User Guide for

MMCR v1.1.1

Version 1 (DRAFT)

November 1998

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1 Introduction

The use of the Multicast Backbone (MBone) for multi-way multimedia conferencing has increased dramatically in the last few years as more and more parts of the internet 'join' this virtual network. In most applications of multimedia conferencing there is a need to store and be able to retrieve stored sessions.

The Multicast Multimedia Conference Recorder (MMCR) is a client-server software system for recording and playback of multicast multimedia conferences. MMCR consists of 2 main parts: the graphical client and the server. This document describes the operation of the client (further reference to MMCR implies the client). The server is described in an accompanying document.

MMCR is capable of recording a multicast multimedia conference and playing an existing recording to a new multicast group or directly (unicast) to a single user. This document assumes that the potential users of MMCR are familiar with the use of the MBone tools and the concept of unicast transmission, multicast addresses, ports and TTL. You should consult the user guide of one of the tools (e.g. rat) at http://www-mice.cs.ucl.ac.uk/multimedia/software/ if you require more information on these subjects.

1.1 Pre-requisites

The MMCR client is written in Java. To run MMCR you must have a Java Runtime Environment (JRE) installed on your computer. JRE is part of the standard JDK distribution or can be downloaded separately (if you don't want the rest of the JDK software). MMCR requires version 1.1.5 or later.

You should set your Windows PATH accordingly (i.e. to include the directory that contains the jre/java executables) to be able to run JRE or JAVA from any directory. As a quick test, type 'jre' (or ‘java’ if you have the full JDK installation) in a command window. If the command is not recognised you should set your PATH variable accordingly in ‘autoexec.bat’ for Windows 95/98, in the system properties for WinNT and in your start-up files for Unix.

Finally, the normal videoconferencing tools (e.g. vic, rat, wb) are required in order to participate in any sessions which you may be recording or to receive a pre-recorded session that MMCR is playing. These are available for download from http://www-mice.cs.ucl.ac.uk/multimedia/software/

1.2 Installing and starting MMCR

The MMCR client can be downloaded from:

http://www-mice.cs.ucl.ac.uk/multimedia/software/mmcr/

1.2.1 Windows 95/98/NT4.0

For the windows platforms an install application is provided that will guide you through the setup process. The installation can be started by double-clicking on *mmcr-1.1-win32.exe*.

A successful installation will create a group for MMCR. To start MMCR double-click on the MMCR icon or use the Start->Programs->MMCR option.

1.2.2 Other operating systems

You should first uncompress and unpack the MMCR client package:

gunzip mmcr-1.1-unix.tar.gz

tar xvf mmcr-1.1-unix.tar

This will create a directory named 'mmcr' that should be included in your 'CLASSPATH' (the variable which the java interpreter uses to look for java programs). The setting for the CLASSPATH is in your .cshrc file. An example setting is:

setenv CLASSPATH "/some/other/directory:$HOME/mmcr/

You can then start MMCR with the following command:

prompt> java VCR

1.2.3 Client configuration

The start-up procedures described above will start MMCR with the default server. You should edit the 'Client.config' file if you want MMCR to start with a different default server. You can also change the server once MMCR has started (see later section).

2 MMCR user guide

The most important components of the MMCR client are the Main Window, the Recorder window and the Player window. The following sections discuss these components in greater detail and describe the setup process for recording and playback of a MBone session.

