Source **TSG-S4**
Title **CRs on Low Bit Rate Codec for Multimedia Telephony Service**

S4 Tdoc.	Spec.	Ver.	CR	Rev.	Rel.	Subject
S4-99434R2	26.111	3.0.2	002	2	R99	Specification of coding parameters for MPEG-4 video codec
S4-99514	26.111	3.0.2	003		R99	Transmission of MPEG-4 configuration information in 3G-324M
S4-99515R	26.911	3.1.0	003	2	R99	Disabling depth information for MPEG-4 video in 3G-324M terminals
S4-99513	26.911	3.1.0	004		R99	Error resilience improvements to using video in 3G-324M
S4-99516R	26.911	3.1.0	005	1	R99	Modification on MPEG-4 Visual implementation

3GPP TSG-S4 meeting #8 *Document* ***S4(99)434R2***

Kyoto, Japan, 06-10 Dec 1999

CHANGE REQUEST No : **002Rev2** *Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*

Technical Specification GSM/UMTS 26.111 Version 3.0.2

Submitted to TSG-SA#6 *list plenary meeting or STC here ↑* for approval [X] for information [ ] without presentation ("non-strategic") [X] with presentation ("strategic") [ ]

PT SMG CR cover form. Filename: crf26_2.doc

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

Source: TSG-SA WG4 Codec **Date:** 99/12/16

Subject: Specification of coding parameters for MPEG-4 video codec

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

F	Correction	
A	Corresponds to a correction in an earlier release	
B	Addition of feature	
C	Functional modification of feature	X
D	Editorial modification	

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	
UMTS	X

Reason for change: The current TS 26.111 allows the optional usage of MPEG-4 visual simple profile. In order to achieve a high error-robustness and a low complexity video codec the working-range of some parameters have to be limited.

Clauses affected: 6.6.1

Other specs affected: *(One or more may be marked with an X)*

Other releases of same spec	[ ]	→ List of CRs:
Other core specifications	[ ]	→ List of CRs:
MS test specifications / TBRs	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments: The new chapter 6.6.1 specifies these parameters and has to be added to chapter 6.6 of TS 26.111

6.6 Video channels

Support for H.261 is optional. Support for MPEG-4 is optional. MPEG-4 provides error concealment as part of the simple profile through Data Partitioning (DP), Reversible Variable Length Coding (RVLC), Resynchronization Marker (RM) and header extension code. MPEG-4 is baseline compatible with H.263.

6.6.1 Requirements for MPEG-4 usage

The following requirements (a)-(e) apply to the usage of specific parameters within MPEG-4.

a) Each 3G-324M MPEG-4 decoder shall be able to decode all frame-rates up to 15 frames per second, but need not support higher rates when MPEG-4 Simple Profile Level 1 is used.

b) Each 3G-324M MPEG-4 encoder shall use a fixed f-code value of 1 when MPEG-4 Simple Profile Level 1 is used.

c) Each 3G-324M MPEG-4 encoder shall use a fixed intra_dc_vlc_threshold of 0 when MPEG-4 Simple Profile Level 1 is used.

d) Each 3G-324M MPEG-4 decoder shall be able to decode all horizontal luminance pixel resolutions up to 176 pels/line when MPEG-4 Simple Profile Level 1 is used. The decoder shall not be required to support higher horizontal resolutions even if the resulting number of MBs was within the 99 MB limit stipulated in MPEG-4 Simple Profile Level 1.

e) Each 3G-324M MPEG-4 decoder shall be able to decode all vertical luminance pixel resolutions up to 144 pels/VOP when MPEG-4 Simple Profile Level 1 is used. The decoder shall not be required to support higher vertical resolutions even if the resulting number of MBs was within the 99 MB limit stipulated in MPEG-4 Simple Profile Level 1.

3GPP TSG-S4 meeting #8
Kioto, Japan, 06-10 Dec 1999

Document ***S4-(99)514***

3G CHANGE REQUEST

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

26.111 **CR** **003** Current Version: 3.02

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

For submision to TSG SA#6 *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-SA WG4 Codec **Date:** 16-Dec-1999

Subject: Transmission of MPEG-4 configuration information in 3G-324M

3G Work item: Codec(s) for low bit-rate multimedia telephony (S4 WI 2)

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	[ ]
C	Functional modification of feature	[X]
D	Editorial modification	[ ]

Reason for change: It is necessarry to define how certain MPEG-4 configuration is transmitted. The present spec leaves this optional which is not optimal for error resilience.

