Highlights of VMR-WB RTP Payload and Storage File Format

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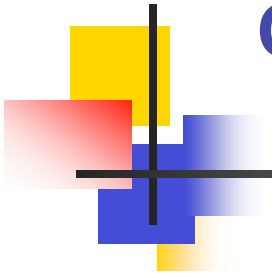
For more information please refer to draft-ahmadi-avt-rtp-vmr-wb-00.txt



Outline

- Background on VMR-WB
- Motivation for the Codec Interoperability
- Interoperability with AMR-WB
- Overview of VMR-WB RTP Payload Format
- Overview of VMR-WB Storage File Format
- Applications of VMR-WB
- Remarks

Background on VMR-WB (1)

- The variable-rate multimode wideband (**VMR-WB**) was selected by 3GPP2 as the new cdma2000® wideband speech coding standard in April 2003.
- Functional Features:
  - Compliant with cdma2000® Rate-Set II (Radio Configuration 4/5)
  - Source-controlled variable-rate multi-mode codec
  - 4 modes of operation where each mode is a tradeoff between quality and capacity
  - Seamless mode switching capability
  - Core technology based on 3GPP/AMR-WB (ITU-T/G.722.2)
  - Interoperable with AMR-WB in one of the operational modes
  - Built-in noise suppression
  - Robust to burst errors and frames with corrupted rate information
  - Narrowband speech processing capability in all modes of operation
  - Superior subjective quality surpassing that of all existing wideband and narrowband speech coding standards operating at the same data rates

Background on VMR-WB (2)

Summary of the quality and average data rates of the existing modes of VMR-WB

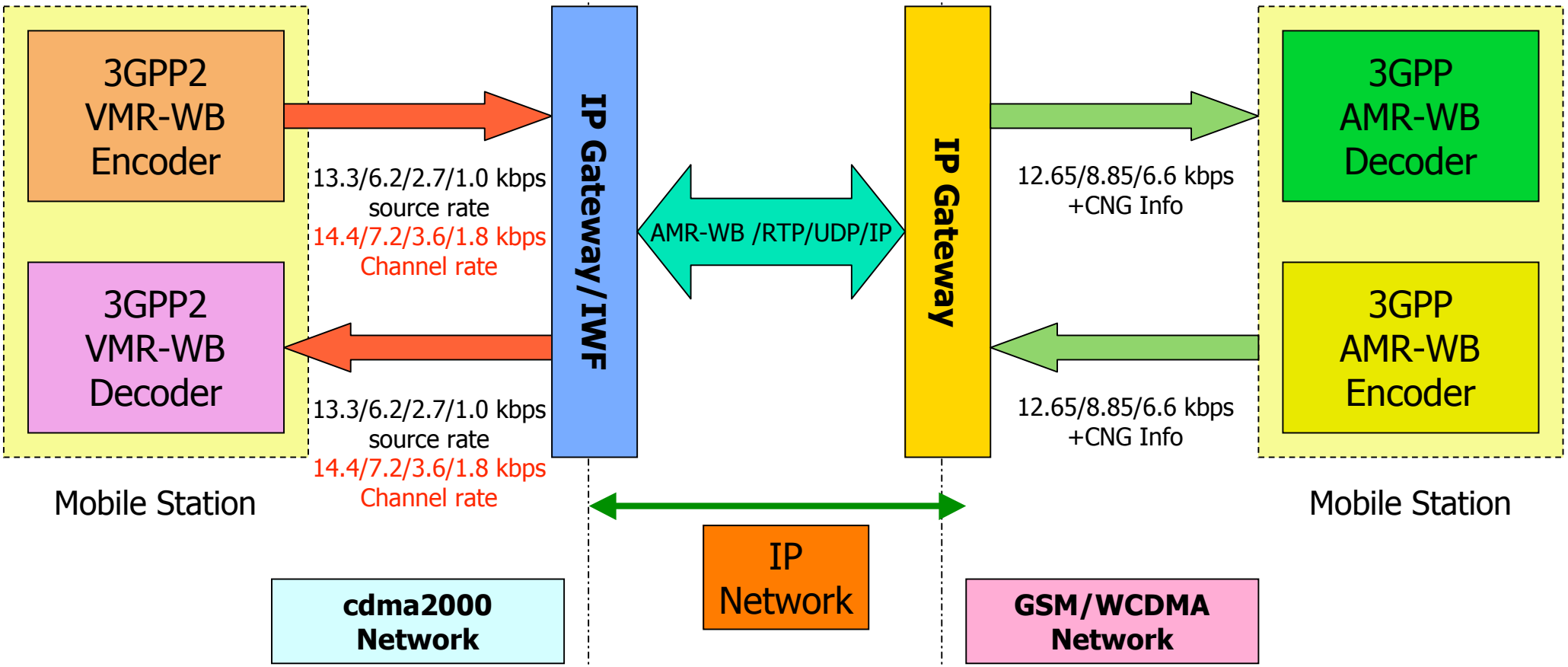
Operating Rate-Set	Mode	Average Data Rate	Quality Reference
cdma2000® rate-set II Radio Configuration 4(reverse link)/5 (forward link)	0	Same as TIA/EIA/IS-733	No worse than 3GPP/AMR-WB @ 14.25 kbps under all conditions
	1	Same as the average of TIA/EIA/IS-733 and TIA/EIA/IS-127	No worse than 3GPP/AMR-WB @ 12.65 kbps under all conditions
	2	Same as TIA/EIA/IS-127	No worse than 3GPP/AMR-WB @ 8.85 kbps under all conditions
	3	Not more than 12% of the ADR of TIA/EIA/IS-733	No worse than 3GPP/AMR-WB @ 12.65 kbps under all conditions

