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### STUDY GROUP 16 – REPORT R 6

SOURCE\*: Study Group 16 (Geneva meeting, 13-17 November 2000)

TITLE: Draft revised Implementor's Guide for the ITU-T H.320-Series (H.221, H.230, H.242) and H.324

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## **I Draft revised Implementor's Guide for the ITU-T H.320 Recommendation series (H.221, H.230, H.242)**

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### **Introduction**

This document is a draft version 2 Implementor's Guide for H.320 series recommendations. Changes are made against the 05/99 revision of H.221, H.230, and H.242.

Changes from the previous published version appear in the following sections:

1. 7.1.1 Table A.1/H.221 (Q11L03 + Q11M06)
2. 7.1.6 Section A.6/H.221 (Q11L03)
3. 7.1.7 Section A.7/H.221 (Q11M06)
4. 7.2.4 Section 5.2.2/H.242 (Q11L03)
5. 7.2.5 Section 5.2.4.4/H.242 (editor + Q. Gu) - text to facilitate additional memory negotiation when Annex U/H.263 is used without sub-picture removal.
6. 7.2.5 Section 5.2.4.4/H.242 (Q11M03/Q15K14 + editor + Rapporteur Q15) - new section 7.2.5.2 incorporating comments from Q15 (harmonization with H.245)
7. 7.2.6 New section 5.2.4.6/H.242 (Q11L03 + editor) - replaced pruning by sub-picture removal
8. 7.2.6 New section 5.2.4.6/H.242 (editor) - Annex W use of picture header repetition, with semantics inspired from H.245v7 (COM16-120)
9. 7.2.6 New section 5.2.4.6/H.242 (editor + M. Horowitz + Q. Gu) - added text related to total memory (mpuTotalByte1, 2, 3) at the end of the section and removed *<reserved>* place holder
10. 7.2.7 Options Indicator table and related text (editor) - removed this section because of work being done in Q15 on new profiles to be incorporated in a new Annex X/H.263 making current Appendix II/H.263 obsolete
11. 7.3.1 Table 1/H.230 (TD32/G)
12. 7.3.2 Table 2/H.230 (TD32/G + D36)
13. 7.3.3 Table 4/H.230 (TD32/G)
14. 7.3.4 Section 3.1/H.230 (TD32/G + Q11L04 + D36 + editor + Rapporteur Q15) – incorporated comments from Q15 on D36

## **Implementor's Guide for the ITU-T H.320 Recommendation series - Narrow-band visual telephone systems and terminal equipment**

### **Abstract**

This document is a compilation of reported defects identified with the 1997-2000 editions of the ITU-T H.320-series Recommendations. It is intended to be read in conjunction with the Recommendations to serve as an additional authoritative source of information for implementors. The changes, clarifications and corrections defined herein are expected to be included in future versions of affected H.320-series Recommendations.

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### **Document history**

<b>Revision</b>	<b>Date</b>	<b>Description</b>
1	7-18 February 2000	Initial version - Reviewed at the Q.11/16 Rapporteur meeting.
2	13-17 November 2000	Second version - Completed at the Q.11/16 Rapporteur meeting.

## 1. Introduction

This document is a compilation of reported defects identified with the 1997-2000 editions of the ITU-T H.320-series Recommendations. It is intended to be read in conjunction with the Recommendations to serve as an additional authoritative source of information for implementors. The changes, clarifications and corrections defined herein are expected to be included in future versions of affected H.320-series Recommendations.

The first version of the guide was produced following the October 1999 ITU-T Study Group 16/Question 11 Rapporteur meeting. Wide distribution of this document is expected and encouraged.

## 2. Scope

This guide resolves defects in the following categories:

- editorial errors;
- technical errors such as omissions or inconsistencies;
- ambiguities.

In addition, the Guide may include explanatory text found necessary as a result of interpretation difficulties apparent from the defect reports.

This Guide will not address proposed additions, deletions or modifications to the Recommendations that are not strictly related to implementation difficulties in the above categories. Proposals for new features should be made in the normal way through contributions to the ITU-T.

