MAVEN

These are some release notes for *Maven*, an Internet audioconferencing tool for the Macintosh computer. This is alpha-quality code, and this is version 2.0a37.

Changes in version 2.0a37:

- This is now a complete rewrite of Maven. New interface, new networking code, new everything. The old version (2.0d23) is included "just in case."

If you have an old version of Maven (use the Finder's "Get Info…" command to retrieve the version number—development versions are those before 2.0a18), please do everyone a favor and throw it away. They were very incomplete and could easily crash. They also had some network behavior that was rather unfriendly.

Providing feedback about Maven:

Maven has two authors. Charley Kline, campus network architect at UIUC, wrote the original 1.0 and 2.0 versions. Eric Scouten, graduate student at UIUC, rewrote the the 2.0 version. This rewrite is the version that's included in this package.

Both can be reached by e-mail: `kline@uiuc.edu` or `scouten@uiuc.edu`. Please send bug reports or other feedback via e-mail if at all possible; we much prefer it to phone conversations.

Also note that I (Eric) will be leaving the project as of early May 1995 and leaving the UIUC campus as of December 1995. I'm interested in the future of the project, but it is probably better to send notices of bugs, feature requests, etc. to Charley. My UIUC e-mail address will be valid until the end of 1995. Long-term I can be reached at `scouten@metrowerks.com`.

A User's Manual (Such As It Is)

I don't have any real documentation written yet, sorry. I'll try to outline some of the features of Maven here. I'm willing to answer any questions you might have about this version. To keep up on future versions and discussions of Maven, please join the Maven discussion list, `maven@cnidr.org`. To join, send electronic mail to `listserv@cnidr.org` containing the single line `sub maven` *Your Name* substituting your full name for *Your Name*.

If you're on a non-AV Macintosh and you don't have version 3.0 of the Macintosh Sound Manager already, you should install it. It incorporates a lot of efficiency improvements over what you probably have in your ROMs. Sound Manager 3.0 is included in this distribution; it belongs in the Extensions folder in your System Folder. You'll have to restart to make it take effect. You may have Sound Manager 3.0 already if you've installed one of the hardware system updaters from Apple or if you've installed System 7.5 or later. I've heard that you don't need it on AV's and Powermacs, and that it might even make them crash.

Maven requires a Macintosh with sound input hardware to send audio to the network. It will run on Macintoshes without sound input hardware, but will only be able to receive other audio packets in this case. Note that there is a long-standing problem with third-party sound input devices. This is still broken, but will be fixed in a version to come later.

While Maven is running, it keeps its main window up at all times.
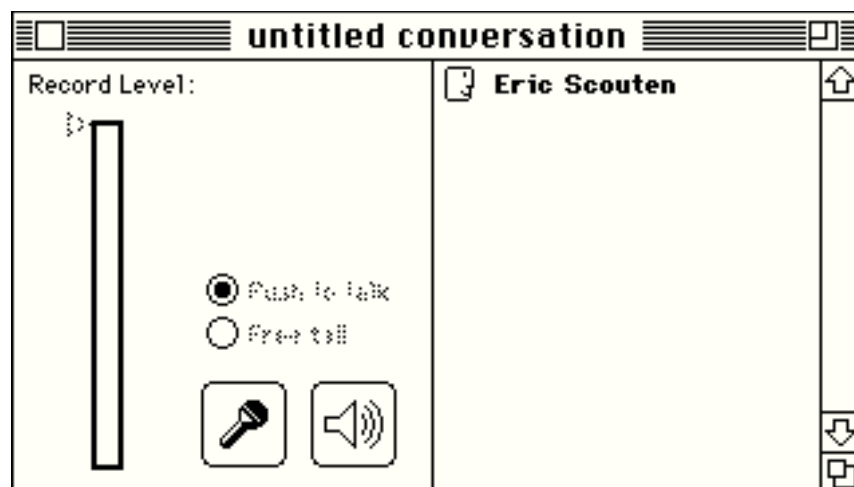
On the left hand side of the main window, a vertical bar graph shows the current sound input level (in push-to-talk mode this is only active when the mouse button is down). In the center of the window is an icon for the sound input device. This button will highlight when Maven is actually transmitting audio packets to the Internet.

When am I talking on the network?

The two buttons labeled "Push to talk" and "Free talk" determine how Maven decides to send audio packets to the network. (Note: Some Macintosh computers are unable to record sound and play sound simultaneously. On these machines, as in the example above, the two buttons will be disabled and you will be restricted to push-to-talk mode only.)

If you're operating in free-talk mode, the small triangular slider will appear to the left of the bar graph will light up. You can drag it with the mouse to the point where you want the silence detector's threshold to be. When the sound level at the microphone causes the bar graph to move above the slider, Maven will start transmitting. When it falls below more half a second or so, Maven will stop transmitting.

