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                                               Microsoft Corporation
                                                      April 1, 1999

Toll Quality Voice - Microsoft GSM
MIME Sub-type Registration
<draft-ema-vpim-msgsm-00.txt>

Status of this memo:

   This draft is being discussed by the Electronic Messaging
   Association VPIM work group. To subscribe to the mailing list, send
   a message to EMA Listserv Requests [listserv@listmail.ema.org] with
   the line "subscribe VPIM-L" in the body of the message.

Abstract

   This document describes the registration of the MIME sub-type
   audio/ms-gsm for toll quality audio. This audio encoding is defined
   by the European Telecommunications Standards Institute (ETSI) in
   ETS 300 961.

1. Introduction

   The MIME subtype "ms-gsm" is being defined primarily for use in
   multimedia and voice messaging standards. The Voice Profile for
   Internet Messaging, version 3 [VPIM3] working draft specifies that
   all VPIM version 3 compliant implementations MAY generate
   audio/ms-gsm bodyparts and MUST receive audio/ms-gsm bodyparts.

   The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
   "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this
   document are to be interpreted as described in [REQ].

2. ETSI Definition

   ETS 300 961 (GSM 06.10 version 5.1.1) [GSM] was prepared by
   European Telecommunications Standards Institute (ETSI) in May 1998.
   It is a reproduction of recommendation T/L/03/11 "13kbit/s
   Regular Pulse Excitation - Long Term Prediction - Linear Predictive
   Coder for use in the digital cellular telecommunications system."

   ETS 300 961 describes the detailed mapping between input blocks of
   160 speech samples in 13 bit uniform PCM format to encoded blocks of
   260 bits, and from encoded blocks of 260 bits to output blocks of
   160 reconstructed speech samples. The sampling rate is
   8000 sample/s leading to an average bit rate for the encoded bit
   stream of 13 kbit/s. The coding scheme is the so-called Regular
   Pulse Excitation - Long Term prediction - Linear Predictive
   Coder, here-after referred to as RPE-LTP.

2.1 Parameter storage

   ETS 300 961 provides a detailed description of the mapping of blocks
   of 160 speech samples in 13 bit uniform PCM format to 76 encoder
   parameters, and the mapping from those encoder parameters back to
   160 reconstructed speech samples. The 76 encoder parameters vary in
   width from 2 to 7 bits, so they all fit in 260 bits.

   ETS 300 961 does not define the correct way to store these 76
   parameters in a computer file, however. To promote interoperability,
   this document describes the MS-GSM version of GSM 06.10 which is to
   be used to encode audio/ms-gsm data.
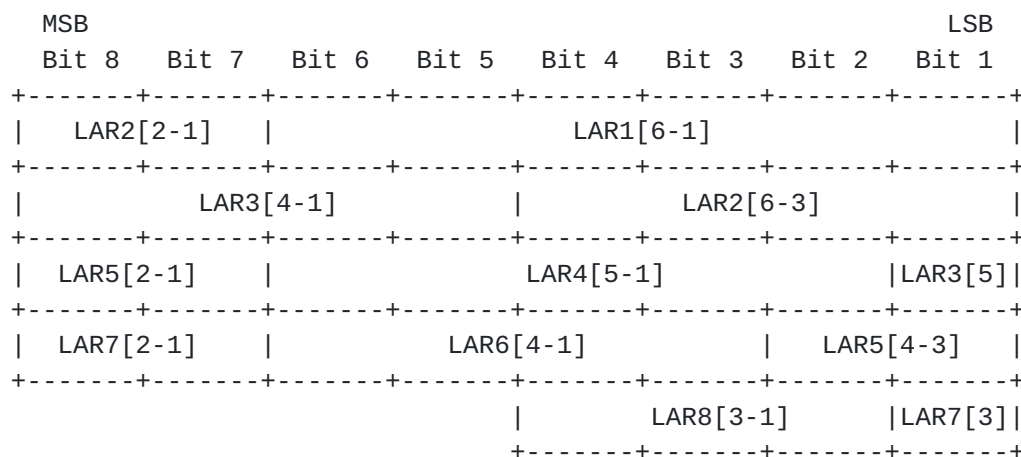
Audio/ms-gsm implementations MUST pack two sets of encoder output
parameters into 65 bytes and MUST right justify the parameters in
a byte. Since each set of encoder output parameters occupies 32.5
bytes, the two sets will be offset by a nibble (4 bits).