## 3. Policies for updating this document

This document is managed by the ITU-T Study Group 16 Question 11 Rapporteur's Group. It can be revised at any recognized Q.11/16 Rapporteur's Group meeting provided the proposed revisions are unanimously accepted by the members of the group. A revision history cataloguing the evolution of this document is included.

## 4. Defect resolution procedure

Upon discovering technical defects with any components of the H.320 Recommendations series, please provide a written description directly to the editors of the affected Recommendations with a copy to the Q.11/16 Rapporteur. The template for a defect report is enclosed. Contact information for these parties is included in this document. Return contact information should also be supplied so a dialogue can be established to resolve the matter and an appropriate reply to the defect report can be conveyed. This defect resolution process is open to anyone interested in H.320-series Recommendations. Formal membership in the ITU is not required to participate in this process.

## 5. References

This document refers to the following H.320-series Recommendations:

- ITU-T Recommendation H.221 (1999), *Frame Structure for a 64 to 1920 kbit/s channel in audiovisual teleservices.*

- ITU-T Recommendation H.230 (1999), *Frame-synchronous control and indication signals for audiovisual systems*
- ITU-T Recommendation H.242 (1999), *System for establishing communication between audiovisual terminals using digital channel up to 2 Mbit/s.*
- ITU-T Recommendation H.320 (1999), *Narrow-band visual telephone systems and terminal equipment.*
- ITU-T Recommendation T.35 (2000), *Procedure for the allocation of ITU-T defined codes for non-standard facilities*

## 6. Nomenclature

In addition to traditional revision marks, the following marks and symbols are used to indicate to the reader how changes to the text of a Recommendation should be applied:

<b>Symbol</b>	<b>Description</b>
<u><i>[Begin Correction]</i></u>	Identifies the start of revision marked text based on extractions from the published Recommendations affected by the correction being described.
<u><i>[End Correction]</i></u>	Identifies the end of revision marked text based on extractions from the published Recommendations affected by the correction being described.
...	Indicates that the portion of the Recommendation between the text appearing before and after this symbol has remained unaffected by the correction being described and has been omitted for brevity.
<b>--- SPECIAL INSTRUCTIONS ---</b> <i>{instructions}</i>	Indicates a set of special editing instructions to be followed.

## 7. Technical and editorial corrections

### 7.1 Technical and editorial corrections to ITU-T Recommendation H.221

#### 7.1.1 Table A.1/H.221 - BAS numerical values

##### 7.1.1.1 New BAS capability and command values

New values are being added in Table A1/H.221 to allow:

1. the use of the H.263 second additional capabilities byte as described in section 7.2.6
2. the support of G.722.1 in H.320 systems

In order to provide H.320/H.32x gateways the ability to constrain the bit rate allowed for use by the H.320 endpoint (for the purposes of enforcing bit rate symmetry, for example), capability codes for

each bit rate are necessary. In the case of G.722.1, this means separate capability codes for 24 kbit/s and 32 kbit/s.

Table 1/H.221 is being updated as follows:

---

*[Begin Correction]*

G.722.1-32 (000) [27]

G.722.1-24 (000) [28]

H.263(2000) (101) [26]

G.722.1-32 (cap) (110) [5]

G.722.1-24 (cap) (110) [6]

---

*[End Correction]*

### 7.1.1.2 Corrections to existing BAS capability and command values

In table A.1 of H.221, Restricted\_required [27] is incorrectly listed in the video, encryption, loop and other command (010) column, and restrict [22] is incorrectly listed in the audio and transfer rate capabilities column (100) (see associated change in 7.1.7).

The solution is to simply swap the command and with the cap to become:

(010)[27] Restrict

(100)[22] Restrict\_required

### 7.1.2 Section A.1/H.221 - Audio command values (000)

Section A.1/H.221 is being updated as follows:

---

*[Begin Correction]*

...

~~G.722.1Au-32k~~ G.722.1 7 kHz audio at 32 kbit/s ~~Reserved for audio at less than 48 kbit/s (for example, 32 kbit/s<sub>2</sub> in bits 1-4).~~

~~G.722.1Au-24k~~ G.722.1 7 kHz audio at 24 kbit/s ~~Reserved for audio at less than 48 kbit/s (for example, 24 kbit/s<sub>2</sub> in bits 1-3).~~

...