Motivation for the Codec Interoperability

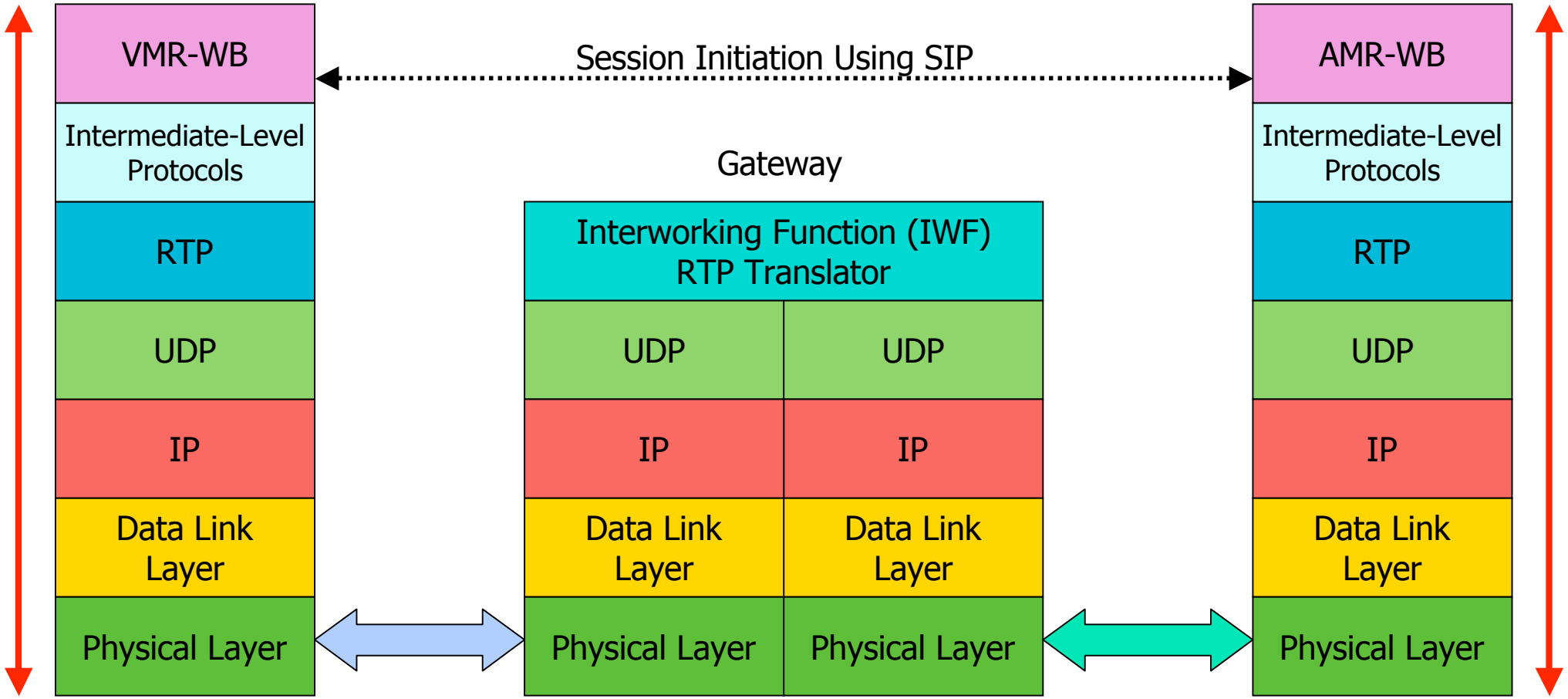
- Global harmonization of multimedia services across different cellular and non-cellular networks has gained a strong momentum in the standardization bodies.
- With the increase of multimedia message traffic, eliminating transcoding at the gateways would result in
  - More efficiency
  - Improving quality of service by avoiding quality degradation due to transcoding
  - Reducing the complexity and cost of the gateways
- Simplifying implementations by recycling the code between various audio codecs.
- Harmonizing applications across different networks, e.g., If AMR-WB is used for streaming services in 3GPP side, 3GPP2/VMR-WB can be used to decode the content and/or generate the content.

