User Guide for

VIC v2.8

Version 1 (DRAFT)

29 September 1998

Acknowledgements

This user guide is based on the UKERNA SHRIMP User Guide which will be available from http://www.ja.net/service_development/video/service_developments/shrimp/index.html.

Currently this document is nearly identical to the chapter on VIC in the UKERNA guide, but as opposed to the UKERNA guide, this document will be updated as VIC gets updated insofar as is possible.

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Copyright note

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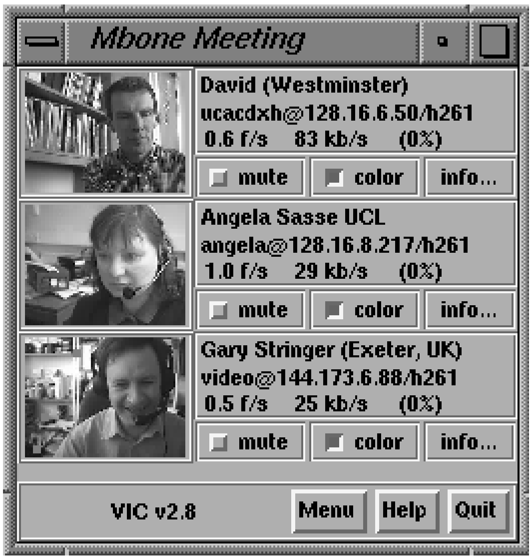

Figure 1: Main VIC Window

VIC - unicast and multicast videoconferencing tool. VIC can be used either for 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).

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

No special equipment is needed in order to receive and display video.

In order to transmit video, you must have a camera and a frame grabber connected to your computer. A frame grabber is a piece of hardware which is installed in the machine and translates the data transmitted by the camera in to the correct encoded format for VIC, or some other video application.

1.2 Getting started

There are two ways of starting up VIC: from the command line and from SDR.

1.2.1 Starting up VIC from SDR

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

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

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

Unix:

```
Prompt> vic [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: vic [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, the following line would start VIC with a TTL of 48 (see Box 2 for an explanation of TTL) the multicast address 224.2.2.70 and port number 5004:

```
Prompt> vic –t 48 224.2.2.70/5004
```

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

In the example above the user has used the option '-t' to specify the TTL. TTL determines how far the packets will go, i.e. how far away people can see you. A TTL of 48 is generally large enough for communication within the UK.

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

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

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

Unix:

```
Prompt> vic [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: vic [options] < remote_hostname /port>
```

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

```
Prompt> Open: vic 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.

TTL is not applicable in unicast sessions.

1.2.4 Quick guide to using VIC

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

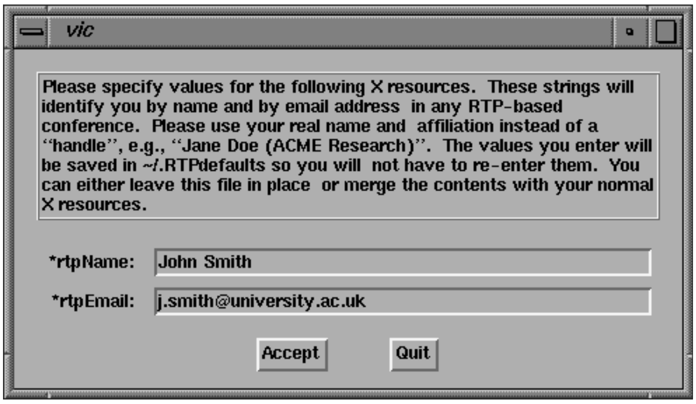

Figure 2: VIC User Information Window

These details will be stored in a file called *.RTPdefaults*. (The details are also used by the audio tool RAT). The file will be stored in your home directory. The name that you type in will appear next to your image in the Main VIC Window if you are transmitting video.

When you start up VIC, the Main VIC Window will automatically display small, thumbnail versions of the video images which are currently being transmitted by other participants (see Figure 1). If you click on a thumbnail image, a separate window containing a larger version of the image will open (see Figure 3).

Figure 3: VIC Enlarged Thumbnail Image

If no one is transmitting video, a *Waiting for video* message will appear (see Figure 4).

