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OF ITU

H.263

Annex X

(03/2004)

SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Coding of moving video

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Video coding for low bit rate communication

Annex X: Profiles and levels definition

ITU-T Recommendation H.263 – Annex X

ITU-T H-SERIES RECOMMENDATIONS

AUDIOVISUAL AND MULTIMEDIA SYSTEMS

CHARACTERISTICS OF VISUAL TELEPHONE SYSTEMS	H.100–H.199
INFRASTRUCTURE OF AUDIOVISUAL SERVICES	
General	H.200–H.219
Transmission multiplexing and synchronization	H.220–H.229
Systems aspects	H.230–H.239
Communication procedures	H.240–H.259
Coding of moving video	**H.260–H.279**
Related systems aspects	H.280–H.299
Systems and terminal equipment for audiovisual services	H.300–H.349
Directory services architecture for audiovisual and multimedia services	H.350–H.359
Quality of service architecture for audiovisual and multimedia services	H.360–H.369
Supplementary services for multimedia	H.450–H.499
MOBILITY AND COLLABORATION PROCEDURES	
Overview of Mobility and Collaboration, definitions, protocols and procedures	H.500–H.509
Mobility for H-Series multimedia systems and services	H.510–H.519
Mobile multimedia collaboration applications and services	H.520–H.529
Security for mobile multimedia systems and services	H.530–H.539
Security for mobile multimedia collaboration applications and services	H.540–H.549
Mobility interworking procedures	H.550–H.559
Mobile multimedia collaboration inter-working procedures	H.560–H.569
BROADBAND AND TRIPLE-PLAY MULTIMEDIA SERVICES	
Broadband multimedia services over VDSL	H.610–H.619

For further details, please refer to the list of ITU-T Recommendations.

ITU-T Recommendation H.263

Video coding for low bit rate communication

Annex X

Profiles and levels definition

Summary

This annex contains a list of preferred feature combinations, which are structured into "profiles" of support. It also defines some groupings of maximum performance parameters as "levels" of support for these profiles. This annex adds a new level (denoted level 45) to provide a conformance point with relatively low resolution but with higher bit rate support at that resolution than what was provided in the previously-defined levels. The new level also provides the capability to support low-resolution custom picture formats and custom picture clock frequencies.

Source

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FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure e.g. interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU had received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

ITU-T Recommendation H.263

Video coding for low bit rate communication

Annex X

Profiles and levels definition

X.1 Scope

With the variety of optional modes available in this Recommendation, it is crucial that several preferred mode combinations for operation be defined, so that option-enhanced terminals will have a high probability of connecting to each other using some syntax better than the "baseline". This annex contains a list of preferred feature combinations, which are structured into "profiles" of support. It also defines some groupings of maximum performance parameters as "levels" of support for these profiles. The primary objectives of this annex are:

1) to provide a simple means of describing or negotiating the capabilities of a decoder (by specifying profile and level parameters);
2) to encourage common enhancement features to be supported in decoders for achieving maximal interoperability; and
3) to describe feature sets chosen as particularly appropriate for addressing certain key applications.

The profiles and levels are defined in the following clauses and in Tables X.1 and X.2. The minimum picture interval as specified in Table X.2 is the minimum difference in time between the decoding of consecutive pictures in the bitstream. Support of any level other than level 45 implies support of all lower levels. Support of level 45 implies support of level 10.

X.2 Profiles of preferred mode support

The profiles of support are defined by the set of features supported in the decoder for each profile. Decoder support for a given profile implies support for all valid subset combinations of the constituent modes of that profile. This requirement exists so that the limitations placed upon an encoder's choice of mode combinations are minimized. This is in keeping with the primary objective of this annex, which is to describe which optional modes should be supported at the decoder to address key applications, rather than to enforce a particular small set of mode combinations upon the encoder.

X.2.1 The Baseline Profile (Profile 0)

The Baseline Profile, designated as Profile 0, is defined herein to provide a profile designation for the minimal "baseline" capability of this Recommendation. "Baseline" refers to the syntax of this Recommendation with no optional modes of operation. This profile of support is composed of only the baseline design.