In this illustration, as in ETS 300 961, arrays are 1-based and
the least significant bit is numbered 1.
The first eight encoder parameters are named LAR1 through LAR8,
and they vary from 6 to 3 bits in width. The notation LAR1[6-3]
indicates the 4 high order bits of LAR1, and LAR5[2-1] indicates
the 2 low-order bits of LAR5. The remaining 68 parameters are
packed similarly.

```
   MSB                                                        LSB
   Bit 8   Bit 7   Bit 6   Bit 5   Bit 4   Bit 3   Bit 2   Bit 1
 +-------+-------+-------+-------+-------+-------+-------+-------+
 |   LAR2[2-1]   |              LAR1[6-1]                       |
 +-------+-------+-------+-------+-------+-------+-------+-------+
 |          LAR3[4-1]            |         LAR2[6-3]            |
 +-------+-------+-------+-------+-------+-------+-------+-------+
 |  LAR5[2-1]    |           LAR4[5-1]            |LAR3[5]|
 +-------+-------+-------+-------+-------+-------+-------+-------+
 |  LAR7[2-1]    |         LAR6[4-1]         |    LAR5[4-3]   |
 +-------+-------+-------+-------+-------+-------+-------+-------+
                 |           LAR8[3-1]        |LAR7[3]|
                 +-------+-------+-------+-------+
```

3.   MIME Definition

3.1 audio/ms-gsm

European Telecommunications Standards Institute (ETSI) ETS 300
961 [GSM] describes the algorithm recommended for conversion of
blocks of 160 speech samples in 13 bit uniform PCM format to
encoded blocks of 260 bits, and the mapping back from those 260
bit blocks to output blocks of 160 reconstructed speech
samples.

The MIME sub-type audio/ms-gsm is defined to hold binary audio
data encoded exactly as defined by ETS 300 961 (GSM 06.10) No
header information shall be included as part of the audio data.
The content transfer encoding is typically either binary or
base64.

To enable interoperability, the audio data MUST conform to the
parameter storage definition provided in the section above and
in the IANA registration below.

3.2 **VPIM Usage**

   The audio/ms-gsm sub-type is a component of the proposed VPIM
   version 3 specification [VPIM3]. In this context, the
   Content-Description headers is used to succinctly describe
   the contents of the audio body.

   All VPIM Version 3 systems MUST be capable of receiving audio
   encoded in the MS-GSM version of GSM 06.10. Sending systems MAY
   choose to send audio data encoded in MS-GSM. All receiving
   systems MUST be able to process MS-GSM audio data.

   Refer to the VPIM Specification for proper usage.

4. **IANA Registration**

   To: ietf-types@iana.org
   Subject: Registration of MIME media type audio/ms-gsm

   MIME media type name: audio

   MIME subtype name: ms-gsm

   Required parameters: none

   Optional parameters: none

   Encoding considerations:
      Binary or Base-64 generally preferred

   Security considerations:
      There are no known security risks with the sending or
      playing of raw audio data. Audio data is typically interpreted
      only by an audio codec. Unintended information introduced into
      the data stream will result in noise.

