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Report on Videoconferencing Systems

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Abstract

This report is a compendium of all knowledge gained during two months testing of various videoconference systems and consulting this topic with the people involved in videoconferencing within Czech Republic and worldwide.

The report includes proposed subdivision of videoconference types (chapter 1), suggested set of criteria for evaluation of each videoconferencing product (chapter 2), followed by the reviews of all systems tested together with description of how they meet each single criterion (chapter 3), recommendation of a particular system for each specific kind of videoconferencing (chapter 4) and the list of other available videoconferencing products (chapter 5).

We hope this report will help to make faster decision of which particular system should be used for required type of videoconferencing for better consultations of scientific problems.

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1 Videoconference types subdivision

We have suggested three main types of video conferences each one with own specific requirements:

1. One-to-one conference
2. One-to-many conference
3. Many-to-many conference

For each listed type of videoconferencing a particular system is suggested for a use in chapter 4 of this report.

2 Suggested criteria

1. Multi platform product

For peer to peer videoconference this means that there are client distributions for various operating systems. For one to many or many to many videoconferences this means that both client and server are provided under various operating systems.

2. Services offered

A spectrum of communication services offered by the videoconference system i.e.: file transfer, application sharing, audio (video) transmission, conference recording.

3. Classification of users involved in a conference

Presenters, Active presenters, Attendees.

4. GUI configurability

Ability to arrange view and control items of videoconference system on a desktop for individual user convenience.

5. HW, SW requirements

Network connection speed, min. hardware configuration required.

6. New conference creation / setting difficulty

Difficulty of a new conference establishment itself and “invitation to conference” process.

7. Conference joining difficulty

Complexity of the process that need to be done by user in order to join a conference.

8. Installation difficulty

Difficulty of installation process compared to other systems tested / known.

9. Additional network requirements

Network adjustments that have to be done prior to begin of conference transmission itself.

3 Systems tested

We have tested six videoconferencing software products from different groups with respect to subdivision from chapter 1. This chapter offers reviews of all tested systems together with short description of how tested system meets each single criterion specified in the previous chapter.

Skype

Skype¹ is a peer-to-peer VoIP client. It has capabilities for voice and video calls, instant messaging, audio conferencing, file transfer and buddy lists.

Connected active Skype clients form the Skype network composed of ordinary hosts, super nodes and login sever – which is the only central component in the Skype network. Ordinary hosts are connected to super nodes (active Skype clients running on computer with sufficient network bandwidth and other required system resources). Super nodes form the main skeleton of Skype network and provide efficient routing of client-to-client or client-to-Skype login server communication. Once connected to Skype network Skype client authenticates its user name and password with the login server, advertises its presence to other peers and its buddies, determines the type of NAT and firewall it is behind, and discovers online Skype nodes with public IP addresses.

Voice traffic to another online Skype node is send over UDP. If both users are behind port-restricted NAT and UDP-restricted firewall, then caller and callee sent and receive voice traffic over TCP from another online Skype node.

Conference calls are handled by one of the conference member (or other Skype network node) that acts as a mixer and is not behind port-restricted NAT and UDP-restricted firewall.

GUI specially designed to be very easy and easy-to-use offers small - but because of easiness - sufficient amount of configurability (video call may be observed in a separate window).

In a current version, Skype client does not offer advanced sharing functionality (i.e. application windows sharing, whiteboard, remote desktop sharing).

Positive is that Skype client works well no matter how user is connected to the network (whether or not the one is behind NAT). The only network setup is related to firewall (if present) where some TCP ports have to open for outgoing connection (see *Additional network requirements* below).

Skype appears to be a good candidate in cases when short voice communication between two or more user is required. Unfortunately in the current version 2.5, without additional plug-ins, allows only peer-to-peer video transmission. Once the third member joins a conference, video transmission is terminated.