2.1 MMCR main window

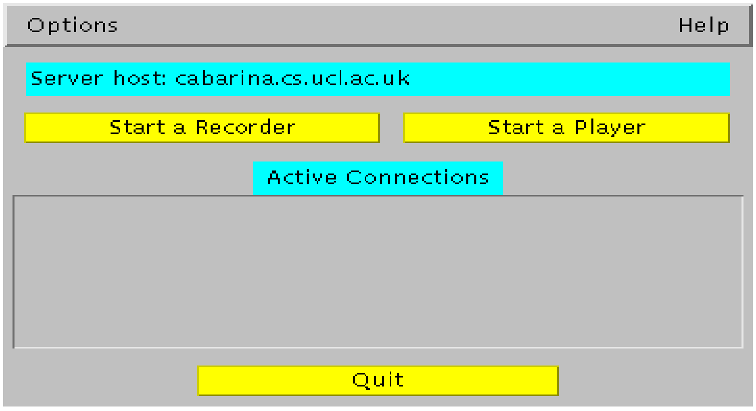

Figure 1: Main MMCR Window

The Main MMCR Window (Figure 1) serves as the controller window. At the top the name of the MMCR server machine is displayed. The server host machine can be changed from the ‘Options’ menu. The ‘Active Connections’ part (which is obviously empty at the start) gives the titles being recorded or played. It also provides a way of displaying the control window of a hidden player or recorder (see section 2.2.3).

The “Start a recorder” button starts a new recorder (but does not connect it to the server yet). The “Start a Player” button starts a conference browser (connects the client to the browsing interface of the server) that is the first step of the playback setup process.

Using the MMCR client, a user can start multiple recorders and players that coexist independently. A newly created player or recorder will connect to the currently specified server (as a result you can have two recordings going on simultaneously on different servers).

2.2 The Recorder window

The initial recorder window is shown below. It appears on the screen when the “Start a Recorder” button is pressed in the main window of MMCR.

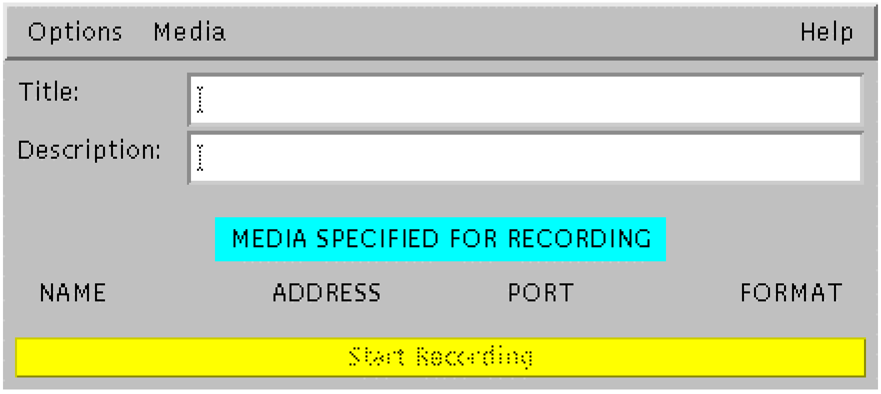

Figure 2: The Recorder

You should type in a title and a description for the recording you are about to make. You should be as informative as possible as this will help in identifying the recording in the future. After the title and description are inserted (hit return after entering each), the media details window appears.

2.2.1 Media details

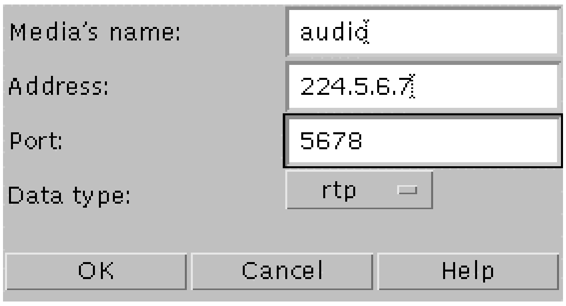

Figure 3: Media details

You should enter a name for the medium (most commonly used and indicative names are audio, video, whiteboard or the name of the tool). Then, you should specify the multicast address/port combination which you want the recorder to record the data from. The type of the medium must then be selected from the supported types.

- You are not allowed to use the same name or multicast address/port in multiple media.