X.2.2 H.320 Coding Efficiency Version 2 Backward-Compatibility Profile (Profile 1)

The H.320 Coding Efficiency Version 2 Backward Compatibility Profile, designated as Profile 1, is defined herein to provide compatibility with a feature set adopted into the H.242 capability exchange mechanism for use by H.320 circuit-switched terminal systems. It provides basic enhanced coding efficiency and simple enhanced functionality within the feature set available in the second version of this Recommendation (which did not include Annexes U, V and W). This profile of support is composed of the baseline design plus the following modes:

1) **Advanced INTRA Coding (Annex I)** – Use of this mode improves the coding efficiency for INTRA macroblocks (whether within INTRA pictures or predictively-coded pictures). The additional computational requirements of this mode are minimal at both the encoder and decoder (as low as a maximum of 8 additions/subtractions per 8 × 8 block in the decoding process plus the use of a different but very similar VLC table in order to obtain a significant improvement in coding efficiency). For these reasons, Advanced INTRA Coding is included in this basic package of support.

2) **Deblocking Filter (Annex J)** – Because of the significant subjective quality improvement that may be realized with a deblocking filter, these filters are widely in use as a method of post-processing in video communication terminals. Annex J represents the preferred mode of operation for a deblocking filter because it places the filter within the coding loop. This placement eases the implementation of the filter (by reducing the required memory) and somewhat improves the coding performance over a post-processing implementation. As with the Advanced Prediction mode, this mode also includes the four-motion-vector-per-macroblock feature and picture boundary extrapolation for motion compensation, both of which can further improve coding efficiency. The computational requirements of the deblocking filter are several hundred operations per coded macroblock, but memory accesses and computational dependencies are uncomplicated. This last point is what makes the Deblocking Filter preferable to Advanced Prediction for some implementations. Also, the benefits of Advanced Prediction are not as substantial when the Deblocking Filter is used as well. Thus, the Deblocking Filter is included in this basic package of support.

3) **Full-Picture Freeze Supplemental Enhancement Information (Annex L, clause L.4)** – The full-picture freeze is very simple to implement, requiring only that the decoder be able to stop the transfer of new pictures from its output buffer to the video display. This capability is useful for preventing the display of low-fidelity pictures while the encoder is building up a higher fidelity picture.

4) **Modified Quantization (Annex T)** – This mode includes an extended DCT coefficient range, modified DQUANT syntax, and a modified step size for chrominance. The first two features allow for more flexibility at the encoder and may actually decrease the encoder's computational load (by eliminating the need re-encode macroblocks when coefficient level saturation occurs). The third feature noticeably improves chrominance fidelity, typically with little added bit-rate cost and with virtually no increase in computation. At the decoder, the only significant added computational burden is the ability to parse some new bitstream symbols.

X.2.3 Version 1 Backward-Compatibility Profile (Profile 2)

The Version 1 Backward-Compatibility Profile, designated as Profile 2, is defined herein to provide enhanced coding efficiency performance within the feature set available in the first version of ITU-T Rec. H.263 (which did not include Supplemental Enhancement Information or any of the optional features which use PLUSPTYPE). This profile of support is composed of the baseline design plus the following single mode:

1) **Advanced Prediction (Annex F) –** From a coding efficiency standpoint, this mode is the most important of the modes available in the first version (Version 1) of this Recommendation. It includes overlapped block motion compensation, the four-motion-vector-per-macroblock feature, and it allows for motion vectors to point outside of the picture boundaries. The use of Advanced Prediction results in significant improvements in both subjective and objective performance. It does, however, require an appreciable increase in computation and introduces complicating data dependencies in the order of processing at the decoder. However, since implementations of this Recommendation that were designed prior to the adoption of the other modes in this list might have implemented Advanced Prediction by itself, Advanced Prediction-only operation is recommended for maximal quality with backward compatibility to version 1 decoders.

X.2.4 Version 2 Interactive and Streaming Wireless Profile (Profile 3)

The Version 2 Interactive and Streaming Wireless Profile, designated as Profile 3, is defined herein to provide enhanced coding efficiency performance and enhanced error resilience for delivery to wireless devices within the feature set available in the second version of this Recommendation (which did not include Annexes U, V, and W). This profile of support is composed of the baseline design plus the following modes:

1) **Advanced INTRA Coding (Annex I) –** See X.2.2 item 1.