Interoperability with AMR-WB (1)

Enabling Transcoder-Free (TrFO) multimedia content transfer between AMR-WB/VMR-WB based terminals



Interoperability with AMR-WB (2)



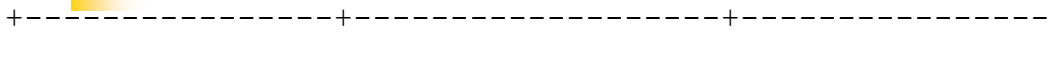
Overview of VMR-WB RTP Payload Format (1)

- Similarities and differences with AMR-WB RTP payload (RFC3267)
  -
  - VMR-WB and AMR-WB RTP payloads have the same structure
  - Both codecs support Interface Format 2 frame structure
    - Both support
      - Bandwidth efficient and Octet-aligned formats
      - Single-frame and multi-frame encapsulation
      - Forward Error Correction (FEC)
      - Single channel and multi-channel sessions
      - Frame interleaving
      - Congestion control
      - Codec mode switching (although the concept of the mode is different)
    - VMR-WB does not support
      - Robust sorting, Frame CRC, and UEP/UED due to differences in the native networks and in order to simplify the interworking function

Overview of VMR-WB RTP Payload Format (2)

- This internet draft, <draft-ahmadi-avt-rtp-vmr-wb-00.txt>, reuses a large portion of RFC3267 with appropriate modifications
- What is new in VMR-WB payload?
  - Continuous vs. Discontinuous Transmission options
  - Wideband and Narrowband operations
  - Interworking Function for the interoperable mode
  - RTP Payload and Storage File Formats for the non-interoperable modes
- We hope that the existing similarities between the two codecs and their payload and storage formats could result in accelerated completion of a RFC for VMR-WB.

Bandwidth Efficient Payload (1)



Payload header: (4 bits)

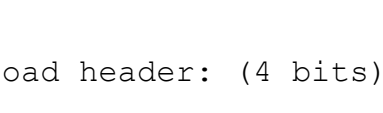
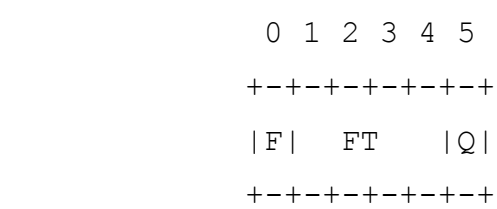
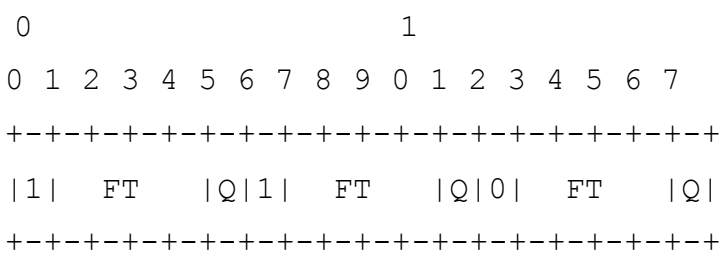