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Media Data Types

Data transmission on the Mbone is performed according to specific protocols. Each type of medium has its own transmission protocol according to the medium characteristics. Selecting the appropriate type for the recorded media enables the recorder to utilise any information present in the media data. You can use the following guidelines when selecting the type of a medium:

RTP: The most commonly used media, audio and video are transmitted using the Real-time Transmission Protocol (RTP). Most audio (e.g. rat, vat) and video (e.g. vic) tools use RTP for data transmission and you should select that data type if you know that the session participants will be using RTP compliant tools.

Encrypt: For encrypted RTP sessions only.

ShW: Used for Shared Workspace media. Example tools are 'wb' and 'nte'. It covers both encrypted and un-encrypted data of this type

Raw: Any media types that do not belong in any of the above categories.

An indication of the type of each medium can be obtained from the session's announcement in SDR if that is available.

Box 1: Media data types

An example recorder control window with all the session and media details specified is shown in Figure 4.

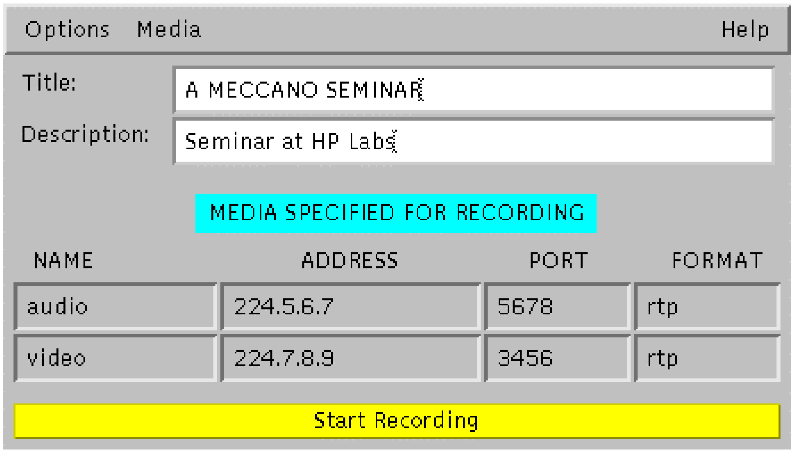

Figure 4: Ready to start recording

You are now ready to start recording by pressing the "Start Recording" button. When recording starts the "Start Recording" button will become a "Pause Recording" button. In pause mode the button becomes "Resume Recording".

2.2.2 Specifying the duration of the recording

Before or after starting recording you can specify the duration of the recording by going into the "Options" menu and selecting "Set Duration". A window will appear where the desired duration can be specified. The duration period starts at the time the duration is specified or at the beginning of the recording (if duration was specified prior) Once specified, the duration can not be changed (but you can manually stop the recording earlier). Any ‘Pause’ periods are also included. After the duration period elapses the recorder quits automatically.

2.2.3 Hiding the recorder window

An alternative to iconising the window of the recorder is dismissing it completely. This is available from the “Options” menu. Dismissing the recorder window does not stop the recording. The window can be displayed again by double-clicking on the title in the MMCR main window.

2.3 Browsing and Playback

When the “Start a Player” button is pressed in the MMCR main window the client connects to a server and retrieves a listing of the titles that server has available for playback. This listing is then presented to the user (figure 5)