2) **Deblocking Filter (Annex J) –** See X.2.2 item 2.

3) **Slice Structured Mode (Annex K) –** The Slice Structured mode is included here due to its enhanced ability to provide resynchronization points within the video bitstream for recovery from erroneous or lost data. Support for the Arbitrary Slice Ordering (ASO) and Rectangular Slice (RS) submodes of the Slice Structured mode are not included in this profile, in order to limit the complexity requirements of the decoder. The additional computational burden imposed by the Slice Structured mode is minimal, limited primarily to bitstream generation and parsing.

4) **Modified Quantization (Annex T) –** See X.2.2 item 4.

X.2.5 Version 3 Interactive and Streaming Wireless Profile (Profile 4)

The Version 3 Interactive and Streaming Wireless Profile, designated as Profile 4, is defined herein to provide enhanced coding efficiency performance and enhanced error resilience for delivery to wireless devices, while taking advantage of the enhanced features of the third version of this Recommendation. This profile of support is composed of the baseline design, plus the following additional features as follows:

1) **Profile 3 –** This feature set provides several enhancements useful for support of wireless video transmission.

2) **Data Partitioned Slice Mode (Annex V) –** This feature enhances error resilience performance by separating motion vector data from DCT coefficient data within slices, and protects the motion vector information (the most important part of the detailed macroblock data) by using reversible variable-length coding. Support of the Arbitrary Slice Ordering (ASO) and Rectangular Slice (RS) submodes are not included in this profile, in order to limit the complexity requirements of the decoder.

3) **Previous Picture Header Repetition Supplemental Enhancement Information (Annex W, clause W.6.3.8)** – This feature allows the decoder to receive and recover the header information from a previous picture in case of data loss or corruption.

X.2.6 Conversational High Compression Profile (Profile 5)

The Conversational High Compression Profile, designated as Profile 5, is defined herein to provide enhanced coding efficiency performance without adding the delay associated with the use of B pictures and without adding error resilience features. This profile of support is composed of the baseline design, plus the following additional features as follows:

1) **Profile 1** – This feature set provides several enhancements useful for enhanced coding efficiency.

2) **Profile 2** – This profile adds the Advanced Prediction mode (Annex F), which provides a further enhancement of coding efficiency performance and backward-compatibility with implementations of the first version of this Recommendation.

3) **Unrestricted Motion Vectors with UUI = "1" (Annex D)** – Annex D has two primary features:

   a) picture boundary extrapolation; and

   b) longer motion vector support.

   The first of these features is already supported by the inclusion of Annex J in Profile 1. The longer motion vector support can provide a significant improvement in coding efficiency, especially for large picture sizes, rapid motion, camera movement, and low picture rates. When used with PLUSPTYPE present, this mode also allows for longer motion vector differences, which can significantly simplify encoder operation. The longer motion vectors do present a potential problem for the decoder in terms of memory access, but picture-size-dependent limits on the maximum motion vector size prevent this problem from becoming an appreciable obstacle to implementation.

4) **Enhanced Reference Picture Selection (Annex U)** – This mode adds a significant gain in compression efficiency performance due to the ability to use multiple prior pictures as reference data for macroblock-level prediction of the subsequent pictures. The Sub-Picture Removal submode (Annex U, clause U.4.3) of the Enhanced Reference Picture Selection mode is not included in Profile 5.

X.2.7 Conversational Internet Profile (Profile 6)

The Conversational Internet Profile, designated as Profile 6, is defined herein to provide enhanced coding efficiency performance without adding the delay associated with the use of B pictures, but adding some error resilience suitable for use on Internet Protocol (IP) networks (which use packet-based data protocols with relatively large packets and which exhibit data losses rather than data corruption). This profile of support is composed of the baseline design, plus the following additional features as follows:

1) **Profile 5** – This feature set provides several enhancements useful for enhanced coding efficiency.

