UCL Transcoding Gateway (UTG)

Client Application v1.3

User Guide

Version 2 (DRAFT)

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Acknowledgements

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Version 2 by Kristian Hasler (update)

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1 Introduction

Since multicast support is not yet ubiquitous, many sites cannot participate in multicast sessions on the Internet multicast backbone (Mbone). The standard multicast routing solutions in widespread use have relatively high overhead and do not operate well over low-speed links and some popular operating systems do not support multicast routing. Whilst these problems will undoubtedly be solved in the medium term, an alternative solution is required for the interim.

Another issue is concerned with the heterogeneity, which is intrinsic to the Internet technology. Due to the mismatch of link speeds, the bandwidths available between different sender-receivers differ. In current ITU-T wide area applications, each sender transmits data at the same rate to all receivers. With heterogeneous receivers, the source would have to run at a rate that matches the most constrained receiver. For example when BR-ISDN is used, the available bandwidth is limited to 64 Kbps (1 B-channel) or 128 Kbps (2 B-channels). Currently most Mbone transmissions use a target rate of 128 Kbps for video and 64 Kbps for audio, precluding simple bridging of Mbone sessions across single 128 Kbps ISDN line. Thus some kind of rate limiting becomes necessary.

The UCL Transcoding Gateway (UTG) provides a solution to these problems by enabling users to participate in an Mbone event from hosts that are not multicast enabled. It is a relay and transcoding gateway, which is incorporated into Internet multicast systems to permit access by workstations with only unicast connectivity. It consists of a Server Application running on a Solaris workstation on the Mbone and a Java Client Application running on a PC or other workstation having only a limited-bandwidth unicast connection to the server. The client interface controls the gateway links to the underlying Mbone conferencing tools which may be running on the same unicast host as the client or on some other unicast host.

2 Pre-requisites

Before using the UTG ensure that you have:

- an internet connection (either dial-up or a direct connection).
- access to a UTG server, local to your internet connection point.

The client is a Java application and controls the Mbone tools running on the local machine. Therefore you will also need the following software installed and operational:

- Java Runtime Environment (PC) or Java Development Kit (UNIX) from Sun Microsystems. Note: Make sure that the 'bin' directory is in your path. The UTG will not start if it cannot find the Java interpreter.
- The Mbone tools: RAT, VIC, WBD, NTE and SDR.

The Mbone tools are available from the UCL multimedia web page at

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

3 Installation

The UTG client is available from the UCL multimedia web page at

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

3.1 Installation on Windows95/NT4.0

3.1.1 Set-up

For Windows95/NT4.0 users, a setup application is provided. The installation program will start and guide you through the installation process. You will need to specify a directory to hold the files, it should be where the Mbone tools have been installed. The default is '\Program Files\Mbone'.

To start the installation program, double click on: utg-client-1.3-win32.exe

3.1.2 De-installation

The installed components can be removed by using the Windows 95 *uninstall* facility by following: Start⇒ Settings⇒ Control Panel⇒ Add/Remove Programs and choose 'UCL Transcoding Gateway' and then click Add/Remove

3.2 Installation on other platforms

Unpack the downloaded UTG client package (utg-client-1.3-unix.tar.gz) using:

```
gunzip utg-client-1.3-unix.tar.gz

tar -xfv utg-client-1.3-unix.tar
```

Add the directory 'utg1.3', to your CLASSPATH variable. eg in the .cshrc file:

```
setenv CLASSPATH "/some/other/classes:$HOME/utg1.3/utg.jar"
```

For operation with SDR you will need to install the plugins for the UTG. Firstly copy the contents of the plugins directory from utg1.3 into your SDR plugins directory (usually $HOME/.sdr/plugins/). Secondly copy vic_utg, rat_utg, wb_utg and nt_utg into your binaries directory: e.g.:

```
cp $HOME/utg1.3/plugins/* $HOME/.sdr/plugins/
```

```
cp $HOME/utg1.3/*_utg $HOME/bin
```

Edit the path in the file 'utg' so that the command 'cd' changes directory to the directory where you installed UTG e.g.:

`vi $HOME/utg1.3/utg` …and edit this line:

```
cd $HOME/utg1.3
```

Finally copy the file 'utg', edited above, into your binaries folder e.g.:

```
cp $HOME/utg1.3/utg $HOME/bin
```

You may need to run 'rehash' so your shell finds the new commands.