---

*[End Correction]*

### 7.1.3 Section A.5/H.221 - Audio capabilities (100)

Section A.5/H.221 is being updated as follows:

...

G.722-64 Capable of decoding audio to Recommendation G.722 (mode 1) and to Recommendation G.711.

G.722-48 Capable of decoding audio to Recommendation G.722 (modes 1, 2, 3) and to Recommendation G.711.

---

*[Begin Correction]*

G.722.1-32 (cap) Capable of decoding audio to Recommendation G.722.1 at 32 kbit/s and to Recommendation G.711.

G.722.1-24 (cap) Capable of decoding audio to Recommendation G.722.1 at 24 kbit/s and to Recommendation G.711.

...

---

*[End Correction]*

### 7.1.4 Bit Position for G.722.1 audio

This new section is being added at the end of section 4.2 (encoded audio streams) as follows:

---

*[Begin Correction]*

## 4.2 Encoded audio streams

...

### G.722.1 audio

G.722.1 provides two bit rates, 24 kbit/s or 32 kbit/s, and uses a frame size of 20ms. This results in either 480 bits (60 octets) or 640 bits (80 octets) in any one frame respectively. The bitrate may be changed at any 20 ms audio frame boundary. Alignment of H.221 audio mode changes with a submultiframe boundary is required by section 3.2/H.221.

Figure 1 & 2 illustrate the bit allocation of the two G.722.1 frames for a bitrate of 32 kbit/s and 24 kbit/s respectively.

H.221 Frame	Sub- Channel Bit #	Sub-Channel							
		1	2	3	4	5	6	7	8
First H.221 Frame	1	1	2	3	4				FAS
	2	5	6	7	8				FAS
	3	9	10	11	12				FAS
	4	13	14	15	16				FAS
	5	...	...	...	...				FAS
	6								FAS
	7								FAS
	8								FAS
	9								
	...								
	80	317	318	319	320				
Second H.221 Frame	81	321	322	323	324				FAS
	82	...	...	...	...				FAS
	83								FAS
	84								FAS
	85								FAS
	86								FAS
	87								FAS
	88								FAS
	89								
	...								
	160	637	638	639	640				

**Figure 1 - Bit positions for G.722.1 audio at 32 kbit/s**



H.221 Frame	Bit #	Sub-Channel							
		1	2	3	4	5	6	7	8
First H.221 Frame	1	1	2	3					FAS
	2	4	5	6					FAS
	3	7	8	9					FAS
	4	10	11	12					FAS
	5	...	...	...					FAS
	6								FAS
	7								FAS
	8								FAS
	9								
	...								
	80	218	219	220					
Second H.221 Frame	81	221	222	223					FAS
	82	224	225	226					FAS
	83	...	...	...					FAS
	84								FAS
	85								FAS
	86								FAS
	87								FAS
	88								FAS
	89								
	...								
	160	478	479	480					

**Figure 2 - Bit positions for G.722.1 audio at 24 kbit/s**

*[End Correction]*

### 7.1.5 Clarifications to include revised T.35 country codes

The revised Recommendation T.35 (2000) extends the number of possible country codes to allow more than 254 countries. This is being achieved by introducing a second byte for new countries being reached by an escape code in the first byte of “1111 1111” (0xFF). Countries defined in the first byte are listed in Annex A/T.35 and countries defined in the second byte are listed in Annex B/T.35.

T.35 country codes are used by NS-cap and NS-comm as described in section A.9 - Escape table values (111). In footnote 4, the following text should be added:

*[Begin Correction]*

---

<sup>4</sup> Country code consists of two bytes, the first being according to Recommendation T.35 Annex A. The second byte is assigned nationally, unless the first byte is 1111 1111, in which case the second byte shall contain the country code according to T.35 Annex B.~~and~~ The terminal manufacturer code consist of two bytes ~~are~~ assigned nationally.

*[End Correction]*

---

### 7.1.6 Changes to section A.6/H.221 – Video, MBE and encryption capabilities (101)

Explanatory text is being added to section A.6 to describe the new “H.263 (2000)” capability. Editorial corrections are made to the existing text to synchronize it with the values of table A.1/H.221.

*[Begin Correction]*

---

...