Figure 4: Main VIC Window - No Transmission

To *transmit video* click on the *Menu* button at the bottom of the Main VIC Window. This will open the VIC Menu Window. In the VIC Menu Window click the *Transmit* button in the top left hand corner. The little red square on the left hand side of the button will turn red after a few seconds, indicating that you are transmitting video.

! You should not transmit video unless you have been invited to participate in a session.

To *stop transmitting* video, click on the *Release* button beneath the *Transmit* button in the VIC Menu Window. When you stop transmitting, your image on the screens of other participants will not disappear, it will simply freeze. In order to make a frozen picture go away, position your mouse pointer over the frozen thumbnail image, and press d on the keyboard. You should not press any buttons on the mouse.

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

🔔 *If your picture looks strange* – if you can see the outline of yourself, but it looks distorted, press on the *Menu* button in the main VIC window. Then press the *release* button in the VIC Menu Window. Then press *transmit.*

1.3 VIC user guide

VIC consists of a Main Window, a Menu Window, and a number of smaller windows. In the following sections, the Main Window and the Menu Window will be discussed in greater detail.

1.3.1 VIC main window

When nobody is transmitting video on the address/port that VIC has been started up on, the main window displays a "Waiting for video…" message (see Figure 4). Otherwise, the Main VIC Window will automatically start displaying small thumbnail versions of the video images that are currently being transmitted (see Figure 1). The default size of the Main VIC Window can display three thumbnail images (see Figure 1), so in order to see more thumbnail images you must enlarge the Main VIC Window.

🔔 *If you cannot see all the participants in VIC*: Make sure that the VIC video window is large enough to accommodate all the pictures. Depending on your window manager, you can normally enlarge the VIC video window by dragging the edges of the window. If you still cannot see them, it may be because they are not transmitting video.

🔔 *If you cannot see yourself in VIC*: Make sure that you are transmitting video. There should be a little red square on the *Transmit* button in the menu which you get by pressing the *Menu* button in the VIC video window. If not, press *Transmit*.

Also make sure that the camera's power supply is plugged into the mains and that the camera itself is connected to the computer.

Each active conference participant has a separate area of the main window consisting of the following:

- *Thumbnail Image*. The image is updated every few seconds (the default update interval can be overridden with an X resource using the -U command line option. See Box 6 at the end of this chapter).

- Each thumbnail image can be enlarged by clicking on it once. A larger image will then be displayed in a separate window (see Figure 3). This larger image can be resized using the *Size…* button at the bottom the window. There are three different encoding schemes, CIF, NTSC and PAL, each offering three different sizes, a small, a medium and a large size. The three encoding schemes produce roughly the same size images.

  The *Modes…* button offers four different modes, *voice-switched* which will display the image of whoever is talking at any one time (enabling this option is non-trivial (see Box 3); *Timer-switched* which will cycle display each of the thumbnail images in turn, with each image being displayed for 5 seconds; *Save-CPU;* and *Use-Hardware* which uses a graphics adaptor to decode the image, if you have one. The window can be dismissed by clicking the *Dismiss* button in the bottom right hand corner of the window or by clicking the thumbnail images that you clicked to bring up the window in the first place.

Voice Switching in VIC:

You need VIC v.2.8 and RAT v.3.0.8 (or later), and you need to enable LBL Conference Bus support in both tools:

```
rat -lbl_channel x <address/port>
vic -I x <address/port>
```

where x is replaced by the Conference Bus channel, which is a number between 1 and 300 and must be unique for all sessions running on your machine.

In VIC, you must then bring up a single large participant window (by clicking on one of the thumbnail sized imaged). On the enlarged window, select *Modes…* and *voice-switched*.

If you bring up multiple windows, it should display the last few speakers.

Box 3: Voice Switching in VIC

- *Identification Text*. The identification text contains the name of the participant, information about the machine that the participant is using (either the full Internet name or the IP address) plus information about the video format that the participant is transmitting. The name appears greyed-out if a *session message* has not been received from that site for a number of seconds (each VIC tool sends out *session messages* periodically). A greyed-out name usually indicates that the site has lost connectivity or that VIC has been abnormally aborted or stopped.

- Below the identification text, there is information about the video stream that you are *receiving* from that participant. It tells you how many frames per second and how many kilobits per second you are receiving. These numbers may differ from the actual sender's rate because of network loss, and may differ from the local display rate because of CPU overload. The number in brackets tells you the packet loss from that participant on the video stream.

