Technical Specification Group Services and System Aspects
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3G CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

26.911	**CR**	**002Rev1**	Current Version:	3.0.1

3G specification number ↑ *↑ CR number as allocated by 3G support team 802*

For submision to TSG SA #5 *list TSG meeting no. here ↑*

for approval [X]
for information [ ]

(only one box should be marked with an X)

Form: 3G CR cover sheet, version 1.0 *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

Proposed change affects: *(at least one should be marked with an X)* USIM [ ] ME [X] UTRAN [ ] Core Network [ ]

Source: TSG-S4, Tdoc TSG-S4#(99)249 **Date:** 9.9.1999

Subject: Proposals for updates to implementors guide for video in 3G-324

3G Work item: Codec for low bit rate multimedia telephony service

Category: *(only one category shall be marked with an X)*

F	Correction	[ ]
A	Corresponds to a correction in a 2G specification	[ ]
B	Addition of feature	[X]
C	Functional modification of feature	[ ]
D	Editorial modification	[ ]

Reason for change:

The change enables improved error robustness, improved compression and, higher quality. The change also improves the interoperability between 3G multimedia terminals that uses the H.263 video codec. The change is implemented by recommending a number of annexes to be used in a mobile multimedia terminal. An informative sentence about error robustness is also added.

Some minor editorial changes (shall -> should) is also included.

Clauses affected: 7.1, 7.2, 7.3

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other 2G core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:


help.doc

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7 Video Codec

This section gives recommendations for the video codec implementations within 3G-324M terminals. Section 7.1 is applicable to the use of any mandatory or optional video codec. Section 7.2 includes specific recommendations for using the H.263 codec. Section 7.3 gives specific recommendations for the use of MPEG-4 and other possible optional video codecs.

7.1 General Recommendations

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-324M encoders and decoders are recommended to support the 1:1 pixel format (square format) . Encoders should signal this capability using H.245 capability exchange and the appropriate header fields in video codecs so that unnecessary pixel shape conversions can be avoided.

7.2 H.263

Several of the optional annexes of H.263 are useful for improving the compression efficiency and error resilience of the codec. ~~Implementors are recommended to carefully consider supporting a set of selected annexes. For example, there is wide consensus that Annex K (Slice Structured mode) improves error resilience of the codec.~~The annexes below form a balanced set of tools with respect to error robustness, compression efficiency, quality, and~~,~~ complexity. It is recommended that an H.263 video decoder should support the following annexes.~~,~~ T~~t~~he main feature of each annex is also mentioned:

- Annex I (Advanced Intra Coding), improves error resilience~~robustness~~ and compression efficiency.
- Annex J (Deblocking Filter), improves~~ing~~ compression efficiency.
- Annex K (Slice Structure Mode), ~~which~~ improves error resilience~~robustness~~.
- Annex T (Modified Quantizer), improves~~ing~~ ~~the~~ compression efficiency~~quality~~.

Non-empty GOB headers should be used frequently to improve error resilience (see [6], Section 5.2).

7.3 Other Video Codecs

It is recommended that all terminals additionally support the ISO/IEC 14496-2 (MPEG-4 Visual) video codec [11]. The explanatory text below gives justification and further detail for this recommendation.

One of the main target environments for MPEG-4 Visual is mobile use. For this purpose the following error resilient techniques have been adopted in MPEG-4 Visual: Resynch Marker, Header Extension Code, Data Partitioning, and Reversible Variable Length Code. With these techniques MPEG-4 Visual codec can be used over errorprone channels enabling highly efficient low delay multimedia communication services for 3G networks. Support for MPEG-4 Visual potentially provides capabilities for communicating with heterogeneous networks without transcoding, or reusing pictures/video from 3G multimedia telephony service by different applications and vice versa.

MPEG-4 Visual and H.263 have substantial technical similarities. MPEG-4 Visual also includes support for the H.263 baseline codec.

Because of multi-functionality of MPEG-4 Visual, subsets of different tools have been defined in order to allow effective implementations of the standard. These subsets, called “Profiles”, limit the tool set which shall be implemented. For each of these Profiles one or more Levels have been set to restrict the computational complexity of implementations. It is here recommended that the Simple Visual Profile with [Level 1] is supported to achieve adequate error resilience for transmission error and low complexity simultaneously. No other Profiles are recommended to be supported. Higher Levels for ths Simple Visual Profile may be supported depending on the terminal capabilities.

MPEG-4 Visual accepts various sizes of input picture within the capability specified from the Profile and Level. Picture size of [QCIF] for Level 1 and [CIF] for Levels 2 and 3 ~~shall~~should be used while other sizes ~~shall~~should not be used for the sake of interoperability.

All of the error resilience tools in Simple Visual Profile are recommended to be activated.

More than [3] Resynch Markers per one frame should be inserted into the bitstream. It means that the bitstream of one frame is constructed from at least [4] Video Packets.

At least [1] Video Packet in one frame should include Header Extension Code. The decoder should utilize information derived from the Header Extension Code to avoid total discard of the VOP when VOP header could not be received.

Data Partitioning syntax should be used by decoders to detect errors and localize their effects. The decoder should not discard whole Video Packets with errors when motion information or I-VOP DC coefficients are decoded correctly, but

reconstruct corresponding part of the picture using the above information or coefficients.
Reversible Variable Length Code (RVLC) should be used. RVLC decoding operation should be made as described in section E.1.4 of Annex E in [11].
To prevent extended propagation of degraded video, Intra Refresh should be used. More than [5 %] of the macroblocks per one frame should be refreshed. Adaptive Intra Refresh (AIR) described in section E.1.5 in Annex E of [11] should be used in conjunction with cyclic Intra Refresh.
One Video Packet of MPEG-4 Visual should be mapped to one AL-SDU of ITU-T H.223 Adaptive Layer.