Table of content



Example of three entry TOC



CMR	Codec Mode
0	Rate-Set II mode3 (AMR-WB interoperable mode at 6.6 kbps)
1	Rate-Set II mode3 (AMR-WB interoperable mode at 8.85 kbps)
2	Rate-Set II mode3 (AMR-WB interoperable mode at 12.65kbps)
3	Rate-Set II mode 2
4	Rate-Set II mode 1
5	Rate-Set II mode 0
6-14	(reserved)
15	No Preference (Codec mode SHOULD be set by the network)

- Identical entries

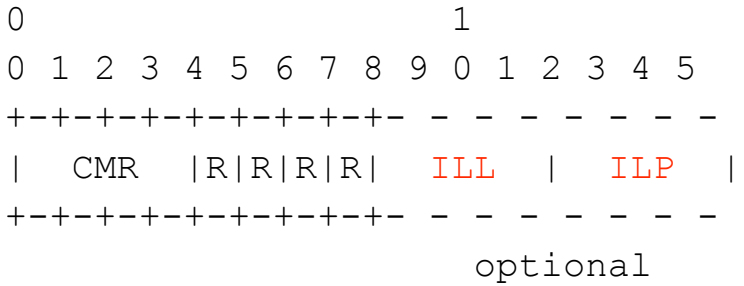
Bandwidth Efficient Payload (2)

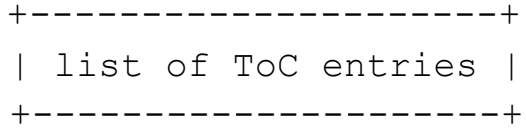
FT	Encoding Rate	Frame Size (Bits)
0	RS-II Full-Rate (AMR-WB 6.6 kbps)	13 Preamble+132 Data+121 Padding
1	RS-II Full-Rate (AMR-WB 8.85 kbps)	13 Preamble+177 Data+76 Padding
2	RS-II Full-Rate (AMR-WB 12.65 kbps)	13 Preamble+253 Data
3	RS-II Full-Rate 13.3 kbps	266
4	RS-II Half-Rate 6.2 kbps	124 (Preamble + Data)
5	RS-II Quarter-Rate 2.7 kbps	54
6	RS-II Eighth-Rate 1.0 kbps	20
7	(reserved)	
8	(reserved)	
9	RS-II CNG (AMR-WB SID+ padding)	5 Preamble+35 Data+14 Padding
10	(reserved)	
11	(reserved)	
12	(reserved)	
13	(reserved)	
14	RS-II Erasure (AMR-WB SPEECH_LOST)	0
15	RS-II Blank (AMR-WB NO_DATA)	0