- *mute* button. When the *mute* button is selected, VIC will no longer decode video from the corresponding participant. The image will appear frozen on your screen. You can mute your own image as well, but remember that even though it appears frozen on your own screen, it will not appear frozen on other participants' screens unless they mute your image at their end. It is advisable that, in order to limit the load on your machine, the images that you are not interested in are muted.

- *color* button. The *color* button controls the colour options of the received video. By default, video is displayed in colour but it can also be displayed in greyscale. Using greyscale reduces the CPU load on machines without TrueColor displays because colour dithering is costly in terms of CPU loading. The *color* button does not affect your transmitted video.

- *Info…* button. Clicking on the *info…* button will give you a menu containing the following items: *Site info*, *RTP Stats*, *Decoder Stats*, *Mtrace from*, *Mtrace to*.

  Site info will open a window containing information about the participant, such as name, e-mail address, video format, version of VIC etc. (see Figure 5). From this window you can press the *Stats* button which will bring up a small menu containing two items, *RTP* and *Decoder*. Selecting *RTP* summons a window containing the RTP statistics for that participant. Selecting *Decoder* displays the decoder statistics for that participant.

  The RTP statistics window consists of a grid:

  The grid contains three columns. The first column, labelled *EWA* (Exponentially Weighted Average), is the change since the last sampling period (i.e., change over the last second); the middle column, labelled *Delta*, is a smoothed version of the EWA and the last column, labelled *Total*, is the accumulated value since start-up.

  Clicking any of the buttons in the left column opens a *Plot Window* displaying the statistics for that parameter graphically.

  The windows containing RTP statistics and decoder statistics can also be opened directly from the *info* menu by selecting *RTP Stats* and *Decoder Stats* respectively.

  Selecting *Mtrace from* and *Mtrace to* summons a window which shows the results of an mtrace from and to the participant and your own machine respectively.

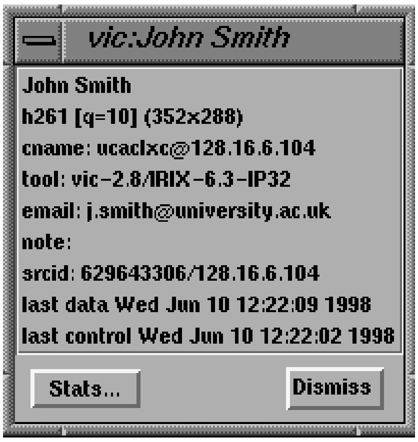

Figure 5: VIC Site Info Window

Clicking the *Help* button at the bottom of the Main VIC Window brings up a window containing 7 bullet points explaining the basic operation of VIC.

1.3.2 VIC menu window

Pressing the *Menu* button in the Main VIC Window brings up a menu which allows you to alter the settings for your own video transmission.

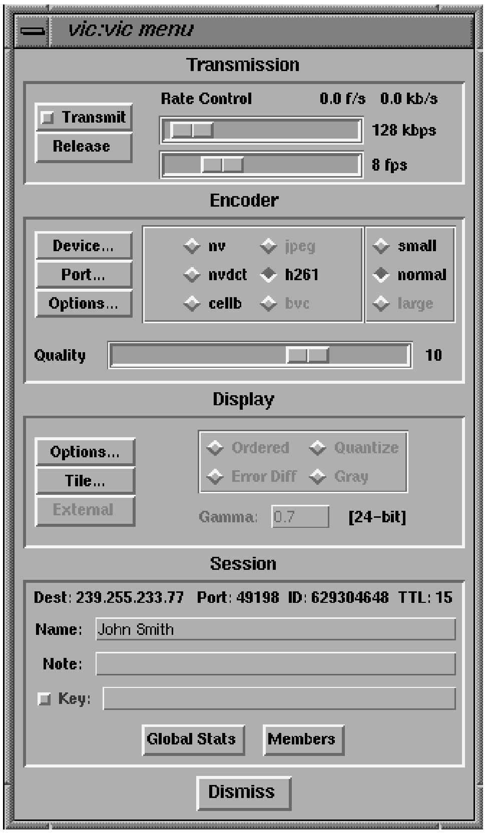

Figure 6: VIC Menu Window

The options you are most likely to use are:

- *Transmit* and *Release* buttons. Click once on *Transmit* to transmit video. To stop transmitting, either click *Release* or click *Transmit* again. When you stop transmitting, your image will freeze. You can get rid of frozen pictures by moving the mouse pointer onto the thumbnail image that you would like to close down, and pressing the letter d on the keyboard. You should not click on any of the mouse buttons.

