Presentation of Specification to TSG

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Title of document:

Packet Switched Conversational Multimedia Applications; Default Codecs

3G TS 26.235 V1.0.0 (2000-12)

Technical Specification

**3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Packet Switched Conversational Multimedia Applications;
Default Codecs
(Release 4)**

3GPP

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Contents

Foreword

This Technical Specification has been produced by the 3GPP.

The present document introduces the set of default codecs applying to 3G packet switched conversational multimedia applications within the 3GPP system.

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version 3.y.z

where:

x   the first digit:

1   presented to TSG for information;

2   presented to TSG for approval;

3   Indicates TSG approved document under change control.

y   the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z   the third digit is incremented when editorial only changes have been incorporated in the specification;

Introduction

This document contains a specification for default multimedia codecs to be used within 3GPP specified IP Multimedia Core Network Subsystem (IM CN Subsystem). IM CN Subsystem as a subsystem includes specifically the conversational IP multimedia services, whose service architecture, call control and media capability control procedures have been defined in 3GPP specifications TS 24.229, and are based on the 3GPP adopted version of IETF Session Invitation Protocol (SIP).

The term codec is usually associated with a single media type. In case of packet switched transport domain, which IM CN Subsystem will depend on, the individual media types are independently encoded and packetised to appropriate separate Real Time Protocol (RTP) packets. These packets are then transported end-to-end inside UDP datagrams over real-time IP connections that have been negotiated and opened between the terminals during the SIP call as specified in 3GPP TS 24.229.

From the codec definition viewpoint, the UEs operating within IM CN Subsystem need to provide encoding/decoding of the derived codecs, and perform corresponding packetisation/depacketisation functions. Logical bound between the media streams is handled in the SIP session layer, and inter-media synchronisation in the receiver is handled with the use of RTP time stamps.

Finally, since 3GPP networks are inherently error prone, error detection and/or correction must also be provided by the individual codecs within IM CN Subsystem, since they have a comprehensive view of the bit stream they produce and therefore can apply the most efficient form of error detection and/or correction.

1 Scope

This specification introduces the set of default codecs for packet switched conversational multimedia applications within 3GPP IP Multimedia Core Network Subsystem. Visual and sound communication are specifically addressed. The intended applications are assumed to require low-delay, real-time functionality.

The present document is applicable, but not limited, to PS video telephony.

2 References

The following documents contain provisions, which through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1]   IETF RFC 2543 "SIP: Session Initiation Protocol"

[2]   IETF RFC 2327 "SDP: Session Description Protocol"

[3]   IETF RFC 2429 "RTP Payload Format for the 1998 Version of ITU-T Rec. H.263 Video (H.263+)"

[4]   IETF RFC 1889 "RTP: A Transport Protocol for Real-Time Applications"

[5]   IETF RFC xxxx "RTP Payload Format for the AMR speech codec"

[6]   ITU-T Recommendation H.263: "Video coding for low bitrate communication"

[7]   3GPP Technical Specification 3G TS 26.110: "Codec for Circuit Switched Multimedia Telephony Service; General Description"

[8]   3GPP Technical Specification 3G TS 26.111: "Codec for Circuit Switched Multimedia Telephony Service; Modifications to H.324"

[9]   3GPP Technical Specification 3G TS 26.071: "Mandatory Speech Codec; General Description"

[10]   3GPP Technical Specification 3G TS 26.090: "Mandatory Speech Codec; Speech Transcoding Functions"

[11]   3GPP Technical Specification 3G TS 26.073: "Mandatory Speech Codec; ANSI C-Code"

[12]   3GPP Technical Specification 3G TS 26.104: "AMR speech Codec; Floating point C-Code"

[13]   International Standard ISO/IEC 14494-2: "Information technology - Generic coding of audio-visual object - Part 2: Visual, 1999".

[14]   3GPP Technical Specification 3G TS 24.228: "Signalling flows for the IP multimedia call control based on SIP and SDP"

[15]   3GPP Technical Specification 3G TS 24.229: "IP Multimedia Call Control Protocol based on SIP and SDP"

[16]   IETF RFC 3016 "RTP Payload Format for the MPEG-4 visual"

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

3G PS multimedia terminal: A terminal based on IETF SIP/SDP internet standards modified by 3GPP for purposes of 3GPP packet switched network based multimedia telephony

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AMR	Adaptive Multirate Codec
IETF	Internet Engineering Task Force
IM CN Subsystem	Internet Multimedia Core Network Subsystem
ITU-T	International Telecommunications Union - Telecommunications
RFC	IETF Request For Comments
RTP	Real Time Protocol
RTCP	Real Time Control Protocol
SDP	Session Description Protocol
SIP	Session Initiation Protocol

4 General

3G PS multimedia terminals provide real-time video, audio, or data, in any combination, including none, over 3GPP IM CN Subsystem. Terminals are based on IETF defined multimedia protocols SIP, SDP, RTP and RTCP. Communication may be either 1-way or 2-way. Such terminals may be part of a portable device or integrated into an automobile or other non-fixed location device. They may also be fixed, stand-alone devices; for example, a video telephone or kiosk. Multimedia terminals may also be integrated into PCs and workstations.