¹ <http://www.skype.com>

- **Multi platform product:** Skype clients for MS Windows, Linux, MacOS X and Pocket PCs.
- **Services offered:** Voice and video calls, instant messaging, file transfer, audio conferencing, “call on hold” service.
- **Classification of users involved in a conference:** No user classification. All active conference members are allowed to contribute to the conference at any time.
- **GUI configurability:** Video observable in a separate window.
- **HW, SW requirements:**
 - PC running Windows 2000 or XP. (XP required for video calls).
 - Internet connection (broadband is best, GPRS is not supported for voice calls, and results may vary on a satellite connection).
 - Speakers and microphone — built-in or separate.
 - A webcam, if you want to make video calls.
 - Recommend that you have at least 400 MHz processor, 128 MB RAM and 15 MB free disk space on your hard drive.
- **New conference creation / setting difficulty:** Easy-to-use user-friendly GUI requires minimal effort to establish new audio conference session (just pick callee from a list and push “call” button).
- **Conference joining difficulty:** Any actual member of voice conference can call another active Skype client user in order to join him to the conference.
- **Installation difficulty:** Minimal effort required. Only download and install procedures have to be done. No special supporting software is required (tested on MS Windows XP).
- **Additional network requirements:** Only special network setup is related to firewall setup a user is behind of. Ideally, outgoing TCP connections to all ports (1..65535) should be opened. If it is not possible, outgoing TCP connections to port 443 (or 80) should be open. If this is also not possible, Skype versions 0.97 or later can use a HTTPS/SSL proxy. But in generally Skype client should work with all major firewall software.

Skype + Festoon extension

As stated in the previous chapter Skype client itself is not able to transmit video among three or more users involved in the conference at the same time. This is why the *Festoon*² extension has been developed for Skype client. In the current version Festoon is available just for Microsoft Windows 2000/XP operating system.

Festoon acts as a standalone application that uses Skype (or Google Talk) client as a medium to send invitation-to-join-conference messages and uses its buddy list for an initial selection of conference members.

Festoon is controlled via icon in the Windows notification area that offers popup menu with the options of start video call, re-enter last call, Festoon settings and help. So in generally Festoon GUI is very simple.

² <http://www.festooninc.com>

During testing Festoon by us we have observed that video transmission is fluent if there are two users involved in the conference at the same time. Once the third or fourth user joined the conference one or two conference members received scattered, slow-speed video and appear to other conference members in a similar way. We believe that this phenomenon is related either to higher network bandwidth requirement or the way in which Skype manages conference calls over the Skype network. One of the conference members become conference main node, which is the one all conference communication goes through. That is why there is suddenly high performance required for that computer - and if not present - video transmission quality goes lower.

- **Multi platform product:** Currently only for MS Windows 2000/XP.
- **Services offered:** Video calls, application window and desktop sharing.
- **Classification of users involved in a conference:** No user classification provided. All active conference members are allowed to contribute to the conference at any time.
- **GUI configurability:** Each user is observable in a separate window. No other GUI adjustments possible.
- **HW, SW requirements:**
 - PC running Microsoft Windows 2000 / XP.
 - Festoon works on connections from 40Kbps through 1536Kbps (or higher). It continuously measures available bandwidth and scales video and shared data streams to fit this available bandwidth. (It also prioritizes media – audio being highest priority). Bandwidth measurements occur at 30ms intervals.
 - 800 MHz processor
 - Windows 2000 or XP
 - Internet Explorer 5.0+
 - Latest Skype client version (currently version 2.5).
- **New conference creation / setting difficulty:** Very simple due to very simple GUI.
- **Conference joining difficulty:** Two step process. An invitation has to be send by an active conference member and accepted by the invited user.
- **Installation difficulty:** Uses standard Windows installer, but we have experience difficulties with un-installation process as there is actually no way available to un-install Festoon.
- **Additional network requirements:** Similar to Skype. Festoon Beta is designed to support most standard firewall configurations (all traffic uses outbound TCP Port 443, which must be open). Festoon Beta also supports NAT (Network Address Translation) and ICS (Internet Connection Sharing).

RAT (Robust Audio Tool) + VIC (Videoconference Tool)

The Robust Audio Tool (RAT)³ is an open-source audio conferencing and streaming application that allows users to participate in audio conferences over the internet. These can be between two participants directly, or among a group of participants.

RAT requires no special features for point-to-point communication, just a network connection and a soundcard. For multiparty conferencing RAT uses IP multicast and therefore all participants must reside on a multicast capable network or unicast transmission using **packet reflector** used by all conference members.

RAT features a range of different rate and quality codecs. It offers better sound quality relative to the network conditions than most audio tools available. It also features encryption so you can keep your conversations private.