2) **Slice Structured mode (Annex K) with Arbitrary Slice Ordering (ASO) submode** – The Slice Structured mode is included here due to its enhanced ability to provide resynchronization points within the video bitstream for recovery from lost data packets. The Arbitrary Slice Ordering (ASO) submode of the Slice Structured mode is also included in order to allow for interleaved packetization for motion-compensated error concealment and for out-of-sequence data reception. Support for the Rectangular Slice (RS) submode of the Slice Structured mode is not included in this profile, in order to limit the complexity

requirements of the decoder. The additional computational burden imposed by the Slice Structured mode is minimal, limited primarily to bitstream generation and parsing.

X.2.8 Conversational Interlace Profile (Profile 7)

The Conversational Interlace Profile, designated as Profile 7, is defined herein to provide enhanced coding efficiency performance for low-delay applications, plus support of interlaced video sources. This profile of support is composed of the baseline design, plus the following additional features as follows:

1) **Profile 5 –** This feature set provides several enhancements useful for enhancing coding efficiency without adding delay.

2) **Interlaced Field Indications For 240-line and 288-line Pictures (Annex W, clause W.6.3.11) –** This feature allows video to be sent in an interlaced source picture format for compatibility with existing camera designs.

X.2.9 High Latency Profile (Profile 8)

The High Latency Profile, designated as Profile 8, is defined herein to provide enhanced coding efficiency performance for applications without critical delay constraints. This profile of support is composed of the baseline design, plus the following additional features as follows:

1) **Profile 6 –** This feature set provides several enhancements useful for enhanced coding efficiency and robustness to data losses.

2) **Reference Picture Resampling (Implicit Factor-of-4 Mode Only) (Annex P, clause P.5) –** The implicit factor-of-4 mode of Reference Picture Resampling allows for automatic reference picture resampling only when the size of the new frame is changed, as indicated in the picture header. No bitstream overhead is required for this mode of operation. Predictive dynamic resolution changes allow an encoder to make intelligent trade-offs between temporal and spatial resolution. Furthermore, this simplest mode of operation for Annex P (factor-of-4 upsampling or downsampling only) adds only a modest amount of computational complexity to both the encoder or decoder, since the factor-of-4 case uses a simple fixed FIR filter (requiring roughly 4 operations per pixel, at most).

3) **B Pictures (Temporal Scalability, Annex O, clause O.1.1) –** This feature consists of B pictures, which are pictures allowing bidirectional temporal prediction. The addition of B pictures enhances coding efficiency performance, but at some cost in added processing power and encoding and decoding delay. The two-picture backward prediction submode for B pictures in Enhanced Reference Picture Selection mode (Annex U, clause U.3.1.5.5) is not supported in Profile 8.

X.3 Picture formats and picture clock frequencies

To ensure a high quality level of interoperability, encoders and decoders supporting a large standard picture format (QCIF, CIF, 4CIF, 16CIF) should support all smaller standard picture formats. This is a requirement of all decoders conforming to the profiles and levels defined in this annex. (As specified elsewhere in this Recommendation, decoders shall support sub-QCIF and QCIF, and encoders shall support sub-QCIF or QCIF.) For example, a decoder conforming to a profile and level defined in this annex which is capable of decoding 4CIF pictures shall also support the decoding of CIF pictures.

Decoders should be capable of operation with a smaller picture format at maximum picture rates no lower than the maximum picture rate for which it is capable of operation with a larger standard picture format. This is a requirement of all decoders conforming to the profiles and levels defined in this annex. For example, a decoder conforming to a profile and level defined in this annex which is

capable of decoding 4CIF pictures at 25 pictures per second shall also be able to decode CIF, QCIF and SQCIF pictures at least at 25 pictures per second.

Encoders and decoders supporting custom picture formats and/or custom picture clock frequencies are recommended to follow the rules defined in this paragraph. These rules are requirements of all decoders conforming to the profiles and levels defined in this annex:

1) A decoder for any profile and level defined herein that supports a maximum picture format shall support all standard picture formats smaller or equal in both height and width than those of the maximum supported picture format. For example, a decoder supporting a custom picture format of 720 × 288 shall support CIF, QCIF and sub-QCIF picture decoding.