Clauses affected: 6.6

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: This change should be made to a subsection (6.6.1) of Section 6.6 which does not yet exist in 3.02. This subsection will be created by other change requests which should be implemented before this one. This change will go into a subsection about MPEG-4.

help.doc

<--------- double-click here for help and instructions on how to create a CR.

6.6 Video channels

Support for H.261 is optional. Support for MPEG-4 is optional. MPEG-4 provides error concealment as part of the simple profile through Data Partitioning (DP), Reversible Variable Length Coding (RVLC), Resynchronization Marker (RM) and header extension code. MPEG-4 is baseline compatible with H.263.

[Some new text is here coming from other CRs from the same meeting.]

When opening a logical channel for MPEG-4 Visual, configuration information (Visual Object Sequence Header, Visual Object Header, and Video Object Layer Header) shall be sent in the decoderConfigurationInformation parameter. The same information shall also be sent in the MPEG-4 video bitstream. If the operational mode of MPEG-4 encoder needs to be changed, the existing MPEG-4 video logical channel shall be closed and H.245 procedures for opening a new MPEG-4 video logical channel shall be started. The new operational mode shall be indicated in the parameters of the new logical channel.

6.7 Audio channels

AMR is the mandatory speech codec. Support for G.723.1 is not mandatory, but recommended. If both the receiving and transmitting terminals support AMR and G.723.1, then AMR shall be used. This applies to connections without an Multipoint Control Unit (MCU).

3GPP TSG-S4 meeting #8
Kyoto, Japan, 06-10 Dec 1999

Document ***S4(99)515R***
Replaces ***S4(99)435R2***

CHANGE REQUEST No : **003Rev2**

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Technical Specification GSM/UMTS 26.911 Version 3.1.0

Submitted to TSG-SA#6 *list plenary meeting or STC here ↑*

for approval	X	without presentation ("non-strategic")	
for information		with presentation ("strategic")	X

PT SMG CR cover form. Filename: crf26_2.doc

Proposed change affects: *(at least one should be marked with an X)*

SIM	ME	Network	**Workitem:**

Source: TSG-SA WG4 Codec **Date:** 99/12/16

Subject: Disabling depth information for MPEG-4 video in 3G-324M terminals

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

F	Correction	
A	Corresponds to a correction in an earlier release	
B	Addition of feature	X
C	Functional modification of feature	
D	Editorial modification	

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
UMTS	X

Reason for change: Currently the control protocol H.245 allows the usage of drawing order information for MPEG-4 visual simple profile objects. However there is no position information available at the receiving terminal, therefore there is no possible usage for this optional parameter. This change request proposes that this parameter should not be sent to the receiver and the receiver shall ignore this parameter.

Clauses affected: new section 6.1

Other specs affected: *(One or more may be marked with an X)*

Other releases of same spec		→ List of CRs:
Other core specifications		→ List of CRs:
MS test specifications / TBRs		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments: This proposal shall be included to the technical specification within section 6.

6.1 Usage of DRAWING_ORDER-information for MPEG-4 video objects

3G-324M decoders should ignore any drawing order information as signalled by H.245 drawingOrder Capability, see Table E.5/H.245, if the MPEG-4 simple profile level 1 is used.

Joint SMG11/TSG-SA4 Meeting #13 / #8
Kyoto, Japan, 6-10 December 1999

***Document* S4-99-516R**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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26.911	CR	005	Current Version:	3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG-SA#6	for approval	X	Strategic	X	*(for SMG use only)*
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*

(U)SIM		ME	X	UTRAN / Radio		Core Network	

Source: TSG-S4 Codec **Date:** 16.12.1999

Subject: Modification on MPEG-4 Visual implementation.

Work item: Low bit rate codec for Multimedia Telephony

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

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:
In 4th paragraph of clause 7.3, the current tentative recommendation “Simple@Level1” is fixed, since it achieves “adequate error resilience and low complexity”.
In 5th paragraph, regarding Level 1, QCIF is an appropriate picture format considering the maximum number of macroblocks, therefore it is fixed. Regarding the Level 2 and 3, there is no clear justification for the picture format at the moment, therefore this part is removed.
In 7th to 11th paragraphs, since optimum value of parameters for error resilience tools can vary widely dependent on the picture conditions, there is no justification for the current tentative parameters. Therefore they are replaced with description of each tool and the recommended codec operation to utilize the tools.

Clauses affected: 7.3

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM 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

<--------- double-click here for help and instructions on how to create a CR.

