User Guide for

RAT v3.0.33

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Acknowledgements

This user guide is based on the UKERNA SHRIMP User Guide. Unlike the UKERNA guide, this document is updated to reflect developments in RAT.

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Encryption features of this software use the RSA Data Security, Inc. MD5 Message-Digest Algorithm.

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1 Introduction

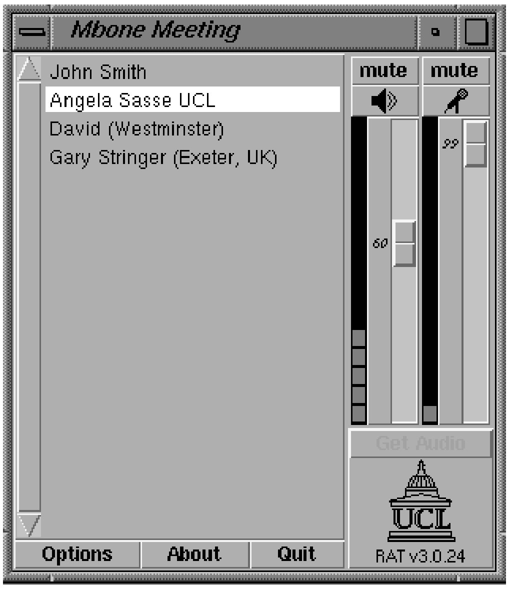


Figure 1: Main RAT Window

RAT (Robust Audio Tool) - unicast and multicast audio conferencing tool. RAT can be used for both point-to-point videoconferencing involving a direct link between two hosts or for multiparty conferencing with many participants via the Internet Mbone (see Box 1).

A

Unicast and Multicast

A *unicast* connection is like a telephone call which has one connection between two telephones for the duration of the call. You should use unicast if there are only two people in the conference and if one of you does not have access to multicasting. In order to set up a unicast connection, you must know the name of the computer that the person you want to have a conference with is going to use.

A *multicast* connection can, in principle, have an unlimited number of participants. You should use multicast if it is likely that there will be more than two participants in the conference. Tools like RAT, VIC, NTE, WB and SDR have been specially developed for multicasting.

Box 1: Unicast and Multicast

1.1 Before you start

In order to receive audio, there must be either a speaker or a pair of headphones connected to your computer.

In order to transmit audio, you must have a microphone plugged into your computer.

It is recommended that headphones are used in preference to speakers (see Box 6). Using headphones allows you to listen and talk at the same time (this is known as full duplex audio). Without the use of headphones the output from the speakers can interfere with the microphone, causing unpleasant feedback. The only way of avoiding this is either to use an echo canceller, or to switch to half duplex audio, which means that you can only speak *or* listen at any one time, i.e. you cannot listen to others when you speak, or you cannot speak when you are listening. This is unnatural and can make conversation difficult.

! Some audio cards do not support full duplex.

1.2 Getting started

There are two ways of starting up RAT: from the command line and from SDR. Using SDR is easier as it automatically configures the tool for use.

1.2.1 Starting up RAT from SDR

When joining a conference with audio using SDR, RAT will start up automatically. All parameters will be set automatically.

1.2.2 Starting up RAT from the command line for a multicast conference

As with the other Mbone tools the format for setting up RAT from the command line is as follows:

Unix:

```
Prompt> rat [options] <address/port>
```

Windows95/NT4.0:

Click on the *Start* button in the bottom left hand corner of the screen. Select *Run...* In the Run Window, type the following in the *open:* field.

```
Open: rat [options] <address/port>
```

The multicast address should be in the range 224.2.0.0 - 224.2.255.255 (except when using admin scope – see Box 2). The port number should be at least 5002.

So, as an example, this line would start RAT with a TTL of 47 (see Box 2 for an explanation of TTL) on the multicast address 224.2.2.60 and port number 5004:

```
Prompt>/Open: rat –t 47 224.2.2.60/5004
```

In the example above the user has used the option '-t' to specify the TTL. TTL determines how far the audio packets will go, i.e. how far away you can talk to people. A TTL of 47 is generally large enough for communication within the UK.

🔔 All participants must use the same multicast address and port number in order to talk to one another.

A

TTL

TTL stands for Time To Live and determines how far the audio that you transmit will travel. A TTL of 15 will reach other parts of your campus, a TTL of 47 will reach all parts of the JANET Mbone, a TTL of 63 reaches Europe, and 127 worldwide.

The default for all the Mbone tools is a TTL of 16.

Admin scope

There is currently a move away from using TTL for scoping conferences to using admin scopes. Using admin scope will limit conferences more accurately and is more sophisticated than specifying a TTL.

Like TTL scopes, admin scopes need to be set up by the network administrator. When the scopes have been configured, you will get a range of addresses for each of the scopes defined. Using an address in the range provided will limit your conference to that scope.

Example: If local scope is defined as addresses in the range of 239.0.0.0 - 239.100.255.255, any conference on addresses in this range will be restricted to the local area as defined by the network administrator.