4/29.97 Can decode video, having a minimum picture interval of 4/29.97 seconds, to Recommendation H.261.

H.263(2000) Can accept <H.262/H.263> MBE with second additional H.263 capabilities as described in section 5.2.4.6/H.242.

~~Vid imp(R) Reserved for future improved recommended video algorithm.~~

Video-ISO/MPEG-1 Can decode video to ISO/IEC 11172-2 ("MPEG-1").

Esc-CF Capability to accept escape code (111) [0].

Encryp. Capable of handling signals on the ECS channel.

MBE-cap Can handle multiple-byte extensions messages in the BAS position, those beginning with codes in the range (111) [25-31], in addition to other values.

~~Esc-CF Capability to accept escape code (111) [0].~~

~~Encryp. Capable of handling signals on the ECS channel.~~

...

*[End Correction]*

---

### 7.1.7 Changes to section A.7/H.221 - Transfer-rate capabilities (100)

The text in section A.3 correctly describes the [restrict] command, but the text in section A.7 needs to be changed from [restrict] to [restrict\_required] (see associated change in 7.1.1.2). The text of section A.7 is corrected as follows:

*[Begin Correction]*

---

...

Restrict\_required Can work only at  $p \times 56$  kbit/s, rate-adapted to  $p \times 64$  kbit/s by moving the SC to bit position 7 and setting bit 8 to "one" in every channel or time-slot; a

constant "one", however, may be set in bit 8 if it is known by out-of-band signalling prior to the connection that the restriction exists; this code has the effect of forcing the remote terminal to work in the  $p \times 56$  kbit/s mode (see Annex B).

...

---

*[End Correction]*

## 7.2 Technical and editorial corrections to ITU-T Recommendation H.242

### 7.2.1 Table 5/H.242 - BAS capabilities that can be included in a valid capability set

Table 5/H.242 is being updated as follows:

---

*[Begin Correction]*

Audio	Absent or One or more values <sup>b)</sup> from A-law, m-law, G.722-48, G.722-64, G.728, G.723.1, G.729, <u>G.722.1-24</u> , <u>G.722.1-32</u>
-------	--

...

---

*[End Correction]*

b) See Appendix VII for interpretation of received audio capabilities.

### 7.2.2 Appendix 6 - Hierarchical capability BAS codes

Appendix 6 is being updated as follows:

---

*[Begin Correction]*

The following capability codes are hierarchically structured:

G.711 (A or  $\mu$  or both) < G.722-64 < G.722-48

G.711 (A or  $\mu$  or both) < G.728

G.711 (A or  $\mu$  or both) < G.723.1

G.711 (A or  $\mu$  or both) < G.729

G.711 (A or  $\mu$  or both) < G.722.1-24

G.711 (A or  $\mu$  or both) < G.722.1-32

...

---

*[End Correction]*

Note that, while they have not been included previously, G.723.1 and G.729 have been now added to the list for completeness.

### 7.2.3 Clarifications to include revised T.35 country codes

In Appendix III, two sections are affected by the extension of T.35 country codes (see details in section 7.1.5).

#### 7.2.3.1 Section III.2 - Subsequent capability exchange, including MBE capability message

Section III.2 is updated as follows:

---

*[Begin Correction]*

---

...

{M} Information will be M-bytes

{byte 1} Country code according to Recommendation T.35 Annex A

{byte 2} Country code assigned nationally, unless the first byte is 1111 1111, in which case this field shall contain the country code according to T.35 Annex B

{bytes 3, 4} Manufacturer code (Company XYZ)

**{bytes 5-M} Type identity**

...

---

*[End Correction]*

---

#### 7.2.3.2 Section III.3 - Mode switch to non-standard mode using MBE command

Section III.3 is updated as follows:

...

{N} Information will be N-bytes

---

*[Begin Correction]*

---

{byte 1} Country code according to Recommendation T.35 Annex A

{byte 2} Country code assigned nationally, unless the first byte is 1111 1111, in which case this field shall contain the country code according to T.35 Annex B

---

*[End Correction]*

---

{bytes 3, 4} Manufacturer code (Company XYZ)

{bytes 5-N} Type identity

...