In addition, interoperation with other types of multimedia telephone terminals, such as 3G-324M may be possible, however in such case a media gateway functionality supporting 3G-324M - IM CN Subsystem interworking will be required within or outside the IM CN subsystem operated by the network operator. *(Editor's comment: Exact interworking between the 3GPP defined CS and PS multimedia services is to be defined in TS 27.TBA, in a WI owned by TSG CN WG3, to be completed by 3GPP Release 5)*.

Multipoint communication between more than two 3G PS multimedia terminals is for further study.

5 System overview

This specification describes the required codec related elements for 3G PS multimedia terminal.

- Mandatory codecs for 3G PS multimedia terminal

- Media encapsulation and decapsulation rules for each mandatory codec

6 Functional requirements

SIP protocol itself does not mandate any codecs. Standardisation of mandatory codecs does not prevent the use of other codecs that can be signalled using the SDP protocol. 3G PS multimedia terminals shall be able to use the same audio and video codecs applied in 3G-324M [8]. This will ensure the interoperability with 3G circuit switched multimedia telephony.

6.1 Audio

3G PS multimedia terminals offering audio communication shall support AMR narrowband speech codec [9]. This is the mandatory speech codec.

The AMR wideband speech codec may be supported. This is an optional speech codec.

6.2 Video

ITU-T recommendation H.263 baseline shall be supported. This is the mandatory video codec.

H.263 Version 2 Conversational and Streaming Wireless Profile (Profile 3) may be used. This is an optional video codec.

ISO/IEC 14496-2 (MPEG-4 Visual) Simple Profile at Level 1 should be used for improved error resilience. This is an optional video codec. MPEG-4 visual provides error concealment as part of the Simple Profile through Data Partitioning (DP), Reversible Variable Length Coding (RVLC), Resynchronisation Marker (RM) and header extension code. MPEG-4 is baseline compatible with H.263.

6.3 Data

SIP signalling offers initialisation of packet switched interactive or background class reliable data services as well. However specification of such data services are outside the scope of TSG SA WG4, and are not mandatory parts of the IM CN Subsystem.

7 Call control

[*Editor's note: Work on SIP call control is being specified in TSG SAWG2. Functional requirements will be specified in TS 23.228.*]

TSG-CN WG1 specifies the required signalling functions in TS 24.228 and call control protocols in TS 24.229.

8 Bearer control

The media control is based on declaration of terminal media capability sets in SDP part of appropriate SIP messages. Exact format and content of SDP descriptions is ffs.

Relation of application level SDP signalling and radio access bearer assignment, and any SDP QoS attribute mapping for WCDMA and GERAN channels is specified by TSG-SA WG2 and TSG-CN WG1 *[Editor's note: replace this last sentence with TS numbers when known].*

9 Multimedia stream encapsulation

9.1 MIME types

The terminal shall declare the mandatory and any optional media streams using the codec specific MIME types in the associated SDP syntax. The MIME types for the mandatory codecs shall be according to the corresponding types registered by IANA.

- AMR narrow band speech codec MIME type as specified by [TBD] IANA documentation.

- H.263 video codec MIME type as specified by RFC 2429 IANA documentation.

- MPEG-4 visual simple profile 0 MIME type as specified by RFC 3016 IANA documentation.

9.2 RTP payload

RTP payload formats specified by IETF shall be used for real time media streams.

RTP payload format for the ITU-T H.263 video is specified in IETF RFC 2429.

RTP payload format for the MPEG-4 visual simple profile level 0 is specified in IETF RFC 3016.

Editor's note: RTP payload format and MIME type registration for AMR narrow band codec is expected to be approved in December 2000.

Annex A:
Information on optional enhancements

The section is intended for informational purposes only. This is not an integral part of this specification.

A.1 Video

This section gives recommendations for the video codec implementations within 3G PS multimedia terminals.

Regardless of which specific video codec standard is used, all video decoder implementations should include basic error concealment techniques. These techniques may include replacing erroneous parts of the decoded video frame with interpolated picture material from previous decoded frames or from spatially different locations of the erroneous frame. The decoder should aim to prevent the display of substantially corrupted parts of the picture. In any case, it is recommended that the terminal should tolerate *every* possible bitstream without catastrophic behaviour (such as the need for a user-initiated reset of the terminal).

3G PS terminal video encoders and decoders are recommended to support the 1:1 pixel format (square format).

[FFS]

A.2 Audio

[FFS]

Annex B:
Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

<Publication>: "<Title>".

Annex C (informative):
Change history

Change history								
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment		Old	New