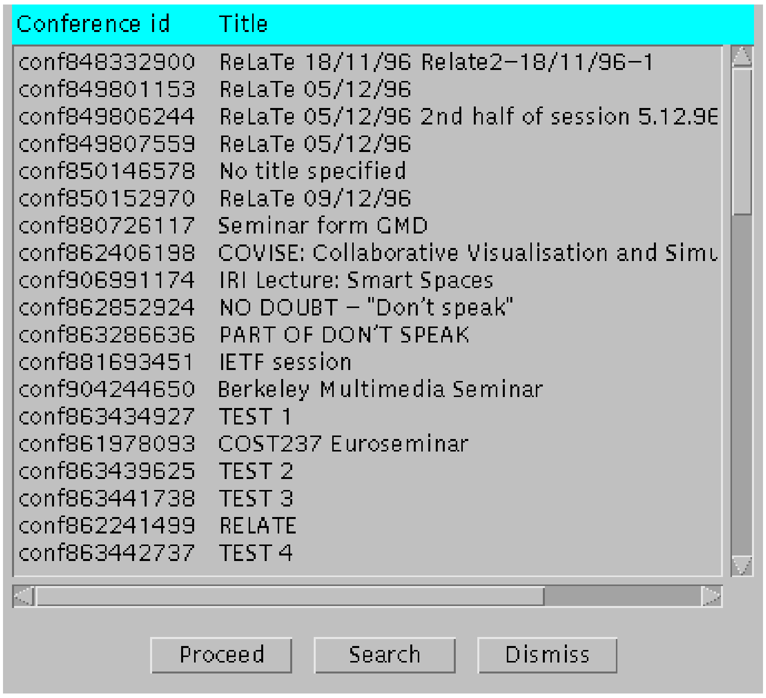

Figure 5: The titles listing

At this stage there are 3 possible options: to select one of the titles and ‘Proceed’ to view more information on it (the same can be achieved by double-clicking on the title), to try a ‘Search’ in order to narrow down the possible selection or to decide that the clip you want is not available on this server and ‘Dismiss’.

2.3.1 Search

The “Search” button causes a small window to appear. You should enter the keyword that you want to search for. All the titles are then searched and only those that contain the keyword will remain in the titles listing window. At this stage you have the option to select one of the titles for more information (as before) or to “Undo” the search and show again the full listing.

2.3.2 Viewing more information on a clip

To assist in selecting a particular clip for playback more information on clips is available. Figure 6 shows further details on a session.

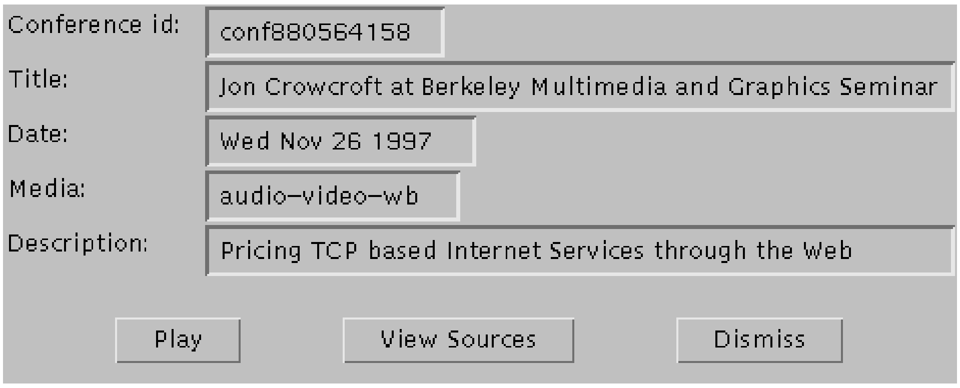

Figure 6: Viewing Session information

At this stage, if you decide that the clip is the one required click the "Play" button to select the media and sources you want to play. You can go back to the listing of the clips with the "Dismiss" button or view the session's participants with the "View Sources" button.

A

Viewing & Selecting 'sources'

A source is defined as a medium stream from a participant e.g. the sources of 'audio' are all the participants who transmitted audio during the recorded session. Each source is independent from the others.

The "View Sources" option will display all the sources of each medium. You can use this information to identify the participants of the recording. The name that each participant used is only available for RTP (i.e. audio and video) streams. For participants who only used other types of media (e.g. whiteboard) the IP address of their machine is displayed.