- You can change your name as it appears next to your thumbnail image by editing the *Name* field: click in the field, edit the text and press the Enter key on the keyboard.

- If you want to see a list of all the people running VIC on the address/port, click the *Members* button.

- If you need to confirm the address, port, ID and TTL of VIC for the session, all of this information can be found in the VIC Menu Window.

- You can adjust the maximum amount of bandwidth (kbit/s) that you are using and the maximum number of frames per second (fps) that you a transmitting by adjusting the slider bars to the right of the *Transmit* and *Release* buttons in the VIC Menu Window.

For a thorough description of all the options, see Box 4 below.

VIC Menu Window

The VIC menu is divided into four boxes relating to *Transmission*, *Encoder*, *Display* and *Session*.

Transmission Control Panel

The Transmission Control Panel contains the *Transmit* button which initiates video sending. This is a toggle button that will stop transmission if selected again. The box at the left hand side of the button indicates the current status of transmission: the box is red when video is being transmitted.

The *Release* button can also be used to terminate any transmission and explicitly close the video capture device on the computer. This can be useful if you wish to run another application that requires access to the video board.

The *Rate Control* sliders are positioned next to the Transmit buttons. There are two sliders present: the top slider controls bit rate and the bottom slider controls frame rate. The frame rate slider ranges from 1 to 30 fps, while the bit-rate slider ranges from 10 to the maximum for that particular session. It is possible to manipulate both of these sliders during a session. The actual rates are displayed above the sliders. These rates are affected by how much movement there is in the image that you are transmitting. For example, lots of movement will typically make the frame rate go down and the bit rate go up.

Encoder Control Panel

The Encoder Panel controls the selection of the encoding format, video image size, coding quality level, device ports, signal type, and device. Not all of these options are supported by every video capture device. Those that are not available for your particular video board will be greyed out.

Down the left hand side of the Encoder control panel are three buttons:

Device is the device selector. It is possible that the version of VIC you are running only has support for the particular frame grabber on your machine, but it may be the case that there are other devices supported and it may be necessary either to specify the correct device at start-up or to select it from the devices menu.

Port: The Port button allows you to select which input port you wish to use with your video capture card. For example, a VideoPix card has two composite input ports and an S-Video port. The user must select which one is active. If the wrong port is selected, a black thumbnail will appear in the main VIC window. The port can be changed at any time during a session.

Box 4: VIC Menu Window

Options allows you to choose the options of sending slides and using JPEG for H.261. The option for sending slides was intended to optimise bandwidth when displaying slides by pointing a camera at them and transmitting the images using VIC. In reality this option makes little difference. Use the JPEG for H.261 encoding if you have a Sun video card which has JPEG encoding in the hardware. This will significantly reduce CPU load in the encoding process.

Encoding Format

The encoding formats that are available are displayed in the middle panel. These can be changed at any time either before transmission or during a session. Those encoding formats that are not supported by your video capture board will be disabled.

Video Image Size

In the right hand panel, it is possible to control the size of the video image that you transmit. There are three generic sizes available: small, normal, and large. The actual size of the image will be dependant on the encoding format and signal type used. If a size is not supported by the underlying hardware, the corresponding button will be disabled.

Quality Slider

If the chosen encoding format supports quality adjustment, then the quality slider will be enabled with the corresponding quality value displayed next to the slider. Quality settings are very much dependant on the encoding format that is being used but in general higher quality settings are obtained by moving the slider to the right, i.e. the smaller the number, the higher the quality.

VIC Menu Window – Display Control Panel

Options gives you the option of muting new sources as they become available and using hardware to decode the signal (if you have the dedicated hardware). Muting new sources is useful if your computer has too little CPU power to cope with the number of video streams. *Optimize Colormap* will change the dithering algorithm to avoid using too many colours. This is useful for machines which only have 8 bit displays.

Options which are not available are disabled.

Box 4: VIC Menu Window – Cont…

Tile allows you to specify the number of columns you wish to use for displaying the thumbnail information in the main VIC window. The default is single column. The number of columns can also be specified by typing a single digit into the main window.

External sends the image to an external monitor, if your hardware supports it.