Videoconferencing tool (VIC)⁴ is a real-time, multimedia application for video conferencing over the Internet. VIC is based on the Draft Internet Standard Real-time Transport Protocol (RTP)⁵ developed by the IETF. Similarly to RAT it uses either IP Multicast Backbone (MBone) or unicast transmission using packet reflector.

Installation and usage is very simple. We have tested this system with packet reflector (not though an IP multicast) and have experienced small system requirements on PC running combination of RAT for audio transmission and VIC for video transmission among up to 10 conference members. Aside this, there is a fact of lower video quality (relatively to RAT + DVTS combination discussed later in this document) on an account of higher number of conference members and smaller.

VIC + RAT combination may be supported by WDB⁶ application from the same family providing shared whiteboard.

There is only a need to spread reflector's IP and port numbers dedicated to an upcoming conference.

- **Multi platform product:** Releases available for Linux Redhat 7.2, Solaris 8, Windows 98, FreeBSD 4.5, Windows 2000/XP, Linux Redhat 8.0, Linux Redhat 7.2.
- **Services offered:** Audio and video transmission, whiteboard sharing through WBD application also from VIC-RAT family, conference audio record via RAT.
- **Classification of users involved in a conference:** No user classification. All active conference members are allowed to contribute to the conference at any time.
- **GUI configurability:** Each user may be watched in a separate window. No other GUI adjustments possible.
- **HW, SW requirements:** No special HW and SW requirements are proposed by the authors except to have soundcard properly installed and working.

³ <http://www-mice.cs.ucl.ac.uk/multimedia/software/rat/>

⁴ <http://www-mice.cs.ucl.ac.uk/multimedia/software/vic/>

⁵ <http://www.ietf.org/rfc/rfc1889.txt>

⁶ <http://www-mice.cs.ucl.ac.uk/multimedia/software/wbd/>

- **New conference creation / setting difficulty:** Packet reflector's IP and port number have to be announced to all conference members and moreover RAT and VIC (WBD) have to be run down with packet reflector's IP and port number as the command line parameters.
- **Conference joining difficulty:** RAT and VIC (WBD) have to be run with packet reflector's IP and port number as the command line parameters. No additional steps are required to be done.
- **Installation difficulty:** Installation of RAT and VIC (WBD) is very simple. User is required just to download and extract files into desired folder and applications are ready to use.
- **Additional network requirements:** There are no additional network adjustments required for point to point communication. For multiparty conferencing an end user has to be connected to a network allowing IP multicasts or a packet reflector has to be installed and running on a public IP address for unicast style conferencing.

RAT + DVTS

After testing RAT + VIC configuration we have concluded that sometimes there may be requirement for a higher resolution video to be transmitted which is why we tested a combination of RAT for audio transmission and DVTS (Digital Video Transport System)⁷ application for higher resolution video transmission.

We have tested RAT + DVTS combination also with packet reflector that has been addressed by DVTS. One DVTS + RAT PC sends captured high quality video converted into stream of data in DV format⁸ to a packet reflector. But DVTS itself can only receive (or send) DV stream but can not request it from a selected server. Therefore we use PING⁹ application which pings packet reflector periodically after a few minutes which is what secure that packet reflector sends non-stop DV stream to an address from which a ping came. Because video can be send to a packet reflector by only one conference member RAT provides possibility of audio feedback from other conference members.

With this configuration we have experienced highly stable audio-video transmission. System has been tested for a period of one and half day of non-stop transmission without any problems encountered.

- **Multi platform product:** Releases available for Linux 2.4.20 or 2.5.50, FreeBSD 4.x, Windows 2000/XP and MacOS X.
- **Services offered:** Audio (RAT) and video (DVTS) transmission.
- **Classification of users involved in a conference:** User classification is forced by the system itself as only one user sends DV stream to a packet reflector and all the others are just receiving video. But RAT keeps its ability to provide all-to-all audio transmission.
- **GUI configurability:** No GUI configuration possible.

⁷ <http://www.sfc.wide.ad.jp/DVTS/>

⁸ <http://www.rfc-archive.org/getrfc.php?rfc=3189>

⁹ <http://herakles.zcu.cz/seminars/help.php>

- **HW, SW requirements:** There is a camera that is able to produce DV stream required and soundcard properly installed and working for RAT application.
- **New conference creation / setting difficulty:** Packet reflector's IP and port number have to be announced to all conference members and moreover RAT and DVTS have to be run down with packet reflector's IP and port number as the command line parameters.
- **Conference joining difficulty:** RAT and DVTS have to be run down with packet reflector's IP and port number as the command line parameters. No additional steps are required to be done.
- **Installation difficulty:** User need just to download and extract RAT application files into desired folder and download and install DVTS application.
- **Additional network requirements:** A packet reflector has to be installed and running on a public IP address.