2) A decoder for any profile and level defined herein that supports custom picture formats shall support all standard or custom picture formats having both height and width smaller than or equal to those of the maximum supported picture format.

3) A decoder for any profile and level defined herein that supports a minimum picture interval with the standard picture clock frequency of (30 000)/1001 units per second shall support the same or smaller minimum picture interval for all supported picture formats having both height and width smaller than or equal to those of the maximum picture format at which the minimum picture interval is specified.

4) A decoder for any profile and level defined herein that supports a minimum picture interval and supports custom picture clock frequencies shall support the use of any picture clock frequency with the same or larger picture interval for all supported picture formats having both height and width smaller than or equal to those of the maximum picture format at which the minimum picture interval is specified.

X.4 Levels of performance capability

~~Seven~~ Eight levels of performance capability are defined for decoder implementation. The Hypothetical Reference Decoder has the minimal size specified in Table X.1 for all levels of Profiles 0 through 4. In Profiles 5 though 8 the Hypothetical Reference Decoder has an increased size and Enhanced Reference Picture Selection is supported with multiple reference pictures. Table X.2 defines the detailed performance parameters of each of these levels:

1) **Level 10** – Support of QCIF and sub-QCIF resolution decoding, capable of operation with a bit rate up to 64 000 bits per second with a picture decoding rate up to (15 000)/1001 pictures per second.

2) **Level 20** – Support of CIF, QCIF and sub-QCIF resolution decoding, capable of operation with a bit rate up to 2·(64 000) = 128 000 bits per second with a picture decoding rate up to (15 000)/1001 pictures per second for CIF pictures and (30 000)/1001 pictures per second for QCIF and sub-QCIF pictures.

3) **Level 30** – Support of CIF, QCIF and sub-QCIF resolution decoding, capable of operation with a bit rate up to 6·(64 000) = 384 000 bits per second with a picture decoding rate up to (30 000)/1001 pictures per second.

4) **Level 40** – Support of CIF, QCIF and sub-QCIF resolution decoding, capable of operation with a bit rate up to 32·(64 000) = 2 048 000 bits per second with a picture decoding rate up to (30 000)/1001 pictures per second.

4.5) **Level 45** – Support of QCIF and sub-QCIF resolution decoding, capable of operation with a bit rate up to 2·(64 000) = 128 000 bits per second with a picture decoding rate up to (15 000)/1001 pictures per second. Additionally, in profiles other than profiles 0 and 2, support of custom picture formats of size QCIF and smaller.

5) **Level 50** – Support of custom and standard picture formats of size CIF and smaller, capable of operation with a bit rate up to 64·(64 000) = 4 096 000 bits per second with a picture decoding rate up to 50 pictures per second for CIF or smaller picture formats and up to (60 000)/1001 pictures per second for 352 × 240 and smaller picture formats.

6) **Level 60** – Support of custom and standard picture formats of size 720 × 288 and smaller, capable of operation with a bit rate up to 128·(64 000) = 8 192 000 bits per second with a picture decoding rate up to 50 pictures per second for 720 × 288 or smaller picture formats and up to (60 000)/1001 pictures per second for 720 × 240 and smaller picture formats.

7) **Level 70** – Support of custom and standard picture formats of size 720 × 576 and smaller, capable of operation with a bit rate up to 256·(64 000) = 16 384 000 bits per second with a picture decoding rate up to 50 pictures per second for 720 × 576 or smaller picture formats and up to (60 000)/1001 pictures per second for 720 × 480 and smaller picture formats.

The bit rate at which a particular profile and level are used in a system shall never exceed that specified in this annex. However, particular systems may include other means to signal further limits on the bit rate. Other aspects of profile and level capabilities may also be subject to additional capability restrictions when used in particular systems, but the capabilities required for decoding any bitstream for a particular profile and level defined herein shall never exceed those specified in this annex.

