and upcoming standards in a timely manner

On the basis of this criteria, Intel ProShare was selected as the desktop conferencing package for this project. To test the package, two stations were established, one at the UDOT Research Division in Salt Lake City and the other at the Utah Transportation Center in Logan. The tests revealed that desktop video provides an inexpensive and efficient means for a few people at remote locations to share data and ideas electronically.

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