

**Real-Time Transport Protocol (RTP) Payload Format for the
Variable-Rate Multimode Wideband (VMR-WB) Extension Audio Codec**
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Abstract

This document is an addendum to RFC xxxx, which specifies the real-time transport protocol for the Variable-Rate Multimode Wideband (VMR-WB) speech codec. This document contains the information related to the new operating mode of VMR-WB. All provisions, restrictions, use cases, features, etc. that are specified in RFC xxxx are applicable to the new operating mode without any exception.

No new media type registration is included in this document as the new VMR-WB mode, defined in this document, will use the same media type specified in RFC xxxx (i.e., audio/VMR-WB). Note that the RFC xxxx was developed with sufficient flexibility for future

extensions and thereby it allows the addition of new operating modes without any impacts on the interoperability of terminals supporting different versions of the VMR-WB standard.

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[1](#). Introduction

This document is an addendum to RFC xxxx [[2](#)] and contains the necessary updates for the support of the new operating mode of 3GPP2 VMR-WB standard [[1](#)]. The new mode of VMR-WB standard (i.e., VMR-WB mode 4) has similar characteristics (e.g., narrowband/wideband input/output media processing capability, continuous and discontinuous transmission, etc.) as the other modes of VMR-WB already included in RFC xxxx. Therefore, all provisions and restrictions specified in RFC xxxx are applicable to all modes of the VMR-WB standard including the new mode, which is described in this document.

As a result, no media type registration is required. The VMR-WB file format; i.e., for transport of VMR-WB speech data in storage mode applications, is specified in [[1](#),[4](#)] and supports the new mode.

The following sections provide the necessary updates to RFC xxxx to enable support of VMR-WB mode 4.

[2](#). Conventions and Acronyms

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 [RFC2119](#) [3].

The following acronyms are used in this document:

- 3GPP2 - The Third Generation Partnership Project 2
- CDMA - Code Division Multiple Access
- VMR-WB - Variable-Rate Multimode Wideband Codec
- CMR - Codec Mode Request
- DTX - Discontinuous Transmission
- RTP - Real-Time Transport Protocol
- MIME - Multipurpose Internet Mail Extension
- SDP - Session Description Protocol

The term "frame-block" is used in this document to describe the time-synchronized set of speech frames in a multi-channel

3. The Variable-Rate Multimode Wideband (VMR-WB) Extension

VMR-WB is the wideband speech-coding standard developed by Third Generation Partnership Project 2 (3GPP2) for encoding/decoding wideband/narrowband speech content in multimedia services in 3G CDMA cellular systems [1]. VMR-WB is a source-controlled variable-rate multimode wideband speech codec. It has a number of operating modes, where each mode is a tradeoff between voice quality and average data rate. The operating mode in VMR-WB (as shown in Table 2) is chosen based on the traffic condition of the network and the desired quality of service. The desired average data rate (ADR) in each mode is obtained by encoding speech frames at permissible rates (as shown in Tables 1 and 3) compliant with CDMA2000 system depending on the instantaneous characteristics of input speech and the maximum and minimum rate constraints imposed by the network operator.

The capabilities of the VMR-WB codec were extended through the addition of a new mode operating at lower average data rates, resulting in improved system capacity in IP and non-IP networks [1].

As a result of this extension, certain tables and parameters in RFC xxxx must be updated to support of the new operating mode. VMR-WB mode 4 is compliant with all applicable provisions and restrictions specified in RFC xxxx [2].

The existing flexibility in RFC xxxx for future extensions allows the addition of the new mode without any impact on the interoperability with earlier implementations of RFC xxxx.

The following sections provide the necessary updates that are required to be made in RFC xxxx.

[4.](#) The Necessary Updates in RFC xxxx

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Table 1 of RFC xxxx is updated as follows:

Frame Type	Bits per Packet (Frame Size)	Encoding Rate (kbps)
Full-Rate	266	13.3
Full-Rate	171	8.55
Half-Rate	124	7.2
Half-Rate	80	4.0
Quarter-Rate	54	2.7
Quarter-Rate	40	2.0
Eighth-Rate	20	1.0
Eighth-Rate	16	0.8
Blank	0	-
Erasure	0	-
Full-Rate with Bit Errors	171	8.55

Table 1: CDMA2000 system permissible frame types and their associated encoding rates

Note that the new permissible rates correspond to CDMA2000 rate-set I.

Table 2 of RFC xxxx is updated as follows to include VMR-WB mode 4 and VMR-WB mode 4 with maximum half-rate similar to that described in [Section 2.4](#) of the revised VMR-WB specification [1].