Table X.1/H.263 – Summary of profiles

Annex/clause below for profile listed at the right	0	1	2	3	4	5	6	7	8
5.1.5: *Custom Picture Format (CPFMT)*	L	L	L	L	L	L	L	L	L
5.1.7: *Custom Picture Clock Frequency Code (CPCFC)*	L	L	L	L	L	L	L	L	L
C: *Continuous Presence Multipoint and Video Mux*									
D.1: *Motion vectors over picture boundaries*		X	X	X	X	X	X	X	X
D.2 with UUI = '1' or UUI not present: *Extension of the motion vector range*						X	X	X	X
D.2 with UUI = '01': *Unlimited extension of the motion vector range*									
E: *Syntax-based Arithmetic Coding*									
F.2: *Four motion vectors per macroblock*		X	X	X	X	X	X	X	X
F.3: *Overlapped block motion compensation*			X			X	X	X	X
G: *PB-Frames*									
H: *Forward Error Correction (use may be imposed at system level as in ITU-T H.320)*									
I: *Advanced Intra Coding*		X		X	X	X	X	X	X
J: *Deblocking Filter*		X		X	X	X	X	X	X
K without submodes: *Slice Structured Coding – Without submodes*				X	X		X		X
K with ASO: *Slice Structured Coding – With Arbitrary Slice Ordering submode*							X		X
K with RS: *Slice Structured Coding – With Rectangular Slice submode*									
L.4: *Supplemental Enhancement Full picture freeze*		X				X	X	X	X

Table X.1/H.263 – Summary of profiles

Annex/clause below for profile listed at the right	0	1	2	3	4	5	6	7	8
L: *Supplemental Enhancement – Other SEI features*									
M: *Improved PB-Frames*									
N: *Reference Picture Selection (and submodes)*									
O.1.1 Temporal (B pictures): *Temporal, SNR, and Spatial Scalability – B pictures for Temporal Scalability*									X
O SNR and Spatial: *Temporal, SNR, and Spatial Scalability – EI and EP pictures for SNR and Spatial Scalability*									
P.5: *Reference Picture Resampling – Implicit Factor of Four*									X
P: *Reference Picture Resampling – More General Resampling*									
Q: *Reduced Resolution Update*									
R: *Independent Segment Decoding*									
S: *Alternative Inter VLC*									
T: *Modified Quantization*		X		X	X	X	X	X	X
U without submodes: *Enhanced Reference Picture Selection – Without submodes*						X	X	X	X
U with SPR: *Enhanced Reference Picture Selection – With Sub-Picture Removal submode*									
U with BTPSM: *Enhanced Reference Picture Selection – With B-Picture Two-Picture submode*									
V: *Data Partitioned Slices*					X				
W.6.3.8: *Additional SEI Specification – Prior Picture Header Repetition*					X				
W.6.3.11: *Additional SEI Specification – Interlaced Field Indications*								X	
W: *Additional SEI Specification – Other SEI features*									
"X" indicates that support of a feature is part of a profile. "L" indicates that the inclusion of a feature depends on the level within the profile.									

Table X.2/H.263 – Levels of operation

Parameter below for level listed at the right	10	20	30	40	45	50	60	70
Max picture format	QCIF (176 × 144)	CIF (352 × 288)	CIF (352 × 288)	CIF (352 × 288)	QCIF (176 × 144) support of CPFMT in profiles other than 0 and 2	CIF (352 × 288) support of CPFMT	CPFMT: 720 × 288 support of CPFMT	CPFMT: 720 × 576 support of CPFMT
Min picture interval	2002/(30 000) s	2002/(30 000) s for CIF 1001/(30 000) s for QCIF and sub-QCIF	1001/(30 000) s	1001/(30 000) s	2002/(30 000) s support of CPCFC in profiles other than 0 and 2	1/50 s at CIF or lower 1001/(60 000) s at 352 × 240 or smaller support of CPCFC	1/50 s at 720 × 288 or lower 1001/(60 000) s at 720 × 240 or smaller support of CPCFC	1/50 s at 720 × 576 or lower 1001/(60 000) s at 720 × 480 or smaller support of CPCFC
Max bit rate in 64 000 bits/s units	1	2	6	32	2	64	128	256
Max HRD B in 16 384 bit units	1: Prof. 5-8	2: Prof. 5-8	6: Prof. 5-8	32: Prof. 5-8	2: Prof. 5-8	64: Prof. 5-8	64: Prof. 5-8	256: Prof. 5-8
Max BPPmaxKb in 1024 bit units	128: Prof. 5-8	512: Prof. 5-8	512: Prof. 5-8	512: Prof. 5-8	128: Prof. 5-8	512: Prof. 5-8	1024: Prof. 5-8	1024: Prof. 5-8
Max ERPS reference pictures (Annex U)	5: Prof. 5-7 10: Prof. 8	5: Prof. 5-7 10: Prof. 8 multiplied by 2 for QCIF or sub-QCIF in Prof. 5-8	5: Prof. 5-7 10: Prof. 8 multiplied by 2 for QCIF or sub-QCIF in Prof. 5-8	5: Prof. 5-7 10: Prof. 8 multiplied by 2 for QCIF or sub-QCIF in Prof. 5-8	5: Prof. 5-7 10: Prof. 8	5: Prof. 5-7 10: Prof. 8 multiplied by 2 for QCIF or smaller in Prof. 5-8	5: Prof. 5-7 10: Prof. 8 multiplied by 2 for CIF or smaller, and by 4 for QCIF or smaller in Prof. 5-8	5: Prof. 5-7 10: Prof. 8 multiplied by 2 for CIF or smaller, and by 4 for QCIF or smaller in Prof. 5-8

