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## The Audio/L16 MIME content type

### Status of this Memo

This memo provides information for the Internet community. It does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

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### 1. Introduction

This document defines the audio/L16 MIME type, a reasonable quality audio format for use in Internet applications.

Possible application areas include E-mail, Web served content, file upload in Web forms, and more.

### 2. The need for the Audio/L16 MIME type

The set of IETF standard MIME types for audio is small; it consists of only the audio/basic and audio/32kadpcm types, which have a sampling rate of 8000 samples/second.

Rates below 11025 may obscure consonant information, even for single-voice speech. Common compressions, such as LPC, are known to be microphone-dependant and lossy. Thus far all IETF MIME Audio types either default to 8000 samples per second or use LPC.

In order for advanced speech recognition and related educational applications to make use of internet transports (such as RFC 1867 file uploading) which use MIME typing, higher standards are required.

This type repairs that lack by registering a very simple MIME type that allows higher rate, linear-encoded audio with multiple channels.

This is an IESG approved MIME type, and its definition is therefore published as an RFC.

Please note that there are many other Audio types described in RFC 1890 [1] which IANA may wish to formally register; this one, of all of them, seems to be most immediately needed. This document may also serve as a template for further registrations of these audio types.

3. The definition of Audio/L16

Audio/L16 is based on the well know audio format "L16" described in RFC 1890 section 4.4.8 for use with RTP transport. L16 denotes uncompressed audio data, using 16-bit signed representation in twos-complement notation and network byte order. (From section 4.4.8 of RFC 1890)

It may be parametrized by varying the sample rate and the number of channels; the parameters are given on the MIME type header.

In order to promote interoperability, only a few rate values are standardized here. Other values may NOT be used except by bilateral agreement.

If multiple audio channels are used, channels are numbered left-to-right, starting at one. Samples are put into the data stream from each channel in succession; information from lower-numbered channels precedes that from higher-numbered channels.

For more than two channels, the convention followed by the AIFF-C audio interchange format should be followed [1], using the following notation:

- l left
- r right
- c center
- S surround
- F front
- R rear

channels	description	channel					
		1	2	3	4	5	6
2	stereo	l	r				
3		l	r	c			
4	quadrophonic	Fl	Fr	Rl	Rr		
4		l	c	r	S		
5		Fl	Fr	Fc	Sl	Sr	
6		l	lc	c	r	rc	S

(From RFC 1890 section 4.1)

## 4. IANA registration form for Audio/L16

MIME media type name : Audio  
MIME subtype name : L16

## Required parameters

rate: number of samples per second -- Permissible values for rate are 8000, 11025, 16000, 22050, 24000, 32000, 44100, and 48000 samples per second.

## Optional parameters

channels: how many audio streams are interleaved -- defaults to 1; stereo would be 2, etc. Interleaving takes place between individual two-byte samples.

## Encoding considerations

Audio data is binary data, and must be encoded for non-binary transport; the Base64 encoding is suitable for Email. Note that audio data does not compress easily using lossless compression.

## Security considerations

Audio data is believed to offer no security risks.

## Interoperability considerations

This type is compatible with the encoding used in the WAV (Microsoft Windows RIFF) and Apple AIFF union types, and with the public domain "sox" and "rateconv" programs.

## Published specification

RFC 2586

## Applications which use this media

The public domain "sox" and "rateconv" programs accept this type.

1. Magic number(s) : None
2. File extension(s) : WAV L16
3. Macintosh file type code : AIFF

## Person to contact for further information

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## Intended usage

Common

It is expected that many audio and speech applications will use this type. Already the most popular platforms provide this type with the rate=11025 parameter referred to as "radio quality speech."

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#### 5. Security considerations

The audio data is believed to offer no security risks.

Note that RFC 1890 permits an application to choose to play a single channel from a multichannel transmission; an attacker who knows that two different users will pick different channels could conceivably construct some confusing messages; this, however, is ridiculous.

This type is perfect for hiding data using steganography.

#### 6. References

- [1] Schulzrinne, H., "RTP Profile for Audio and Video Conferences with Minimal Control", RFC 1890, January 1996.

#### 7. Authors' Addresses

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