The most widely used method for scoping is still TTL, so you should contact your local systems administrator to see if admin scopes have been set up. If not, you should ask them to do it.

Box 2: TTL and Admin scope

1.2.3 Starting up RAT from the command line for a unicast conference

As with the other Mbone tools the command format is as follows:

Unix:

```
Prompt> rat [options] <remote_hostname/port>
```

Windows95/NT4.0:

Click on the *Start* button in the bottom left hand corner of the screen. Select *Run...* In the Run Window, type the following in the *open:* field.

```
Open: rat [options] <remote_hostname/port>
```

So, as an example, this line would start RAT for a unicast conference with someone on the computer called myhost.example.ac.uk on port 5004:

```
Prompt>/Open: rat myhost.example.ac.uk/5004
```

The person at the other end, in this case the person who is working on myhost.example.ac.uk will have to do the same command but with the name of your computer instead of myhost.example.ac.uk. The port number must be the same on both machines.

TTL is not applicable in unicast sessions.

1.2.4 Quick guide to using RAT

The first time you start up RAT, a window might appear where you have to enter your name and then click the *Done* button (see Figure 2).

Please enter the following details, for transmission to other conference participants.

Figure 2: RAT User Information Window

These details will be stored in a file called *.RTPdefaults*. (The details are also used by the video tool VIC.) The file will be stored in your home directory. The name that you type in will appear in the RAT Main Window (see Figure 1), and will identify you to all other participants in the session. You can change your name at any time by changing the text in the name field of the RAT Options Window (see section 1.3.2).

In the Main Rat Window, you can use the left slider bar to adjust the volume of the speaker or headphones. When someone is talking, the left power meter will be activated, and the name of the speaker will be highlighted in the main window (see Figure 1).

A

If you can’t hear other people:

Make sure that the left *mute* button is *not* pressed down. When the *mute* button is pressed down, the icon (depicting either a speaker, headphones, or the symbol for line out), will appear inside a grey box, and the audio will be muted.

Make sure that someone is actually talking. You can see that someone is talking when the left power meter in the RAT audio window is going up and down.

Make sure that the volume of the speaker or headphones is not 0. The volume can be adjusted on the slider bar next to the left power meter.

Make sure that the button with the little icon under the left *mute* button is depicting headsets if using headsets, and speakers if using speakers. You can change between headsets, speakers and line-out by clicking on the button with the icon. (Some audio cards will automatically send audio to headsets if they are plugged in and speakers if not. In this case, the button will not toggle, but will always display a speaker)

Check that your headsets are plugged into the computer correctly.

Box 3: If you can't hear other people

In order to *talk* to other people, you must unmute your microphone. This can be achieved by either clicking on the right *mute* button with your left mouse button, *or* holding down the *right* mouse button anywhere inside any RAT window while you are talking. If you are using headphones rather than speakers, you can leave the microphone unmuted all the time. If you are using speakers (without an echo cancellor connected), the microphone should only be unmuted when you wish to talk.

🔔 If the other participants’ audio is too faint, ask them to turn up their volume. You can *adjust the volume* of your microphone with the right slider bar. On most audio cards, you will not hear yourself in your headsets or through the speakers when you are talking. Whether you can hear yourself or not, you will to a certain extent have to rely on the power meter to adjust your microphone volume – if you can hear yourself, the volume you hear is not necessarily related to the volume other participants will hear. When you speak, the power meter should not go all the way into the red area at the top as this will sound distorted. Generally, you have to rely on the other participants in the conference to tell you whether your volume is set correctly.

- *If the audio from another participant is very broken up* The most likely causes of this are either network congestion, or because the other user is speaking too quietly for the audio tool to distinguish them from the background noise. You can check if you are receiving packet loss from another participant by clicking on their name in the Main RAT Window. A small window will appear (see Figure 3). The last line in this window will tell you how much packet loss (instantaneous Loss Rate) you are receiving from that participant. If the packet loss is small, i.e. less than 5%, ask them to turn their volume up. If that does not help, ask them to turn off silence suppression (this option is available from the *Options* menu, accessible from the RAT audio window).
- *If everyone's audio keeps cutting out* When you move windows around on the screen, the processing power of the computer will be spent on window management rather than audio decoding, and you will lose some audio quality. If possible, try not to move windows around unnecessarily.

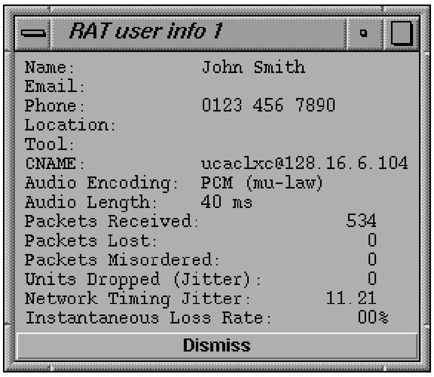
You should now be able to use RAT for taking part in conferences.