NOTE 1 – In profiles for which a maximum number of reference picture buffers is not specified in Table X.2, no support for multiple reference picture buffering is required.

NOTE 2 – In profiles for which a maximum BPPmaxKb and HRD B are not specified in Table X.2, the minimum value specified in Table X.1 applies for the specified maximum bit rate and resolution.

X.5 Generic capability definitions for use with ITU-T Rec. H.245

Table X.3 defines a capability identifier for establishing H.263 capabilities for use in systems that use ITU-T Rec. H.245 for capability determination. These parameters shall only be included as **genericVideoCapability** within the **VideoCapability** structure and as **genericVideoMode** within the **VideoMode** structure of ITU-T Rec. H.245. Tables X.4 to X.14 define the associated capability parameters.

When included in Logical Channel Signalling or Mode Request, exactly one parameter with Parameter identifier value in the range zero to eight shall be present; that is, only one profile shall be specified.

Table X.3/H.263 – Capability identifier for H.263 capability

Capability name:	H.263
Capability class:	Video codec
Capability identifier type:	Standard
Capability identifier value:	itu-t (0) recommendation (0) h (8) 263 generic-capabilities (1) 0
MaxBitRate:	The maxBitRate field shall always be included.
NonCollapsingRaw:	This field shall not be included.
Transport:	This field shall not be included.

Table X.4/H.263 – The Baseline Profile (Profile 0) capability

Parameter name:	baselineProfile
Parameter description:	This is a collapsing GenericParameter. baselineProfile indicates the maximum level of support for the Baseline Profile when present in Capability Exchange, the maximum level to be transmitted when present in Logical Channel Signalling, and the desired level when present in Mode Request.
Parameter identifier value:	0
Parameter status:	Mandatory
Parameter type:	unsignedMin
Supersedes:	–

Table X.5/H.263 – H.320 Coding Efficiency Version 2 Backward-Compatibility Profile (Profile 1) capability

Parameter name:	h320Profile
Parameter description:	This is a collapsing GenericParameter. h320Profile indicates the maximum level of support for the H.320 Coding Efficiency Version 2 Backward-Compatibility Profile when present in Capability Exchange, the maximum level to be transmitted when present in Logical Channel Signalling, and the desired level when present in Mode Request.
Parameter identifier value:	1
Parameter status:	Optional
Parameter type:	unsignedMin
Supersedes:	–

Table X.6/H.263 – Version 1 Backward-Compatibility Profile (Profile 2) capability

Parameter name:	backwardCompatibleProfile
Parameter description:	This is a collapsing GenericParameter. backwardCompatibleProfile indicates the maximum level of support for the Version 1 Backward-Compatibility Profile when present in Capability Exchange, the maximum level to be transmitted when present in Logical Channel Signalling, and the desired level when present in Mode Request.
Parameter identifier value:	2
Parameter status:	Optional
Parameter type:	unsignedMin
Supersedes:	–