The idea is that when you speak, the sound level exceeds this threshold and Maven begins transmitting. When you stop speaking, the sound level drops below the threshold and Maven stops transmitting. This is natural and convenient, but you'll find that if your environment is loud, it doesn't work very well. Also, keep your microphone far from your Macintosh speaker, or the received audio will trigger the silence detector.

If the **Push to talk** button is on, Maven will not send any audio except when the mouse button is pressed in the microphone button. If you've ever used a two-way radio, this will be somewhat familiar to you as you press the mouse button to talk and release it to receive, just like the PTT switch on the side of a radio microphone.

Push-to-talk mode isn't as cool as squelched mode, but I have to say it works a lot more smoothly in practice. But use whatever you can get to work best for you.

When am I listening to the network?

The speaker button is actually a muting button. If you click on it, the button will change to a speaker with a diagonal line through it. From then on, any incoming audio will not be played back to you. You can click on the mute button again to restore normal playout. This is useful, for instance, if your phone rings while you're listening to a conversation.

Who am I talking to?

When Maven starts up, it's not sending audio to anyone. To begin sending to a peer, whether another copy of Maven or a *vat* program on a Unix system, you can select "Add User…" from the File menu. You'll get a dialog box in which you can type the hostname or IP address of the other site. When you press return, Maven will send an audio stream to that site. Alternatively, you can just wait for a peer to connect to you, and the session will be created automatically.

Warning! Maven will let you continue to add new sessions indefinitely. The more sessions you've added, the greater the load you are placing on the Internet as a separate copy of your transmitted audio is sent to each site you've added. Take special care when sending to more than one other site that you don't swamp the network with packets!

To the right of the sound controls is a list containing the list of participants in the conference. Your name (as it appeared in the configuration dialog) always appears first on the list. Other names will appear as new participants are added. On color displays, your user name appears with a darker icon than other icons.

A new participant appears in the list (and Maven begins sending audio to it) when you add a new session manually, or if an ID message arrives from another machine. In the latter case, Maven will automatically create the new session, add it to the list so you can see that a new person has joined the conference, and begin sending your audio to them. When somebody is talking, that user's icon changes to a cartoon-like talk balloon. If somebody's connection unexpectedly disappears for half a minute or so, the icon changes to a broken icon. (Note: There is a bug in that this icon isn't

restored to the normal icon if the connection is restored.) If the connection disappears for two minutes, the user will be removed from the conference.

There's currently no way to delete a session once it has been created; this will be a future enhancement. However, if a participant in a conference quits their conferencing tool (Maven or *vat*), they will be removed from the participant list of the other members of the conference.

How do I configure my connection?

There are several things you can do to modify Maven's behavior when the main window is visible. To change some of the global settings, double click on your username in the participant list.
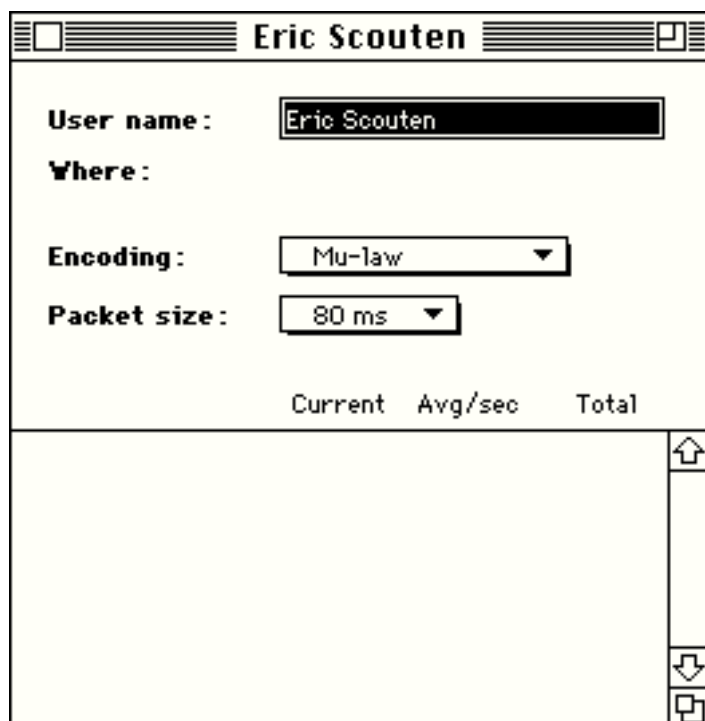
In this window, you can tell Maven how to exchange digital audio over the Internet. Changes you make in the Configuration dialog take effect immediately.