Ordered, Quantize, Error Diff, Grey sets the colour dithering algorithm for 8 bit displays.

Gamma adjusts the gamma correction for 8 bit displays.

Session Control Panel

The Session panel controls information about the particular conference session that is currently in progress. The first line of the panel lists the IP address and port number of the conference and the multicast TTL setting.

The *Name* field displays the RTP identifier that you are using in the session. This is the same information that you typed into the User Information Window when you first started up VIC (see Figure 2). You can change this information at any time during the session by clicking in the field, making the necessary changes, and pressing the *Enter* key on the keyboard.

The *Note* field allows you to display a message next to your thumbnail image, under your name. You can enter a note at any time during the session by clicking in the field, typing in your text, and pressing the Enter Key on the keyboard. The note will replace the identification text next to your thumbnail image.

The *Key* field contains a session key for encryption. As VIC conferences are typically conducted over open networks, there is no way to prevent eavesdropping, particularly for multicast conferences. To add some measure of privacy, VIC allows the streams to be DES encrypted. Only sites sharing the same key will be able to view the session. Encryption is enabled by entering a previously agreed string in the key box. All participants entering the correct key will be able to participate in the conference. Encryption can be turned off by clearing the box.

Clicking on the *Global Stats* button opens a window like the statistics window described above, displaying the global session statistics.

Clicking on the *Members* button opens a window which contains a scrollable list of all the participants who are currently in the session. This list also includes those participants who are not actively sending video.

Box 4: VIC Menu Window – Cont…

VIC Synopsis

vic [-cs] [-A app] [-B kbit/s] [-C conference] [-D device] [-d display] [-f format] [-F fps] [-H] [-i file] [-I channel] [-m mtu] [-N sessionname] [-o file] [-p port] [-r dir] [-t TTL] [-U interval] [- u script] [dest[/port/confid/fmt/TTL]]

Box 5: VIC Synopsis

VIC Command Line Options

-A

Use the RTPv1 packet format and a default address that is compatible with the app argument, which may be NV for Xerox PARC's Network Video tool, or IVS for the INRIA Videoconference System. You should not need to use this option.

-B

Set the maximum value of the bandwidth slider to a user-specified number of kbit/s (kilobits per second). This value is limited to 256 kbit/s if the conference address is a multicast address and the TTL in use is greater than 64 (i.e., the traffic will leave your multicast region).

-C

Use conference, as the title of this VIC window. If the -C flag is ommitted, the destination address and port are used as the window title.

-D

Use device for video capture. This option is used when more than one video capture device is installed in a host. The argument may be one of:

Videopix	Sun VideoPix card parallax
xil	Sun's XIL library

`mme' and `parallax' are not yet implemented. Without -D option, a default device is assumed which can be overridden with the VIC device resource. There are other devices which have not been documented, such as WinTV.

-d

Connect to the X server indicated by the display argument.

-f

Use the video coding indicated by the format argument for transmission. Format may be one of the following:

Jpeg	Motion JPEG
mpeg	MPEG
h261	Intra H.261
nv	Xerox PARC Network Video
nvm	uncompressed (with nv's thresholding algorithm)
cellb	Sun CellB

Not all encodings are compatible with all frame grabbers. For instance, JPEG compression hardware is needed in order to source a JPEG stream (e.g., a DEC J300 or Parallax XVideo board).

-F

Set the maximum value of the frame rate slider to a user-specified number of fps (frames per second).

-H

Don't use hardware decoding even if it is available (i.e., force decoding to be done in software).

Box 6: VIC Command Line Options

-I

Use the small integer channel, which must be non-zero, as the channel identifier for group interprocess communication on the local host. This value should be consistent across each group of applications that belong to a single conference, and should be unique across conferences. SDR will allocate appropriate values. (VIC and RAT currently use this mechanism to coordinate voiceactivated video switching.)

-i

Use the stored video sequence, from file, as the source of frames. A simple VCR interface will replace the frame grabber controls in the user interface. The video is treated just as if it came from the camera.

-m

Set the packet transmission size to mtu bytes, but limited to1024 bytes (per the application protocol). The default is 1024. You should not need to use this.

-N

Use session, in lieu of your user name and local host, to identify you to other sites. If -N is ommitted, the X resource vic.sessionName is used.

