                    The Audio/L16 MIME content type

Status of this Memo

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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 tranmission; an attacker who knows that
two different users will pick different channels could concievably
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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8. Full Copyright Statement

Acknowledgement