



- *Config Manager* stores configuration options such as software executable name, SIP default port, audio/video codec, audio/video device information, enable auto start, etc.
- *Login Manager* handles user login and logout.
- *Presence Manager* handles presence information. There are four options: online, offline, away and busy.
- *Contact Manager* manages a contact list for a Kiara user. A user can add, remove and modify a contact profile.
- *User Profile Manager* stores a Kiara user profile including name, birth date, phone number, SIP address, etc. It also enables the user to change the information.
- *Chat Manager* handles Instant Messaging using Session Initiation Protocol for Instant Messaging and Presence Leveraging Extensions (SIMPLE).
- *Voice/Video Call Manager* handles calls using SIP and RTP/RTCP to transmit the voice/video stream.
- *Log Manager* records call activities.
- *Relay Manager* is the most important part in Kiara for Deaf telephony. This is the work-in-progress. Kiara needs a human interpreter help translate text, voice and video, but the relay mechanics are meant to happen automatically.

#### 1) Session Initiation Protocol

The Session Initiation Protocol (SIP) is a standard for establishing sessions over Internet Protocol (IP) [4]. SIP's capacity to simplify creation, management and termination of sessions is ideally suited to build communication systems for the Deaf. SIP meets requirements for accessing a wide array of devices (telephone, mobile phone, PC) over a variety of networks (IP, WiFi, PSTN, 3G). This widespread availability enables any SIP-compatible device (soft phone, telephone, SIP-enabled cell phone, PBX, VoIP server) to work with our software.

#### 2) User Interface

Deaf users at DCCT have a lot of experience with Instant Messaging, email and video chat. They are familiar with Skype and Google Talk, so we used those tools as a reference to build the user interface reference to Kiara.

### D. Implementation Details

#### 1) Server Side

Table 1 lists the services on the server side. Kiara integrates several fully open source software packages.

**Table 1 Open source services used by Kiara**

OpenSER	SIP registrar, proxy
Asterisk	Transfer calls from PSTN to IP network
MySQL	Restore user information

#### 2) Client Side

Table 2 lists the open source libraries that a Kiara client is built on. For more information on Kiara, including documentation and source code, please refer to <http://softbridge.uwc.ac.za/>.

**Table 2 Open source libraries utilized by Kiara.**

oSIP	oSIP is an implementation of SIP
ortp	oRTP is an implementation of RTP
Qt	Qt is a cross-platform application framework for desktop and embedded development.
ffmpeg	Ffmpeg includes libavcodec, the leading audio/video codec library.
PortAudio	PortAudio is a cross-platform audio I/O library.
TinyXML	TinyXML is a simple, small, C++ XML parser.

### III. CONCLUSION

In conclusion, Kiara is a SIP-based communication tool that currently supports synchronous communication of text, voice and video. All Kiara components, at both client and server side, are implemented in free and open source software. The goal is to use this functionality as a basis to design and build text and video relay services for the Deaf.

### IV. FUTURE WORK

Kiara still needs several extensions to support both text and video relay for the Deaf. First, Kiara should implement automatic translation between text and voice using open source Text-to-Speech (TTS) and Automatic Speech Recognition (ASR) technologies. We may also use a human interpreter for speech-to-text instead of ASR. A human SASL interpreter is definitely needed to translate between text and sign language. Lastly, Kiara should support asynchronous messaging for text (like SMS), voice and video.

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