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]~~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~~ the 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]~~QCIF for Level 1 ~~and [CIF] for Levels 2 and 3~~ should be used ~~while other sizes 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.~~Resync Marker is a tool which increases the opportunities for the decoder to resynchronize with the bitstream and after loss of synchronization due to errors in the bitstream, thus enabling normal decoder operation to continue. The encoder should insert Resync Marker in the bitstream, in order to enable the decoder to search for the Resync Marker in addition to the Start Code.

~~At least [1] Video Packet in one frame should include~~ Header Extension Code (HEC) enables independent decoding of each video packet. One or more than one video packet in a VOP should have HEC in order for ~~The~~ the decoder ~~should~~ to utilize information derived from ~~the Header Extension Code~~HEC, to avoid ~~total~~ discarding a whole ~~of the~~ VOP when the VOP header could not be received.

Data Partitioning is a tool that separates the information within a video packet to improve the degree of error localization and concealment~~syntax should be used by decoders to detect errors and localize their effects~~. When the decoder detect errors in a video packet, ~~The~~ the decoder ~~should~~ may not discard whole ~~Video Packets with errors when~~the packet if the motion information or the I-VOP DC coefficients are decoded correctly. ~~, but~~The decoder may reconstruct the corresponding part of the picture ~~using~~ utilizing the above motion information or DC coefficients. The encoder should use Data Partitioning syntax in order to enable the decoder the above operation.

Reversible Variable Length Code (RVLC) ~~should be used~~is a tool which reduce the number of discarded bits. RVLC decoding operation ~~should be made~~ as described in section E.1.4 of Annex E in [11] may be performed. The encoder should utilize RVLC to enable the decoder to perform such operation.

In addition to these tools~~To prevent extended propagation of degraded video~~, Intra Refresh should be ~~used~~inserted in order to prevent inter-frame propagation of errors. ~~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.

3GPP TSG-S4 meeting #8
Kioto, Japan, 06-10 Dec 1999

Document* *S4-99513

3G CHANGE REQUEST

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26.911 **CR** **004** Current Version: 3.1.0

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

For submision to TSG SA#6 *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-SA WG4 Codec **Date:** 16-Dec-1999

Subject: Error resilience improvements to using video in 3G-324M.

3G Work item: Codec(s) for low bit-rate multimedia telephony (S4 WI 2)

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	[ ]
C	Functional modification of feature	[X]
D	Editorial modification	[ ]

Reason for change: The change enables the use of GFID field for picture header recovery and improves error resilience of H.263 in 3G-324M. The change also clarifies the opening of video channels for MPEG-4.

Clauses affected: 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: There are other non-conflicting CRs coming for Section 7.3. The change to 7.3 proposed in this CR can be placed anywhere in this section, for example at the end.


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<--------- double-click here for help and instructions on how to create a CR.

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. 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. The main feature of each annex is also mentioned:

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

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

H.263 encoders in 3G-324M terminals should respond to all videoFastUpdate commands received via the H.245 control channel (i.e., videoFastUpdatePicture, videoFastUpdateGOB, and videoFastUpdateMB presented in section 7.11.5 of [2] Version 3). Using this feedback information to make a focused picture update can significantly improve the error performance of the codec. 3G-324M decoders are correspondingly recommended to transmit videoFastUpdate commands when the received picture is detected to be significantly corrupted due to transmission errors.

It is recommended that H.263 decoders take advantage of the GOB and slice header Group Frame ID (GFID) field in recovering corrupted picture header data (see Sections 5.2 and K.2 of H.263 recommendation version 2). For this purpose it is recommended that H.263 encoders should not use the Rounding Type (RTYPE) bit of the extended picture header as described in Section 5.1.4.3 of [1]. The RTYPE bit should always be set to 0 since it otherwise effectively prevents the use of the GFID field for picture header recovery.

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.

When an incoming bi-directional openLogicalChannel request has unsuitable reverse parameters for the local encoder, e.g., unsuitable MPEG-4 decoderConfigurationInformation, the terminal should reject the request. The cause field of openLogicalChannelReject should be set to value unsuitableReverseChannelParameters.A new openLogicalChannel request should be sent to the other end, now using the forward channel parameters of the rejected request as reverse channel parameters, and specifying new preferred forward channel parameters.

All MPEG-4 encoders should accept and respond to H.245 videoTemporalSpatialTradeOff commands. Support for temporal-spatial trade-off cannot be signaled for MPEG-4 encoders, but the encoders should provide that support by default. MPEG-4 decoders are encouraged to utilize the videoTemporalSpatialTradeOff command. The specific response to the TemporalSpatialTradeOff command by MPEG-4 encoders is not defined and it is up to the implementation to decide how to respond to the command.

8 Audio Codec