The top line of this window contains your user name. This name appears in other users' session windows when you are connected with them. By default, the name is the system user name you have specified in the Sharing Setup control panel. You can change this name at any time by typing a new name in this edit box and pressing return. If you are already connected when you change the name, it may take a few seconds for the change to be noticed by other users. (Conference ID messages are sent only every 10 seconds.)
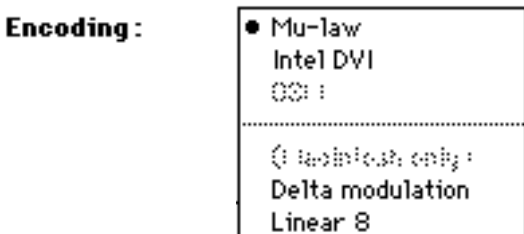
The **Encoding** popup menu of the audio menu lets you select the digital encoding Maven will use when it digitizes sound.

Mu-law is a format similar to Linear but which allows 12 bits per audio sample to be coded as 8. This provides greater dynamic range which the Mac can't appreciate in any event as the sound hardware in current Macs only uses 8 bits per sample anyway. It is, however, what you'll have to use to interoperate with most other audioconferencing systems as it is a standard encoding in the telephone business. Mu-law streams occupy 64 kilobits per second of network bandwidth.

Intel DVI is the simplest of the compressed audio encodings (and is the default setting). It provides nearly the same audio quality as Linear while using only 50% of the network bandwidth. You should use DVI coding if you're concerned about network load. DVI coding is understood both by other Mavens and by *vat*. Each DVI stream uses 32 kilobits per second of bandwidth.

GSM is the most complex of the audio encodings. It is the standard used by the European cellular phone system. It is understood by newer Mavens and by *vat*. Each GSM stream uses 13 kilobits per second of bandwidth. The bad news is that GSM is very computation-expensive, so much so that 680x0 based Macintoshes cannot keep up with it. For that reason, GSM is available only on Power Macintosh computers.

Delta-mod is a somewhat crude delta-modulation encoding. It is quite bandwidth-efficient, using only half the network bandwidth of DVI and one quarter that of mu-law. It does not however go to any great pains to preserve audio quality, so using this encoding will result in somewhat noisy audio, not unlike that of an AM radio tuned slightly off-station. The quality is however plenty good for speech. You should use this when you have very low bandwidth available to you and making efficient use of this bandwidth is more important than the quality of the audio. Since this encoding algorithm was dreamed up by the author from some information in Cooper and McGillem, *Modern Communications and Spread Spectrum*, it is not likely to be understood by other conferencing tools. It was also not present in versions of Maven older than 2.0a18. Therefore, use this encoding only when you're sure all the other participants in the conference are using Maven 2.0a18 or newer.

Linear is the most natural format for the Macintosh, but unfortunately isn't understood by the Unix *vat* program. Don't use Linear if you're talking to something other than another copy of Maven. Each stream of Linear audio also uses 64 kilobits per second of network bandwidth.

Other encodings, such as LPC4, can provide even greater compression of the digitized audio data, but they're harder to implement and I haven't gotten round to LPC yet. They appear grayed-out on the menu. Also, these encodings are very CPU-intensive, and will never work at all on 680x0-based Macintoshes.

Maven can understand every encoding it can send, and there's no requirement that others send to you in the same format you're sending to them.

```
Packet size:   ┌─────────┐
               │  20 ms  │
               │  40 ms  │
               │● 80 ms  │
               │ 160 ms  │
               └─────────┘
```
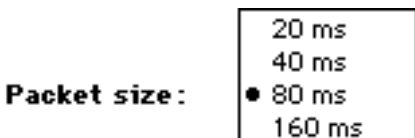
Packet size controls how much sound information Maven will put into each outgoing network packet. The longer the quantization interval, the fewer packets you'll send out and the nicer you'll be treating routers and other network switching equipment. Longer quantization intervals, however, result in longer delays between when you speak and your voice is heard on the remote end. Use the largest value you find tolerable; to be honest I don't find 80 milliseconds bad at all,

but some people find it hard to communicate with large delays. Note that the GSM encoding is only usable at 80 ms packets, so this popup menu will be grayed out when GSM is selected.

Acknowledgements

Thanks to George Brett and Jane Smith at CNIDR for offering to take some of the heat of people clamoring for Maven, which is heat I've been ignoring for a year or so. Thanks to Pete "Network Time" Resnick for help with some more obscure parts of the Macintosh Operating System; it's because of him telling me about something called the Deferred Task Manager that Maven continues to receive and play audio even when you're pulling down a menu or off in another application doing something else. Thanks to the IETF Audio-Video Transport Working Group for the necessary mental stimulation to begin working on this in the first place. And thanks to Yvonne-Marie Andres at the Global Schoolhouse for the nifty T-shirt.