#### 7.2.4 Changes to section 5.2.2/H.242 – H.262 and H.263 capabilities MBE message format

The extension codeword described in this section is extended with an additional 01111111 extension codeword to signal the new features of "H.263++" (H.263v3). These new features are described in Annex U, V, and W of H.263. Section 5.2.2/H.242 is being updated as follows:

[Begin Correction]

For H.262, one byte is needed to signal each capability for a particular image format with its associated parameters (see 5.2.3). H.263 capabilities are specified using a variable number of bytes depending on the features and options selected (see 5.2.4). The ordering of the bytes within the single MBE message is as follows:

- a. First byte B<sub>1</sub> is {highest standard format of H.263} then follow 0, 1 or 2 optional parameter bytes
- b. then {further standard formats of H.263 if needed (see 5.2.4) in descending order of resolution with any optional parameter bytes}
- c. THEN {HIGHEST FORMAT OF H.262}
- d. then {further formats of H.262 if needed (see 5.2.3) in descending order of resolution}
- e. then {extension codeword 01111111 if additional H.263 capabilities are to be specified}
- f. then {enhancement bytes for additional H.263 capabilities of the highest format of H.263}
- g. then {enhancement bytes for additional H.263 capabilities of further formats of H.263 if needed in descending order of resolution}
- h. then {extension codeword 01111111 if second additional H.263 capabilities are to be specified}
- i. then {enhancement bytes for second additional H.263 capabilities of the highest format of H.263}
- j. then {enhancement bytes for second additional H.263 capabilities of further formats of H.263 if needed in descending order of resolution}

As shown above, the H.263 capability bytes for a format are not contiguous. The H.263 capabilities specified for a format prior to the extension codeword 01111111 will be referred to as **initial** H.263 capabilities. The H.263 capabilities specified after the first extension codeword will be referred to as **additional** H.263 capabilities and the bytes used to describe them as **enhancement** bytes. The H.263 capabilities specified after the second extension codeword 01111111 will be referred to as **second additional** H.263 capabilities and the bytes used to describe them as **enhancement** bytes.

For future expansion of the H.262/H.263 capabilities the extension codeword 01111111 will be used as follows:-

A decoder shall interpret the extension codeword when encountered for the first time in the H.262/H.263 capabilities message to mean that the following bytes will contain additional H.263 capabilities.

A decoder shall interpret the extension codeword when encountered for the first time within the first byte of additional H.263 capabilities to mean that the following bytes will contain second additional H.263 capabilities.

However, if this extension codeword is encountered again within the first byte of second additional H.263 capabilities of a particular format, all of the data following the extension codeword until the end of this MBE message shall be ignored. The appearance of this code in an MBE message does not affect the meaning of any bytes **prior** to this code byte.

---

*[End Correction]*

## 7.2.5 Section 5.2.4.4/H.242 - Additional H.263 capabilities

### 7.2.5.1 Changes to the text associated with refSliceParameters

Text needs to be added to the paragraph describing the refSliceParameters byte to facilitate additional memory negotiation when Annex U/H.263 is used without sub-picture removal. Changes are being made as follows:

---

*[Begin Correction]*

...

The following refSliceParameters byte shall be present if either refPictureSelection (optionByte1 bit 8) is 1, or sliceStructuredMode (optionByte2 bit 2) is 1, or enhancedReferencePicSelect (secondAdditionalH.263CapabilitiesByte bit 1-2) is 10 or 11. Its structure is as follows:

1-3	4-6	7-8
videoBackChannel	additionalPictureMemory	sliceType

...

---

*[End Correction]*

### 7.2.5.2 Clarifying text for dynamicPictureResizingByFour

H.242 signaling requires that custom picture format dimensions (height and width) must both be divisible by 8. The derived resolutions might not have that property; in which case they could not be included in the capset. But there is no such restriction for reference picture resampling. Due to this constraint, many useful resolutions cannot be negotiated to use Reference resampling by a factor of 4. As a solution and to simplify dynamicPictureResizingByFour capability exchange, clarifying text is being added to the original text as described in sections 7.2.5.2.1 to 7.2.5.2.3.

#### 7.2.5.2.1 H.263 profiles (text located after OptionsIndicator table)

New text is being added to the original text as follows:

...