Box 2: Media sources

2.3.3 Selecting Media sources

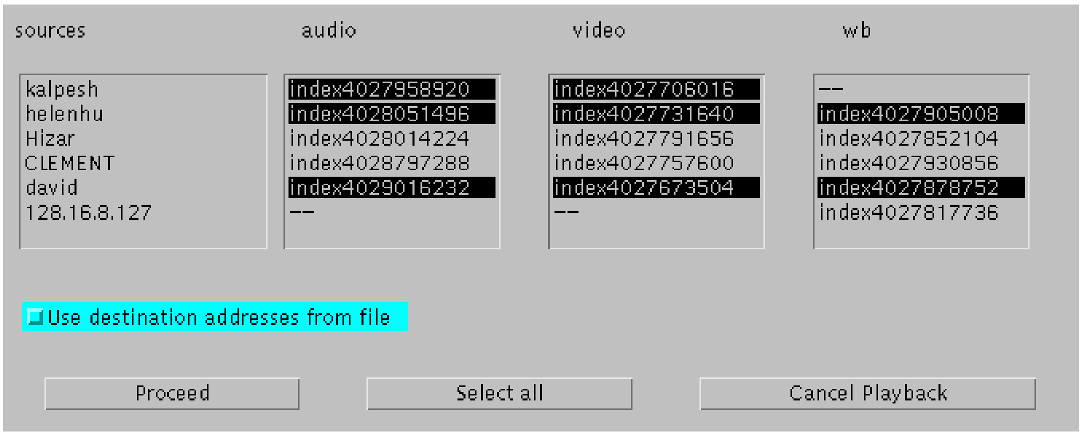

Figure 7: Selecting sources

The player must know which of the recorded sources it must playback. As shown in Figure 7, the names of the participants are listed at the left and the rest of the columns are the media. A "—" indicates that the participant did not send any data of that medium.

Sources can be selected in the following ways:

a) Clicking on the participant's name selects all of his/hers sources.

b) Clicking on a particular source selects/deselects only that source.

c) The "Select all" button selects all the sources for playback.

There is a maximum limit (15) on the number of sources that can be played back. In sessions that have more than 15 sources the "Select All" option is not available. If you manually choose more than 15 sources you will be asked to de-select some.

The purpose of the "Use Destinations Addresses from file" option will become apparent in the next section.

Once all the required sources are selected you can click on the "Proceed" button to go to the next step

2.3.4 Specifying the destination addresses for the media

The player needs to know the multicast addresses at which it will send the data. The user must specify the following information for each medium in the window that automatically appears:

a) Multicast address and port: the destination multicast group. People who want to receive the data from the player must join this group with the appropriate tool (e.g. rat for RTP audio).

b) TTL: How far the data from the player can reach

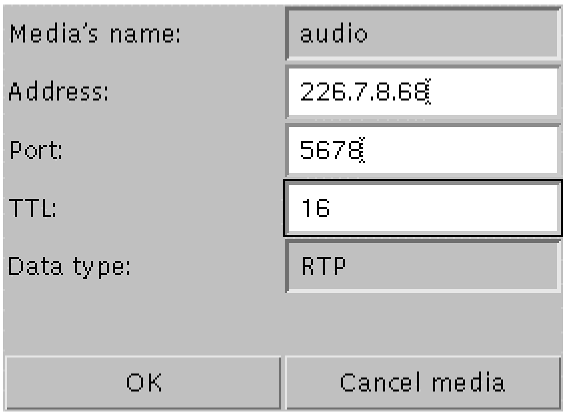

Figure 8: Destination address

If you are frequently using MMCR to playback data to the same multicast address you can use the "Use destination addresses from file" option. This will ask for a filename which contains the addresses for the media you are playing. The full path to the file is required unless the file is in the same directory as the MMCR files.

The format of each line is: <medium name> <address> <port> <ttl>.

A sample file looks like:

audio 226.7.8.68 5678 16

video 224.4.4.4 4688 16

- The media names in the file should match the media names in the clip.