   Interoperability considerations:
      MS-GSM is not compatible with other GSM 06.10
      implementations. To be interoperable, Audio/ms-gsm
      implementations MUST pack two encoder parameter blocks into 65
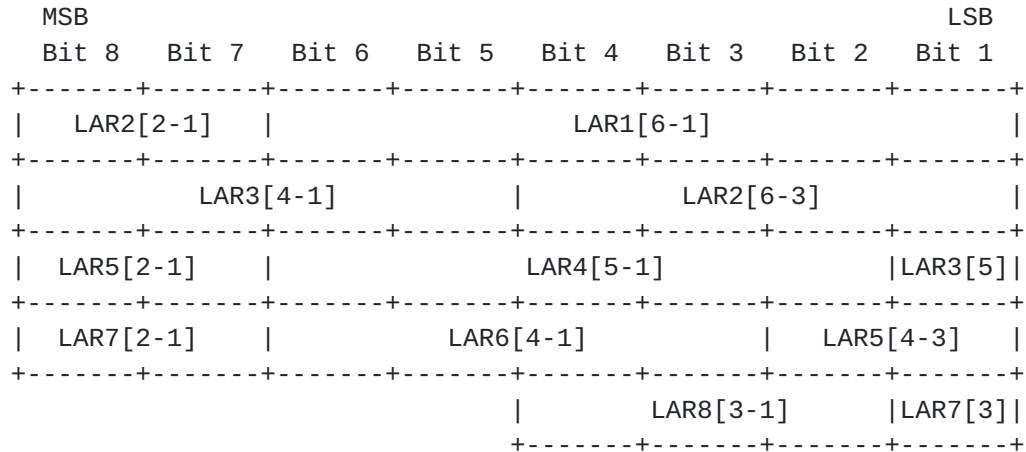   bytes and MUST right justify the parameters in a byte.

In this illustration, as in ETS 300 961, arrays are 1-based
and the least significant bit is numbered 1. The first 8
encoder parameters are named LAR1 through LAR8, and they vary
from 6 to 3 bits in width. The notation LAR1[6-3] indicates
the 4 high order bits of LAR1, and LAR5[2-1] indicates the 2
low-order bits of LAR5. The remaining 68 parameters are
packed similarly.

```
  MSB                                                       LSB
   Bit 8   Bit 7   Bit 6   Bit 5   Bit 4   Bit 3   Bit 2   Bit 1
 +-------+-------+-------+-------+-------+-------+-------+-------+
 |   LAR2[2-1]   |               LAR1[6-1]                     |
 +-------+-------+-------+-------+-------+-------+-------+-------+
 |          LAR3[4-1]            |         LAR2[6-3]           |
 +-------+-------+-------+-------+-------+-------+-------+-------+
 | LAR5[2-1]     |           LAR4[5-1]           |LAR3[5]|
 +-------+-------+-------+-------+-------+-------+-------+-------+
 | LAR7[2-1]     |         LAR6[4-1]         |    LAR5[4-3]    |
 +-------+-------+-------+-------+-------+-------+-------+-------+
                                 |        LAR8[3-1]      |LAR7[3]|
                                 +-------+-------+-------+-------+
```

Published specification:
   ETS 300 961 (May 1998), "Digital cellular telecommunications
   system (Phase 2+); Full rate speech; Transcoding (GSM 06.10
   version 5.1.1)".

Applications which use this media type:
   Voice messaging applications

Additional information:
   Magic number(s): ?
   File extension(s): .gsm
   Macintosh File Type Code(s): 'gsm '

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Intended usage: COMMON

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6. References

[GSM]   ETS 300 961 (May 1998), "Digital cellular
        telecommunications system (Phase 2+); Full rate
        speech; Transcoding (GSM 06.10 version 5.1.1)".
[MIME4] Freed, N., Klensin, J., and J. Postel, "Multipurpose
        Internet Mail Extensions (MIME) Part Four:
        Registration Procedures", RFC 2048, November 1996.
[VPIM1] Vaudreuil, G., "Voice Profile for Internet Mail", RFC
        1911, February 1996.
[VPIM2] Vaudreuil, G., and G. Parsons, "Voice Profile for
        Internet Mail - version 2", RFC 2421, September 1998.
[VPIM3] Vaudreuil, Greg, "Voice Profile for Internet Mail,
        Version 2", Work In Progress, <draft-ema-VPIMv3-
        00.txt>, December 1998.
[REQ]   Bradner, S., "Key words for use in RFCs to Indicate
        Requirement Levels", BCP 14, RFC 2119, March 1997.

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