CMR	VMR-WB Operating Modes
0	VMR-WB mode 3 (AMR-WB interoperable mode at 6.60 kbps)
1	VMR-WB mode 3 (AMR-WB interoperable mode at 8.85 kbps)
2	VMR-WB mode 3 (AMR-WB interoperable mode at 12.65 kbps)
3	VMR-WB mode 2
4	VMR-WB mode 1
5	VMR-WB mode 0
6	VMR-WB mode 2 with maximum half-rate encoding
7	VMR-WB mode 4
8	VMR-WB mode 4 with maximum half-rate encoding
9-14	(reserved)
15	No Preference (no mode request is present)

Table 2: List of valid CMR values and their associated VMR-WB operating modes.

Table 3 of RFC xxxx is updated as follows to include new frame types (FT) associated with VMR-WB mode 4.

Note that the size of the frames are unique and different, allowing for the use of header-free payload format for all modes of operations [2].

+-----+-----+-----+-----+		+-----+-----+-----+-----+	
FT	Encoding Rate	Frame Size (Bits)	
+-----+-----+-----+-----+		+-----+-----+-----+-----+	
0	Interoperable Full-Rate (AMR-WB 6.60 kbps)	132	
1	Interoperable Full-Rate (AMR-WB 8.85 kbps)	177	
2	Interoperable Full-Rate (AMR-WB 12.65 kbps)	253	
3	Full-Rate 13.3 kbps	266	
4	Half-Rate 6.2 kbps	124	
5	Quarter-Rate 2.7 kbps	54	
6	Eighth-Rate 1.0 kbps	20	
7	Full-Rate 8.55 kbps	171	
8	Half-Rate 4.0 kbps	80	
9	CNG (AMR-WB SID)	35	
10	Eighth-Rate 0.8 kbps	16	
11	(reserved)	-	
12	(reserved)	-	
13	(reserved)	-	
14	Erasure (AMR-WB SPEECH_LOST)	0	
15	Blank (AMR-WB NO_DATA)	0	
+-----+-----+-----+-----+		+-----+-----+-----+-----+	

Table 3:VMR-WB payload frame types for real-time transport

Note that the new entries replace the "reserved" entries in RFC xxxx Tables 1 to 3 and there are no changes in the existing table entries of RFC xxxx.

4.1 Implementation Considerations

Same as RFC xxxx

5. Congestion Control

Same as RFC xxxx

6. Security Considerations

Same as RFC xxxx

6.1. Confidentiality

Same as RFC xxxx

6.2. Authentication

Same as RFC xxxx

6.3. Decoding Validation and Provision for Lost or Late Packets

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Same as RFC xxxx

7. Payload Format Parameters

Same as RFC xxxx.

7.1. VMR-WB RTP Payload MIME Registration

No MIME registration is required for the new mode of VMR-WB. The only necessary update is in the definition of the optional MIME parameter "mode-set" by adding the new operating mode. Note that the addition of the new mode does not create any interoperability issues since the modes of operation are negotiated and agreed by the IP terminals through the offer-answer model provided in [Section 9.3](#) of RFC xxxx [2].

mode-set: Requested VMR-WB operating mode set. Restricts the active operating modes to a subset of all modes. Possible values are a comma separated list of integer values. Currently, this list includes modes 0,1,2, 3, and 4 [[1](#),[2](#)] but MAY be extended in the future. If such mode-set is specified during session initiation, the encoder MUST NOT use modes outside of the subset. If not present, all operating modes in the set 0 to 4 are allowed for the session.

Encoding considerations:

Same as RFC xxxx

Security considerations:

Same as RFC xxxx

Public specification:

The VMR-WB speech codec is specified in following 3GPP2 specifications C.S0052-A version 1.0.
Transfer methods are specified in RFC xxxx.

Additional information:

Person & email address to contact for further information:

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Intended usage: COMMON.

Same as RFC xxxx

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Author/Change controller:

IETF Audio/Video Transport working group delegated from the IESG

7.2. Mapping MIME Parameters into SDP

Same as RFC xxxx

7.3. Offer-Answer Model Considerations

Same as RFC xxxx

8. IANA Considerations

None

References

Normative References

- [1] 3GPP2 C.S0052-A v1.0 "Source-Controlled Variable-Rate Multimode Wideband Speech Codec (VMR-WB) Service Options 62 and 63 for Spread Spectrum Systems", 3GPP2 Technical Specification, April 2005.
- [2] S. Ahmadi, "Real-Time Transport Protocol (RTP) Payload Formats for the Variable-Rate Multimode Wideband (VMR-WB) Audio Codec", RFC xxxx, Internet Engineering Task Force, May 2005.
- [3] S. Bradner, "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), Internet Engineering Task Force, March 1997.

Informative References

- [4] 3GPP2 C.S0050-A v1.0 "3GPP2 File Formats for Multimedia Services", 3GPP2 Technical Specification, May 2005.

Any 3GPP2 document can be downloaded from the 3GPP2 web server, "<http://www.3gpp2.org/>", see specifications.

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This Internet-Draft expires in six months from May 27, 2005.

RFC Editor Considerations

The RFC editor is requested to replace all occurrences of xxxx with the RFC number that reference [2] will receive.

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