2.3.5 Starting and controlling playback

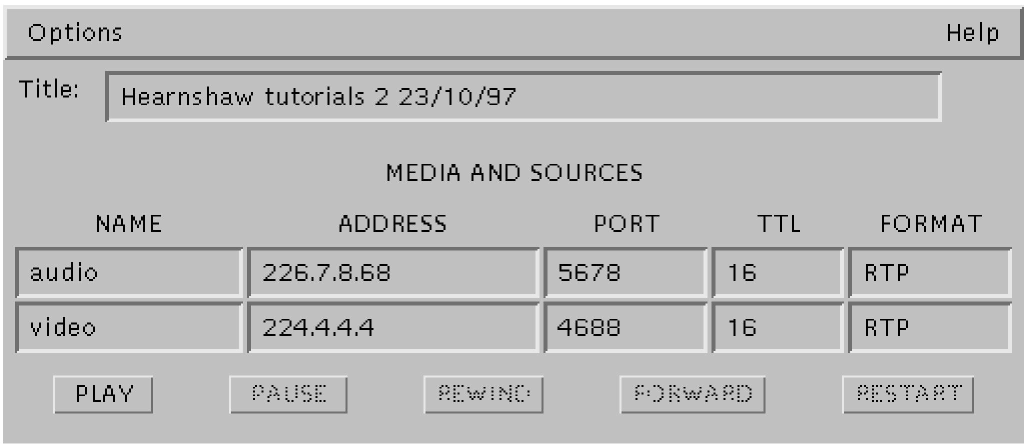

Figure 9: Playback control

Once all the necessary information on the media has been specified, the playback control window appears (Figure 9) and playback can start.

Clicking on the “Play” button sends all the necessary information to the MMCR server and playback at the destination address for each medium begins. The original session is reproduced as accurately as possible (some media may start later than others if that was the case during the recording).

Once playback starts all the other control buttons become available and a scrollbar appears that gives the duration of the clip and the current position.

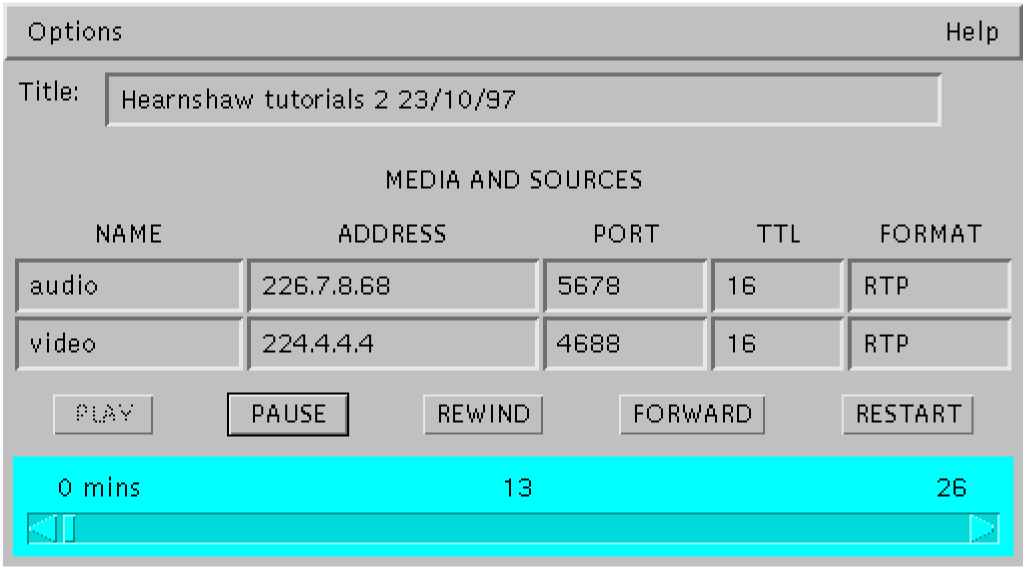

Figure 10: Playing

The control buttons serve the same purpose as on a home VCR. Pressing “Rewind” or “Forward” brings up a window in which the time to move forward/back must be specified. The “Restart” button rewinds the clip back to the beginning. The slider bar can also be moved forwards/backwards to the desired position.

The player window can be 'Hidden' (see section 2.2.3) in the same way as the recorder.