3.3 Getting Started

3.3.1 Windows95/NT

After UTG installation a program group, *UCL Transcoding Gateway*, is added in the Start⇒Programs menu. This group contains three icons:

- SDR
- UTG help text
- UTG client (SDR relay enabled)
- UTG client (SDR relay disabled)
- UTG configuration

Start the application by selecting the appropriate client icon.

3.3.2 Other platforms

Start the application by typing:

```
utg
```

4 Configuration settings

The configuration settings should be checked the first time the client is used by selecting *Settings* from the menu and then clicking on *Configuration*.

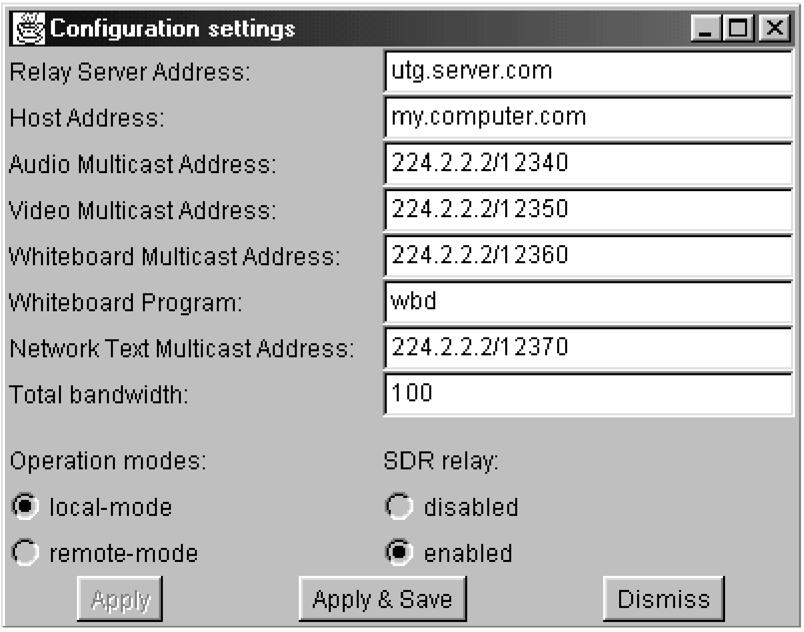

Figure 1: The Configuration Panel

The configuration settings are as follows.

Relay Server Address specifies the host name (or dotted IP address) of the UTG relay server. See Box 1: IP Addresses and Machine Names

Host Address specifies the host name (or dotted IP address) of the client. This is usually the local host address on which the user interface is running. This field MUST be completed - it is where the server forwards the data. See Box 1: IP Addresses and Machine Names

Audio/Video/Whiteboard/Network Text Multicast Addresses specify the default multicast session addresses (and port numbers) for audio, video, whiteboard and text services, respectively. The default addresses are not required if you use SDR to start sessions but may be useful if you connect to a session that uses the same addresses

Whiteboard Program specifies the name of the whiteboard tool. When using windows this should be ‘wbd’ and under unix it could either be ‘wbd’ or ‘wb’.

Total bandwidth indicates the total bandwidth (in kilobits) available for *incoming* audio and video only. This figure should be reduced by a factor of 12 for every instance of a shared workspace running and it should not exceed more than 85% of your total available bandwidth. For example if you had a 128Kbit ISDN connection and were going to use RAT, VIC and NTE then you could enter the value 98 into the field (roughly 85% of 128-12).

Note: The transmitting rate for *outgoing* video is set in the field: ‘Video_bw’ field (U ⇒ M)’ from the main UTG window. See below.

Operation modes

There are two modes: local and remote. In *Local mode* the interface controls the multimedia tools on the local host/machine. In *Remote mode* the interface controls the relay service on behalf of a remote unicast host in which case the field *Host Address* is the address for that remote host.

SDR relay

The checkboxes allow you to enable or disable the SDR relay service. Disabling it will stop the UTG server forwarding sessions to the SDR tool.