VWHO

VWHO is a small (363KB) application, allowing communication of up to 9 people. It is designed for small conferences with low resolution video transmission. It also provides audio transmission. User is only required only to type in IP addresses of all videoconference members.

VWHO does not provide any conference members classification or protection against joining an existing conference. Application is available only for Microsoft Windows 2000/XP operating system. A little disadvantage is a limited GUI configurability.

- **Multi platform product:** Release is available for Microsoft Windows 2000/XP OS.
- **Services offered:** Audio and video transmission.
- **Classification of users involved in a conference:** No classification.
- **GUI configurability:** No GUI configuration possible.
- **HW, SW requirements:**
 - CPU clocked at 1000MHz (Pentium 4, AMD64 and AMD XP are recommended),
 - 256MB memory (512MB or more recommended),
 - Internet bandwidth 128 kbps upload (better is **strongly** recommended),
 - Windows XP SP1 (SP2 recommended) or Windows 2000 (SP4 recommended).
- **New conference creation / setting difficulty:** IP addresses of conference members have to be typed.
- **Conference joining difficulty:** Extremely easy. IP addresses of conference members have to be typed.
- **Installation difficulty:** Application has to be downloaded from the website and executed. No other installation steps are required.
- **Additional network requirements:** None.

Microsoft NetMeeting

NetMeeting¹⁰ is very similar to Skype described earlier. For Windows 2000/XP user NetMeeting is installed with standard OS installation. It just needs to be activated. It offers built in functionality to share whiteboard, application window and remote desktop in addition to the standard audio-video conferencing, text chat and file transfer.

Microsoft developed NetMeeting audio and video conferencing features based on the H.323 infrastructure, which allows NetMeeting to interoperate with other H.323¹¹ standards-based products.

Video transmission is restricted to communication of two users as well as in the case of Skype client. During our tests we have experienced higher system performance requirements once the third user joined conference. But for point-to-point communication it worked well.

Obvious disadvantage is that NetMeeting is available just for Microsoft Window OS. However, there is a possibility to communicate with H.323 compatible products over the common H.323 standards.

- **Multi platform product:** Releases available only for Microsoft Windows OS.
- **Services offered:** Audio and video conferencing, chat, file transfer, program sharing, remote desktop sharing and whiteboard.
- **Classification of users involved in a conference:** No user classification provided.
- **GUI configurability:** No GUI configuration possible.
- **HW, SW requirements:** To use the data, audio, and video features of NetMeeting, computer have to meet the following hardware requirements:
 - For Windows 95, Windows 98, or Windows Me, a Pentium 90 processor with 16 MB of RAM (a Pentium 133 processor or better with at least 16 MB of RAM is recommended).
 - For Windows NT, a Pentium 90 processor with 24 MB of RAM (a Pentium 133 processor or better with at least 32 MB of RAM is recommended).
 - 4 MB of free hard disk space (an additional 10 MB is needed during installation only to accommodate the initial setup files).
 - 56,000 bps or faster modem, ISDN, or LAN connection.
 - Sound card with microphone and speakers (sound card required for both audio and video support).
 - Video capture card or camera that provides a Video for Windows capture driver (required for video support).
- **New conference creation / setting difficulty:** For the point-to-point or multiparty NetMeeting conferencing all the users have to be registered in the Microsoft Passport Network. NetMeeting uses Windows Messenger to provide a buddy list. However, there is a possibility to address its peer via his IP address directly or to connect to H.323 compatible conferencing system.

¹⁰ <http://www.microsoft.com/windows/netmeeting/>

¹¹ <http://www.iec.org/online/tutorials/h323/>

- **Conference joining difficulty:** Users have to be registered on the Microsoft Passport Network and added to buddy list in the Windows Messenger or call via IP address. There are no additional requirements. Easy, user-friendly GUI requires user just to pick a peer from a user list and initiating a call by clicking “call” button.
- **Installation difficulty:** NetMeeting is a part of standard Windows 2000/XP installation. It just has to be activated. Moreover user has to sign in to the Microsoft Passport Network.
- **Additional network requirements:** None except personal firewalls setting to allow incoming and outgoing communication for NetMeeting application.