2.4 Known bugs

a) The Player may stop responding if the scrollbar is moved quickly backwards and forwards. It is recommended to use the “Forward” and “Rewind” buttons when you want to skip a large period of time (> 1 minute)

b) The 'unicast' option is only available in the WWW interface of the MMCR player. It will be available in the stand-alone client in its next release.

Further Reading

MMCR

Lambrinos, L. Kirstein, P.T., and Hardman, V.:"The Multicast Multimedia Conference Recorder". Proceedings of ICNNN'98, Lafayette, Louisiana, USA

See also: http://www-mice.cs.ucl.ac.uk/multimedia/mmcr

MBone

For further information about the JANET Mbone service, see the JANET Mbone Service Technical Guide. The guide is available from: http://www.ja.net/documents/mbone3.4.ps

Glossary

Bandwidth
: A term used to show the amount of information flowing through a communications channel. Expressed in units of n $\times$1000 bits per second, kbit/s.

CODEC
: COder/DECoder. A hardware or software processor converting between analogue audio or video and the digital format used for transmission, in both directions. The term is also used to describe the major hardware component of a videoconferencing system.

DES
: Data Encryption Standard.

IP address
: IP (Internet Protocol) addresses are unique numerical identifiers for each networked host computer. The IP address is used in conferencing when the conference is point-to-point rather than multiparty.

JDK
: The Java Development Kit from Sun. More info exists at http://java.sun.com

Kilobits per second (kbit/s)
: The kbit/s rate enables the participants to track how much bandwidth is being used during a session. For videoconferencing, the kbit/s should not be raised above 128 kbit/s, unless using a point-to-point conference or a Local Area Network (TTL=16). See TTL.

LBL
: Lawrence Berkeley Laboratories, University of California, Berkerley, USA.

Loss Rate
: The percentage of packet information lost during transmission.

MBone
: The multicast capable backbone of the Internet. It currently consists of a network of tunnels linking the islands of multicast capable sub-networks around the world.

Multicasting
: Multicasting is sending audio, video etc. on the Internet in way which ensures that anybody who is interested in receiving the information, *can* receive it, but only people who *are* interested will receive it. Think of it as being in between unicast (like most telephone calls - between two telephones only) and broadcast (TV - the signals are sent to you whether you want to watch or not).

Multicast address
: Addresses used for multicast conferencing should be in the range 224.2.0.0 - 224.2.255.255
Note: Multicast addresses must be agreed upon in advance of the multicast session, either through e-mail or phone or assigned using SDR.

Network congestion

A condition in an IP network where the amount of traffic injected into the network is too great for the routers to handle and some packets are discarded.

NTE

Network Text Editor.

NV

Network Video. A software package, in the public domain, which supports videoconferencing over Internet Packet Networks.

Port

A UDP (User Datagram Protocol) number unique to the broadcast session, and should be over 5000.
Note: The port number must be agreed upon in advance, either through e-mail or phone or assigned using SDR.

Protocol

A set of standards that govern the transfer of information between computers over a network or via telecommunications systems. To reduce errors, the computers at both ends of a communications link must follow the same protocol.

RAT

Robust Audio Tool.

Redundant audio encoding

Also known as redundancy. A technique to protect against packet loss where a second, low bandwidth version of the original encoding is piggy-backed onto the preceding packet so that, when single packets are lost, the redundant version is played back instead of silence.

RTP

Real-Time Protocol is an application level protocol that provides real-time support for multimedia communication.

SDR

Session Directory Tool.

SIP

Simple Internet Protocol.

TTL

TTL stands for time to live, and determines how far multicast packages can travel over the Internet. The standard values are:
16 - Site
47 - UK
63 - Europe
127 - World

Unicasting

A unicast connection is a point to point connection between two specific machines.

VAT

Visual Audio Tool.

VIC

Video Conference tool. The tool included in the SHRIMP package for the transmission and reception of video streams.

WB

Whiteboard.