> **IP Addresses and Machine Names**
>
> Every computer on the internet is allocated a unique IP address, also called a dotted IP address. To avoid remembering complicated addresses, an easy to remember machine name is mapped against each address. The UTG server will always have a fixed machine name but if your connection to the internet is a dial-up connection, then it is probable that your machine name is allocated at the time of connection (dynamic allocation). If you are using windows you can find out your current IP address using the program 'ipwincfg'.

Box 1: IP Addresses and Machine Names

5 Normal Operations

5.1 UTG with or without SDR relay.

The UCL Session Directory Tool (SDR) can be used to browse and select which video conferencing sessions the UTG client should join. The session announcements can be forwarded (or *relayed*) by the UTG server to the locally running SDR tool. The UTG client can be started with or without this feature. On Windows95/NT, the two icons in the *UCL Transcoding Gateway* program group allow you to select the relevant invocation. On other platforms, you must use the command line option:

```
-via_relay [true/false]
```

to choose whether to use SDR relay or not. If you enable the SDR relay then remember to also start the SDR tool.

When a session is selected and joined in SDR, a window will pop-up for each tool available. To use the tool via the UTG select the UTG version of the tool (e.g. 'rat_UTG' - see Figure 2). The session addresses will then be passed to the UTG client and placed in the address fields of the main UTG window. The tools are then automatically started.

Figure 2: Joining audio and video sessions via SDR

If you start the UTG client without SDR relay, you must enter the audio and video session addresses, as described below.

5.2 The UTG Client Main window

The UTG client user interface, shown in Figure 3, is divided into four parts for controlling the audio mixer, video filter, whiteboard and text relays respectively. They are described separately in the following sections.

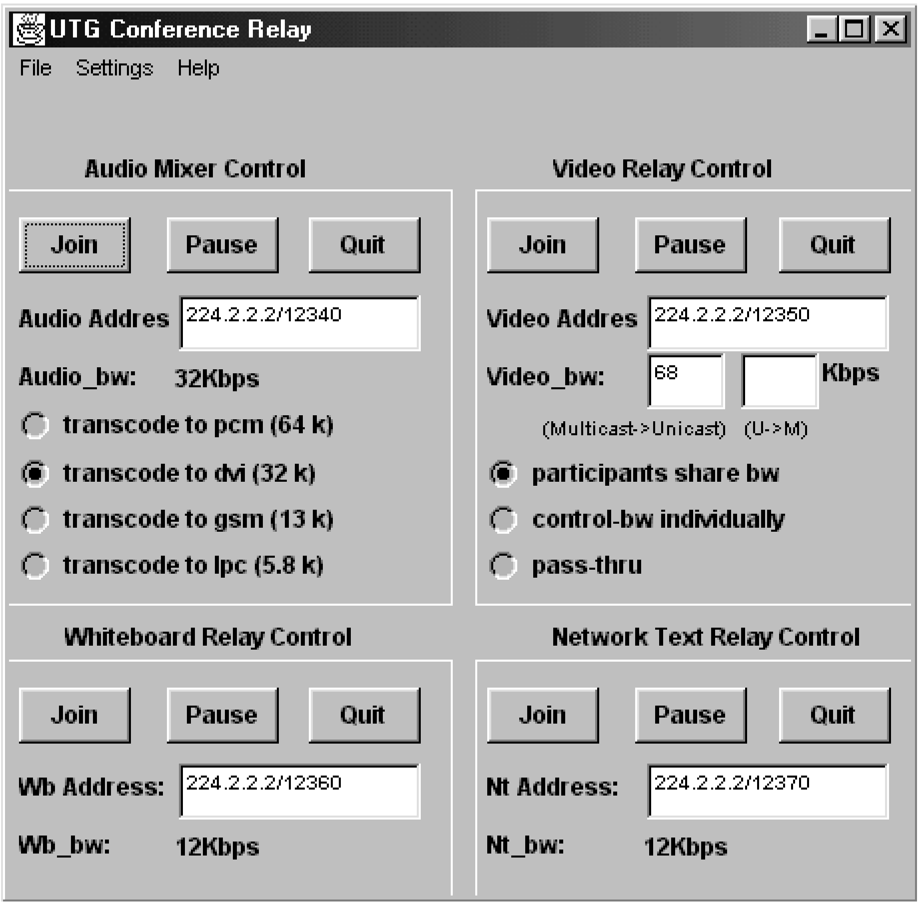

Figure 3: The main UTG client panel

In each of the four panels of the interface, there are three buttons, used for joining, pausing and quitting the relevant media tool. Using these for the Audio Mixer will:

- **Join** the audio session on the address specified by initiating the remote audio mixer.
- **Pause** the audio session temporarily.
- **Quit** the audio session, which also allows you to change the audio session address/port to join another audio session.