H.263 profiles – level 1, 2 and 3 consist of the H.263 options listed below. The Annexes in this paragraph are the Annexes of Recommendation H.263. H.263 profiles – level 1 consists of Advanced Intra Coding (Annex I), Deblocking Filter (Annex J), Supplemental Enhancement Information (Full Frame Freeze Only) (Annex L, Subclauses L.4) and Modified Quantization (Annex T). H.263 profiles – level 2 consists of Unrestricted Motion Vectors (With UUI = "1" Sufficient) (Annex D), Slice Structured Mode (all submodes) (Annex K) and Reference Picture Resampling (Implicit Factor-of-4 Mode only) (Annex P). H.263 profiles – level 3 consists of Advanced Prediction (Annex F), Improved PB-frames (Annex M), Independent Segment

Decoding (Annex R) and Alternate Inter VLC (Annex S). These levels are the same as those specified in Appendix II/H.263.

---

***[Begin Correction]***

---

Note that when the dynamicPictureResizingByFour capability is included in any particular profile, support for some “derived picture sizes” is implied, as described for the dynamicPictureResizingByFour capability.

---

***[End Correction]***

---

#### 7.2.5.2.2 OptionByte 1 (text located after optionByte1 table)

New text is being added to the original text as follows:

...

dynamicPictureResizingByFour, when 1, indicates the capability of an encoder or decoder to support the picture resizing-by-four (with clipping) submode of the implicit Reference Picture Resampling Mode (Annex P/H.263).

---

***[Begin Correction]***

---

The declaration of the capability dynamicPictureResizingByFour with a given picture size, referred to here as the native picture size, implies the support for up to two other picture sizes, referred to here as derived picture sizes. Defining the native picture size as having picture width W, and picture height H; the supported derived picture sizes shall have picture width W/2 and picture height H/2, and picture width W/4 and picture height H/4, subject to the following constraint. Each derived picture size shall be supported provided its picture width is not less than 128 and its picture height is not less than 96 (128 and 96 being the picture width and height of the SQCIF format). The derived picture sizes shall be supported with the same optional modes, MPI (Minimum Picture Interval) and clock frequency as supported with the native picture size.

---

***[End Correction]***

---

#### 7.2.5.2.3 OptionByte 3 (text located after optionByte3 table)

New text is being added to the original text as follows:

...

dynamicPictureResizingSixteenthPel, when 1, indicates the capability of an encoder or decoder to support resizing a reference picture to any supported width and height using the implicit Reference Picture Resampling mode [Annex P/H.263 (with clipping)].

---

***[Begin Correction]***

---

The supported picture sizes include all the declared picture sizes through capability exchange and those derived from dynamicPictureResizingByFour.

---

***[End Correction]***

---

If dynamicPictureResizingSixteenthPel is 1 then dynamicPictureResizingByFour shall be 1. If dynamicWarpingSixteenthPel is 1, then dynamicWarpingHalfPel, dynamicPictureResizingByFour, and dynamicPictureResizingSixteenthPel shall be supported.

*[Begin Correction]*

If dynamicPictureResizingByFour is supported, all the derived picture sizes from this capability shall also be considered supported.

*[End Correction]*

### 7.2.6 New section 5.2.4.6/H.242 – Second Additional H.263 capabilities

To support the new features described in Annex U, V, and W of H.263 in H.320 systems, a new section 5.2.4.6/H.242 is being added as follows:

*[Begin Correction]*

#### 5.2.4.6 Second Additional H.263 capabilities

The second additional H.263 capabilities are specified using a variable number of enhancement bytes from the bytes described in this subclause. The bytes shall be transmitted in the order described in this subclause.

The second additional H.263 capabilities and second extension codeword 01111111 shall not be transmitted unless the “H.263(2000)” capability has been previously received from the far-end terminal, indicating support of the second additional H.263 capabilities described in this subclause.

The leading H.263 enhancement byte – secondAdditionalH.263CapByte – shall be transmitted for all formats larger than or equal to the smallest format for which distinct H.263 second additional capabilities are declared. The secondAdditionalH.263CapByte is structured as shown in table x.42/H.242.