Microsoft LiveMeeting

LiveMeeting¹² is a robust application for conferencing. It provides multiple functionalities ranging from document sharing, whiteboard, application window and desktop sharing to the conference members roles.

At the time we have tested LiveMeeting we had only trial version available. But our conclusions indicate that **system is easy to use but difficult to install**. All the users have to be registered to a web based application which provides an entry point for new conference initialization or joining an existing one. We were unable to find out which kind of server is that web application based on. Moreover, we were unable to test audio and video transmission because we simply couldn't find out how to set it up (even following the step by step Microsoft manual - there were steps that couldn't have been done due to the missing check boxes – *probably due to trial version*).

LiveMeeting conference may be joined via web based LiveMeeting applet or more sophisticated windows application.

New conference is scheduled and initiated by the active presenter by sending email invitations to all the other conference members (that are already signed into web based entry point system mentioned above). Once they accept an invitation they sign in to an entry point web application and join the conference by feeding the “Join” form with conference ID and password that is a part of email invitation.

LiveMeeting provides system for the conference members classification as presenters, one active presenter and attendees. Roles may change once presenters (or active presenter) grant the attendees to become presenters or for any other possible way to contribute to the conference.

Active presenter may share multiple documents or their parts, whiteboard, application window, remote desktop or webpage snapshot with the other conference members or chat with them. There is also a simple system for question poll available to use.

We have found LiveMeeting suitable for seminars with one presenter and multiple attendees.

¹² <http://office.microsoft.com/livemeeting/>

- **Multi platform product:** LiveMeeting is available for Microsoft Windows OS. Simpler Java applet with limited functionality may be used to join the conference in a case that user runs different OS than MS Windows. We were unable to find out any information about web based entry-point application requirements for HW or SW installed.
- **Services offered:** Audio and video conferencing, documents, application window, webpage and whiteboard sharing, simple question poll.
- **Classification of users involved in a conference:** Conference members join the conference under different roles of either be a presenter (or one active presenter) or attendees that can just passively watch the conference unless granted by presenter to be able to actively contribute to it.
- **GUI configurability:** Windows LiveMeeting application is composed of simple dedicated dockable windows that might be arranged for user convenience.
- **HW, SW requirements:** (Official system requirements according to Microsoft Corporation.)

Windows-Based Meeting Console:

- Operating systems: TabletPC, Windows 2000/XP
- Browsers: Microsoft Windows 2000 SP4 requires Internet Explorer 6.0 SP1 or Netscape 7.2, Microsoft Windows XP SP1 or SP2 requires Internet Explorer 6.0 SP1 or Netscape 7.2, Microsoft Windows Server 2003 requires Internet Explorer 6.0 SP1.

Web-Based Meeting Console:

PC Users:

- Operating systems: TabletPC, Windows 2000/XP SP1 or later, Windows NT Server 4.0 SP6a or Windows NT Workstation 4.0 SP6a, Microsoft Windows 98 Second Edition (SE).
- Supported browser configurations: Internet Explorer 6 or later with the Microsoft Java Virtual Machine (JVM) (5.0.0.3810) in pre-installed configurations, Internet Explorer 6 SP1 or later with the Sun JVM 1.4.2 or later, Netscape 7.2 or later with the Sun JVM 1.4.2 or later.

Mac Users:

- Mac OSX 10.3
- Safari 1.2
- Macintosh Runtime for Java (MRJ) 1.4.1 or higher

Solaris Users:

- Solaris 9
- Netscape 7 or Mozilla 1.4
- Sun JVM 1.4.2

Bandwidth: 56Kbps or faster connection

Display:

- Presenter: 1024 x 768 pixels or higher resolution monitor.
- Attendee: 800 x 600 pixels or higher resolution monitor (1024 x 768 or higher recommended).

Recording Playback: Microsoft Windows Media Player 9 or later; 128 Kbps or faster connection.