- Identical entries

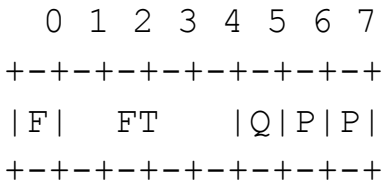
Octet-Aligned Payload

Payload header





TOC

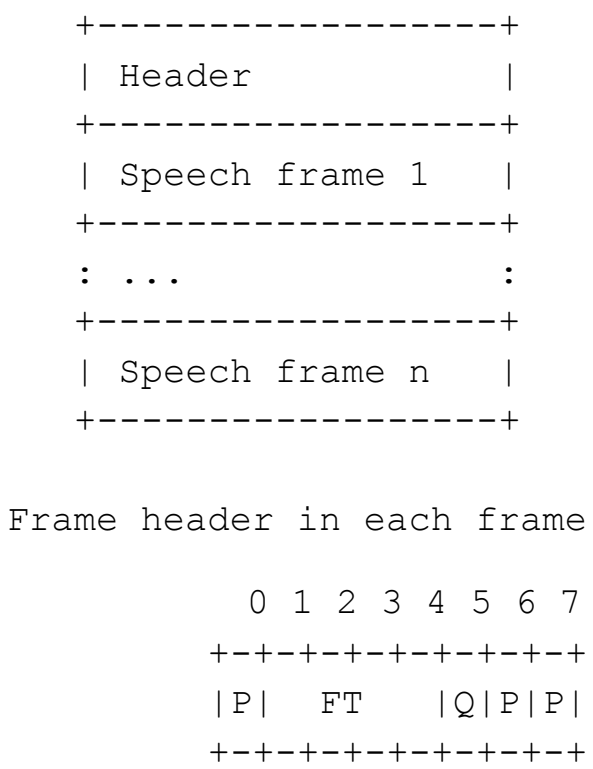


- Identical entries

CMR	Codec Mode
0	Rate-Set II mode3 (AMR-WB interoperable mode at 6.6 kbps)
1	Rate-Set II mode3 (AMR-WB interoperable mode at 8.85 kbps)
2	Rate-Set II mode3 (AMR-WB interoperable mode at 12.65kbps)
3	Rate-Set II mode 2
4	Rate-Set II mode 1
5	Rate-Set II mode 0
6-14	(reserved)
15	No Preference (Codec mode SHOULD be set by the network)

- The definition and usage of ILL and ILP are identical
- FT values same as the previous slide
- F and Q have the same definitions as AMR-WB

Overview of VMR-WB Storage File Format (1)



Frame header in each frame

For Non-interoperable Modes:

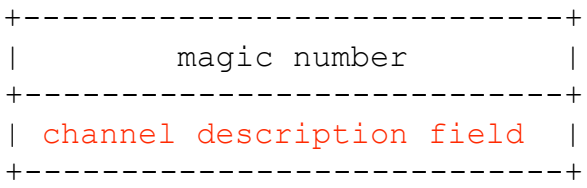
magic number "#!VMR-WB\n" for single channel

magic number "#!VMR-WB_MC1.0\n" for Multi-channel

For the Interoperable Mode:

magic number "#!AMR-WB\n" for single channel

magic number "#!AMR-WB_MC1.0\n" for Multi-channel



- Identical entries

VMR-WB and AMR-WB have identical
storage file formats in the interoperable mode

Overview of VMR-WB Storage File Format (2)

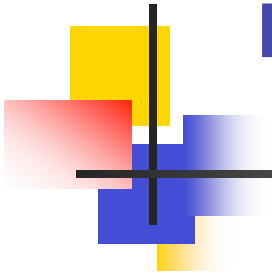
FT	Encoding Rate	Frame Size (Bits)
0	RS-II Full-Rate (AMR-WB 6.6 kbps)	132
1	RS-II Full-Rate (AMR-WB 8.85 kbps)	177
2	RS-II Full-Rate (AMR-WB 12.65 kbps)	253
3	RS-II Full-Rate 13.3 kbps	266
4	RS-II Half-Rate 6.2 kbps	124
5	RS-II Quarter-Rate 2.7 kbps	54
6	RS-II Eighth-Rate 1.0 kbps	20
7	(reserved)	-
8	(reserved)	-
9	RS-II CNG (AMR-WB SID)	35
10	(reserved)	-
11	(reserved)	-
12	(reserved)	-
13	(reserved)	-
14	RS-II Erasure (AMR-WB SPEECH_LOST)	0
15	RS-II Blank (AMR-WB NO_DATA)	0

- Identical entries

Applications of VMR-WB

- Several applications depend on RTP payload and storage file format

Modes of the cdma2000® wideband speech codec	Applications
Rate-set II modes 0, 1, and 2	Packet-Switched VoIP, TFO, or TrFO Mobile-to-Mobile calls within cdma2000® networks, Multimedia Streaming, and Instant Messaging between cdma2000® terminals, Multimedia content generation, Internet applications
Rate-set II mode 3 [3GPP/AMR-WB (ITU-T/G.722.2) interoperable mode]	Packet-Switched VoIP Mobile-to-Mobile Calls, Multimedia content exchange between GSM/WCDMA and cdma2000® terminals, Multimedia content generation for both cdma2000® and GSM/WCDMA networks and terminals, Internet applications



Remarks

We would like to ask IETF/AVT WG to adopt this draft as a Working Group document (work item)

to accelerate its further development and completion

Thank You!