5.3 Audio mixer control

Before joining an audio session, you need to set the following:

Audio session address (Audio Address) will be set automatically where a session is chosen via SDR. When not using SDR relay, the audio session address/port must be set manually either through the configuration panel or directly into the ‘Audio Address’ field in this interface.

Transcoding (Audio_bw) controls the coding method to be used by audio mixer. Different codings use differing bit rates: PCM - 64 Kbps, DVI - 32 Kbps, GSM - 13 Kbps, LPC 5.8 Kbps.

The bandwidth allocated for the audio session is set automatically to that required by the coding method selected (e.g. DVI to 32Kbps).

5.4 Video Relay control

This panel operates in a similar way to the audio mixer control. These items need to be set:

Video session address (Video Address) will be set automatically where a session is chosen via SDR. When not using the SDR relay, the video session address/port must be set manually either through the configuration panel or directly into the ‘Video Address’ field in this interface).

Bandwidth allocated for video session (Video_bw) is set by entering a value into the video_bw field to allocate bandwidth for video session. You should start with a low bandwidth and increase it later (e.g. start from 10 Kb/s for 1-B ISDN channel and 20 Kb/s for 2-B ISDN channels). Too many video packets will influence the audio quality and may break a dial-up connection.

Video rate control method is one of the following:

- All live video streams share the allocated bandwidth for video. If 12 Kb/s allocated for 3 video streams, each stream will be controlled with bit rate around 4 Kb/s.
- Pass-thru – where all video streams are passed without rate reduction.

- Control bit rate for each stream individually – which allows you to monitor and control the rate of each stream. The "Video Rate Control" window (Figure 4) shows all active senders by their name. Double-clicking on a name will show the original transmitting rate and the rate after video filtering. To control the rate of a single sender, choose the ‘Control rate individually’ as the rate control method (in the main window), then double-click the sender in the ‘Video bandwidth control’ window, and then use the ‘Bandwidth Limit’ scrollbar to allocate bandwidth for each the stream.

Figure 4: Video rate control panel

5.5 Whiteboard Relay Control

Before joining a whiteboard session, you need to set the **Whiteboard session address**. This field will be set automatically if SDR relay has been started and a session is chosen via SDR. If not started via SDR, the whiteboard session address/port can be set manually through the configuration panel or typed directly into the ‘WB Address’ field.

The whiteboard relay restricts the data bandwidth to the client to 12kbps.

5.6 Text Relay

Before joining a text session, you need to set the **Text session address**. This field will be set automatically if SDR relay has been started and a session is chosen via SDR. If not started via SDR the text session address/port can be set manually through the configuration panel or typed directly into the ‘NT Address’ field.

The whiteboard relay restricts the data bandwidth to the client to 12kbps.

6 Tips and trouble shooting

Problem

No RAT or VIC window appears after you join an audio or video session.

Action

Check that you have installed the MBone tools and your path contains the location of the tools.

Problem

You joined an audio or video session without error message, but you cannot receive audio or video.

Action

Check the *Host Address* field is set to the correct IP address of your machine. If your machine has two or more network interfaces, you need to disable all other interfaces except the one you specified in *Host Address* field.

Problem

You cannot receive session announcements in the SDR window

Action

If you cannot receive any session announcement, check the *Host Address* field is set to correct IP address (using the program menu configuration settings) before running relay with SDR.

Note: Currently the SDR relay server is configured to listen to the default session announcement address only (224.2.127.254/9875). You may not be able to receive the announcements for specific administrative-scope, except those cached on the SDR relay server in advance.

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.

DVI

Audio encoding standard.

GSM

Audio encoding 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.

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.

LPC

Audio encoding standard. Linear Predictive Coder, 9 kbit/s.

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.

NTE

Network Text Editor.

PCM

Audio encoding standard. Pulse Code Modulation, 64 kbit/s 8-bit µ-law encoded 8 kHz.

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.

SDR

Multicast Session Directory.

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.

VIC

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

WB

Whiteboard.