-o

Dump the video being sourced by the local camera to a file, for later playback using -i. (This option cannot be used to record a conferencing remotely. Such functionality belongs in a separate program.)

-p

Use port as the UDP port for communications. If no - p flag is given, the value of the X resource defaultPort sets the port.

-r

Use RTIP, instead of IP, to deliver the video data stream. RTIP is a real-time connection-oriented communication protocol designed by the Tenet group at UC Berkeley. See http://tenet.berkeley.edu for more information. The session control protocol still runs over IP, and only point-to-point communication is allowed.

RTIP is a simplex protocol requiring connection be set up in both directions. The dir argument indicates the direction, and must be one of send, recv or duplex. If recv, is specified, the application blocks at startup until the connection is established (e.g., vic with a -r send option is initiated on another RTIP host, and directed at our client.) If duplex is specified, two simplex channels, one in each direction are established.

You should not need to use this.

-s

Specifies that shared buffers are not to be used with the X server.

Box 6: VIC Command Line Options – Cont…

-t

Set the multicast TTL (Time To Live) to TTL. (The TTL is ignored if the destination address is not an IP multicast address.) If no -t flag is given, the value of the X-resource default TTL is used. A TTL of 1 restricts traffic to the local net; a TTL of 0 restricts the traffic to the local host (e.g., only loopback works, which is useful for testing).

–U

Use interval as the update period, in seconds, for the thumbnail sized images of each video source.

-u

Use script as the tcl program to build the user interface, rather than the compiled-in script. You should not need to use this option.

Box 6: VIC Command Line Options – Cont…

1.4 Known bugs

There are currently no known bugs in VIC.

Further Reading

VIC

McCanne, S. and Jacobson, V. 1995. vic: A Flexible Framework for Packet Video. *ACM Multimedia '95*, San Francisco, CA, 511-522.

See also: http://www-nrg.ee.lbl.gov/vic/

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.

CellB

A proprietary low bit rate video encoding developed by Sun Microsystems.

CIF

Common Image Format, fitting an image into dimensions of 352x288 pixels.

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.

DVI

Audio encoding standard.

Framegrabber

A device which captures video one frame at a time from an analogue video source.

Frames per second (fps)

The frame rate for video image transmission, measured in frames per second (fps). The higher the frame rate, the better the motion rendition of the video image. 30 fps is the standard necessary for full motion video. To date, most communication channels are not capable of transmitting large numbers of video streams concurrently. With compression and the use of other signal processing algorithms, a videoconferencing VIC between 2 - 10 kilobits per second (kbit/s) is perfectly acceptable.

Gamma correction

Gamma correction is the correction of intensity values of cameras and monitors. In the context of displays, the luminescence of phosphor pixel is a non-linear function of the intensity of the electrons bombarding it. Conversely, both film and CCD cells have non-linear photon intensity versus recorded intensity functions. Gamma correction is a non-linear correcting function to overcome these problems.

GSM

Audio encoding standard.

H.261

ITU-T video encoding standard in narrowband audiovisual systems.

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.

JPEG

Video encoding standard for still images. It has a high compression rate; it computes by dithering and losing "unnecessary" information, hence considered lossy. Decoding speed can be traded off against image quality.

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.

Lecture mode

An optimisation for one-way transmission which increases the delay on the layout of the media in order to minimise the loss of data in the network. The longer the playout is delayed, the more time there is to retransmit lost packets.

Loss Rate

The percentage of packet information lost during transmission.

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.

MJPEG

Motion JPEG. The use of JPEG to encode motion video. A number of manufacturers have developed M-JPEG systems. There is no systems level standard for M-JPEG systems, and different manufacturers' systems will not interoperate.

MPEG

Motion Picture Experts Group.

MTU

Maximum Transmission Unit. A measurement, in Bytes, of the largest packet size which a network is capable of transmitting.

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.

NTSC

National Television Standard Code. The television encoding used in the USA.

NV

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

PAL

Phase Alternate Line. The television encoding used in Europe.

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.

QCIF

Quarter Common Image Format with dimensions of 176x144 pixels.

RAT

Robust Audio Tool.

Receive-only

A condition where a tool is used to receive information, but cannot transmit.

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.

RTIP

Real-Time Internetwork Protocol.

SCIF

Super Common Image Format with dimensions of 704x576 pixels.

SDR

Multicast Session Directory.

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.