- **New conference creation / setting difficulty:** Active presenter has to sign in to the web-based entry point application, start a new conference and send the e-mail invitations to all intended conference members.
- **Conference joining difficulty:** Once an e-mail “Invitation to join the conference” is received user has to sign in to a web-based entry point application, feed the “Join” form with ID and password and join the conference.
- **Installation difficulty:** Installation process begins with installation of LiveMeeting system followed by installation of Windows-Based LiveMeeting Console. Next user has to sign in to a web based LiveMeeting system. Moreover there is another account required for audio transmission service that we were not able to run as described earlier.
- **Additional network requirements:** None.

4 Suitability for a specific kind of videoconference

One- to-one conferencing

Our tests show Skype client as the best for one-to-one conferencing, so far. This is because of its multiplatformity, ability to transmit video, multiparty audio conferencing and a very high number of active users.

There are some disadvantages against VIC+RAT or NetMeeting, for example inability to share whiteboard or application window. However, there is a file transfer service provided. We have appreciated easy installation, GUI and no additional requirements for supporting application running (packet reflector in a case of VIC+RAT, Windows Messenger for NetMeeting).

Other systems mentioned in previous chapter are either too complex to install or to use for a single point-to-point conferencing.

One-to-many conferencing

From all systems tested RAT+VIC, RAT+DVTS and Microsoft LiveMeeting fit this category the best.

The first question is: how much feedback and what form of it is awaited / requested?

If the active feedback is awaited / requested we recommend using RAT + VIC if lower video quality is sufficient and RAT + DVTS if higher video quality is required (i.e. presentation slides have to be readable on the video). For RAT + VIC feedback is possible via both video and audio. Moreover, whiteboard may be shared by the WDB application mentioned in the previous chapter. For RAT + DVTS there is only audio feedback possible as there is only one user (presenter) sending video to the packet reflector. Both configurations require relatively small amount of system resources but provides no restriction for any user to watch the conference. Once the packet reflector IP

and conference ports are known anyone may join the conference unless packet reflector is configured by network administrator not to send a stream to the specified locations.

If the smaller feedback is awaited / requested and observing presentation slides and documents in their original quality is more important than watching presenters during presentation we recommend using Windows LiveMeeting as it was developed especially for this purpose. Moreover it provides a system of conference member roles (presenters, attendees) and access to a conference is restricted only to users that have obtained electronic invitation via email with conference's ID and password.

Many-to-many conferencing

For this kind of video conference we recommend RAT + VIC combination. This is because we have experienced some performance issues of Skype + Festoon once the third user joined a conference. Microsoft LiveMeeting is also not suitable as there may be only one active presenter and there is supposed higher interaction requirement for this kind of conference.

RAT+VIC provides optimal configuration for multiparty conferencing supported by shared whiteboard provided by WDB application described earlier in this document.

For the small conferences (up to 9 people), running on the Microsoft Windows 2000/XP OS, where just the audio transmission and low resolution video transmission suffice we strongly recommend VWHO application.

5 Other solutions

During testing systems listed in chapter 3 and writing this paper there were a few more videoconferencing solutions proposed like *Access Grid*¹³ or *VRVS (Virtual Room Videoconferencing system)*¹⁴ system.

There is another long list of videoconferencing software that have not been tested by us due to various reasons (mainly time reasons):

Gnome-o-phone	Gphone is an internet telephone. Internet audio conferencing software.
Ogg Vorbis	Ogg Vorbis is a completely open, patent-free, professional audio encoding and streaming technology with all the benefits of Open Source.
xmms	XMMS is a multimedia player for unix systems. XMMS

¹³ <http://www.accessgrid.org>

¹⁴ <http://www.vrvs.org>

	stands for X MultiMedia System and can play media files such as MP3, MOD's, WAV and others with the use of Input plug-ins.
gizmo	VoIP. For MS and Mac. Not Linux yet.
OpenWengo	Open source alternative to Skype.
Skype	Skype is a little program for making free calls over the internet to anyone else who also has Skype. Its free and easy to download and use, and works with most computers.
IVS	INRIA Videoconferencing System.
Psi	Psi is the premiere Instant Messaging application designed for Microsoft Wormholes, Apple Mac OS X and GNU/Linux. Built upon an open protocol named Jabber, Psi is a fast and lightweight messaging client that utilises the best in open source technologies.
PalTalk	Voice-enables web sites. Seems to be for MS-Wormholes.
spacialaudio.com	Includes a range of audio broadcast software products.

Complete list is available at <http://www.topology.org/soft/avnet.html>.

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