1.3 RAT user guide

RAT consists of a Main Window (see Figure 1), an Options Window (see Figure 4), and a number of smaller windows. The following sections discuss the Main Window and the Options Window in greater detail. The different command line options are described at the end of the chapter.

1.3.1 RAT main window

The Main Window (see Figure 1) of RAT is split into three sections. On the left is a list of conference participants. Your own name will always appear at the top. Whenever you speak, your name will be highlighted. Clicking on the name of a participant (except yourself) will display a user information panel, giving various statistics for that user, such as reception statistics, which audio tool they are using, which version of the tool they are using, and so on (see Figure 3).



```
Name:               John Smith
Email:
Phone:              0123 456 7890
Location:
Tool:
CNAME:              ucaclxc@128.16.6.104
Audio Encoding:     PCM (mu-law)
Audio Length:       40 ms
Packets Received:                534
Packets Lost:                      0
Packets Misordered:                0
Units Dropped (Jitter):            0
Network Timing Jitter:         11.21
Instantaneous Loss Rate:          00%
```

Figure 3: RAT User Info Window

On the right of the Main RAT Window are volume/microphone controls. There are two sets of controls, the right set is for outgoing audio (microphone) and the left set is for incoming audio (headphones or speakers). Each set of controls consists of a *mute* button, a button for selecting the input/output device, a volume control and a power meter.

🔔 *If other people cannot hear you* Make sure that your microphone is unmuted when you talk. The microphone is unmuted when the right *mute* buttons in the RAT audio window is *not* depressed. The microphone icon immediately beneath the mute button will be greyed out when muted and not greyed out when unmuted.

Also make sure that the TTL is high enough (see Box 2). If your TTL is too low, you may still be able to hear a remote participant even though they cannot hear you. In order to change the TTL you will have to restart RAT.

A

Silence suppression

By default RAT starts up with silence suppression on. The silence suppression ensures that only audio above a certain level is transmitted. This means that you can leave your microphone open, i.e. un-muted, throughout the conference and silence suppression will ensure that background noise is not being transmitted.

However, sometimes the silence suppression will cut out speech as well as background noise. This can happen if your microphone is a long way away from your mouth, making your voice sound faint, or if the microphone is not powerful enough. If whatever is causing the silence suppression to cut you off cannot be rectified, you have to switch off silence suppression in the RAT Control Window (see Figure 4), and use push-to-talk (see Box 5).

Box 4: Silence Suppression

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Push-to-talk

If you prefer to leave your microphone muted when you are not talking, for example if you have switched off silence suppression (see Box 4), or if you are listening to a lecture, you can use push-to-talk. It means that you keep your microphone muted, and only un-mute it when talking. The easiest way of achieving this is by right clicking anywhere within a RAT window, which will toggle the microphone mute button. This is why is it called push-to-talk – because you "push" the right mouse button when you talk.

Box 5: Push to Talk

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Full duplex and half duplex.

Full duplex means that you can talk and listen at the same time and is the most convenient method for taking part in a conference. In order to achieve full duplex, you select *Full duplex* under *Mode* in the RAT Control Window. You must use headphones when using *full duplex* in order to avoid feedback from the speakers – alternatively, you can use an echo canceller.

NB: Full duplex is not supported by all audio cards.

Half duplex: if your audio cards does not support full duplex, you must use half duplex which means that at any point in time, you can only either *listen* to other participants or *talk* to them. When in half duplex mode you must select *Net mutes mike* or *Mike mutes net* under *Mode* in the RAT Control Window (see Figure 4).

When *Net mutes mike* is selected, your microphone will be muted automatically as soon as another participant is talking. This means that if someone is sneezing while you are talking, nobody will be able to hear you.

When *mike mutes net* is selected, you cannot hear other participant while you are talking. This means that you cannot hear people responding to what you are saying while you are talking.

If the audio card supports full duplex, this will be the default setting. If not, Net mutes mike will be the default.

Box 6: Full Duplex and Half Duplex

When pressed down, the *mute* buttons mute incoming and outgoing audio. When muted, the icons underneath the *mute* buttons will be greyed out. The mute button for the outgoing audio, i.e. microphone or line out, can be operated from anywhere within the Main RAT Window by holding down the right mouse button with the cursor anywhere in the Main RAT Window.

The buttons for selecting input and output devices are toggle buttons. The button for outgoing audio toggles between microphone and line in. The button for incoming audio toggles between speaker, headset and line out.

Individual participants can be selectively muted by clicking on their names with the middle mouse button (or by holding both mouse buttons down at the same time on a two-button mouse if using Linux). This function is not available on Windows95/NT4.0 versions.

Between the volume/microphone controls and the logo, there is a greyed out button called *Get Audio.* You can use this if you have more than one instance of RAT running on your computer. Clicking *Get Audio* in one of the RAT windows will switch the control of the input and output devices to that instance of RAT.

1.3.2 RAT options window

Pressing the *options* button in the Main RAT Window brings up a control panel, allowing the operation of RAT to be modified. Options which are not available are greyed out.