Table X.7/H.263 – Version 2 Interactive and Streaming Wireless Profile (Profile 3) capability

Parameter name:	v2WirelessProfile
Parameter description:	This is a collapsing GenericParameter. v2WirelessProfile indicates the maximum level of support for the Version 2 Interactive and Streaming Wireless Profile when present in Capability Exchange, the maximum level to be transmitted when present in Logical Channel Signalling, and the desired level when present in Mode Request.
Parameter identifier value:	3
Parameter status:	Optional
Parameter type:	unsignedMin
Supersedes:	–

Table X.8/H.263 – Version 3 Interactive and Streaming Wireless Profile (Profile 4) capability

Parameter name:	v3WirelessProfile
Parameter description:	This is a collapsing GenericParameter. v3WirelessProfile indicates the maximum level of support for the Version 3 Interactive and Streaming Wireless Profile when present in Capability Exchange, the maximum level to be transmitted when present in Logical Channel Signalling, and the desired level when present in Mode Request.
Parameter identifier value:	4
Parameter status:	Optional
Parameter type:	unsignedMin
Supersedes:	–

Table X.9/H.263 – Conversational High Compression Profile (Profile 5) capability

Parameter name:	conversationalProfile
Parameter description:	This is a collapsing GenericParameter. conversationalProfile indicates the maximum level of support for the Conversational High Compression Profile when present in Capability Exchange, the maximum level to be transmitted when present in Logical Channel Signalling, and the desired level when present in Mode Request.
Parameter identifier value:	5
Parameter status:	Optional
Parameter type:	unsignedMin
Supersedes:	–

Table X.10/H.263 – Conversational Internet Profile (Profile 6) capability

Parameter name:	conversationalInternetProfile
Parameter description:	This is a collapsing GenericParameter. conversationalInternetProfile indicates the maximum level of support for the Conversational Internet Profile when present in Capability Exchange, the maximum level to be transmitted when present in Logical Channel Signalling, and the desired level when present in Mode Request.
Parameter identifier value:	6
Parameter status:	Optional
Parameter type:	unsignedMin
Supersedes:	–

Table X.11/H.263 – Conversational Plus Interlace Profile (Profile 7) capability

Parameter name:	conversationalInterlaceProfile
Parameter description:	This is a collapsing GenericParameter. conversationalInterlaceProfile indicates the maximum level of support for the Conversational Plus Interlace Profile when present in Capability Exchange, the maximum level to be transmitted when present in Logical Channel Signalling, and the desired level when present in Mode Request.
Parameter identifier value:	7
Parameter status:	Optional
Parameter type:	unsignedMin
Supersedes:	–

Table X.12/H.263 – High Latency Profile (Profile 8) capability

Parameter name:	highLatencyProfile
Parameter description:	This is a collapsing GenericParameter. highLatencyProfile indicates the maximum level of support for the High Latency Profile when present in Capability Exchange, the maximum level to be transmitted when present in Logical Channel Signalling, and the desired level when present in Mode Request.
Parameter identifier value:	8
Parameter status:	Optional
Parameter type:	unsignedMin
Supersedes:	–

Table X.13/H.263 – Temporal Spatial Trade-Off capability

Parameter name:	temporalSpatialTradeOffCapability
Parameter description:	This is a collapsing GenericParameter. The presence of this parameter indicates that the encoder is able to vary its trade-off between temporal and spatial resolution as commanded by the remote terminal. It has no meaning when part of a receive capability.
Parameter identifier value:	9
Parameter status:	Optional
Parameter type:	logical
Supersedes:	–

Table X.14/H.263 – Video Bad Macroblocks capability

Parameter name:	videoBadMBsCap
Parameter description:	This is a collapsing GenericParameter. The presence of this parameter indicates the capability of an encoder to receive or a decoder to transmit the videoBadMBs command. When part of a transmit capability, it indicates the ability of the encoder to process videoBadMBs commands and to take appropriate corrective action toward recovery of video quality. When part of a receive capability, it indicates the ability of the decoder to send appropriate videoBadMBs indications.
Parameter identifier value:	10
Parameter status:	Optional
Parameter type:	logical
Supersedes:	–

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