**Table x.42/H.242 – Second Additional H.263 Capabilities Byte**

Bit	Name	Value	Description
1-2	inherit/enhancedReferencePicSelect	00	Inherit second additional options from immediately larger format
		01	Not capable of using enhancedReferencePicSelect
		10	Capable of using enhancedReferencePicSelect without sub-picture removal
		11	Capable of using enhancedReferencePicSelect with sub-picture removal
3	Forbidden	0	Set to 0 to avoid emulation of extension codeword
4	dataPartitionedSlices	0	Not capable of using dataPartitionedSlices
		1	Capable of using dataPartitionedSlices
5	fixedPointIDCT0	0	Not capable of using FixedPointIDCT0
		1	Capable of using FixedPointIDCT0
6	interlacedFields	0	Not capable of using interlacedFields
		1	Capable of using interlacedFields
7	currentPictureHeaderRepetition	0	Not capable of using currentPictureHeaderRepetition
		1	Capable of using currentPictureHeaderRepetition



8	secondOptionExtByteFlag	0	secondOptionExtByte does not follow
		1	secondOptionExtByte follows

inherit/enhancedReferencePicSelect, when 00 indicates inheritance of the H.263 second additional options signaled for the immediately larger video format. In this case, the remainder of the Second Additional H.263 Capabilities Byte shall be set to 0.

inherit/enhancedReferencePicSelect, when 01 indicates that the decoder can not use the Enhanced Reference Picture Selection mode of H.263 Annex U.

inherit/enhancedReferencePicSelect, when 10 indicates the capability of the decoder to use the Enhanced Reference Picture Selection mode of H.263 Annex U without sub-picture removal. It also indicates the capability of an encoder to receive and respond to the three new messages: lostPicture, lostPartialPicture, and recoveryReferencePicture.

inherit/enhancedReferencePicSelect, when 11 indicates the capability of the decoder to use the Enhanced Reference Picture Selection mode of H.263 Annex U with sub-picture removal. In this case, mpuHorizMBs, mpuVertMBs, and mpuTotalNumber values shall follow the second additional H.263 capabilities byte or, if present, the second additional H.263 extensions capabilities byte, as specified respectively in tables x.44/H.242, x.45/H.242, x.46/H.242, x.47/H.242, and x.48/H.242. It also indicates the capability of an encoder to receive and respond to the three new messages: lostPicture, lostPartialPicture, and recoveryReferencePicture.

dataPartitionedSlices, when 1, indicates the capability of a decoder to support the Data Partitioned Slice mode defined in Annex V of Recommendation H.263. dataPartitionedSlices shall be 0 if slicesInOrder-NonRect and slicesInOrder-Rect and slicesNoOrder-NonRect and slicesNoOrder-Rect are all 0 in the same H263Options message.

fixedPointIDCT0, when 1, indicates the capability of a decoder to support Reference IDCT 0 defined in Annex W of Recommendation H.263.

interlacedFields, when 1, indicates the capability of a decoder to support interlaced field coding as defined in Annex W of Recommendation H.263.

currentPictureHeaderRepetition, when 1, indicates the capability of a decoder to support repetition of the current picture header as defined in Annex W of Recommendation H.263.

secondOptionExtByteFlag, when 1, indicates the presence of an extension byte immediately following the second additional H.263 capabilities byte, as specified in Table x.43/H.242.

**Table x.43/H.242 – Second Additional H.263 Extensions Capabilities Byte**

Bit	Name	Value	Description
1	previousPictureHeaderRepetition	0 1	Not capable of using previousPictureHeaderRepetition Capable of using previousPictureHeaderRepetition
2	nextPictureHeaderRepetition	0 1	Not capable of using nextPictureHeaderRepetition Capable of using nextPictureHeaderRepetition
3	Forbidden	0	Set to 0 to avoid emulation of extension codeword
4	pictureNumber	0 1	Not capable of using pictureNumber Capable of using pictureNumber
5	spareReferencePictures	0 1	Not capable of using spareReferencePictures Capable of using spareReferencePictures
6-8	Reserved	0	Reserved for future use

previousPictureHeaderRepetition, when 1, indicates the capability of a decoder to support repetition of the previous picture header as defined in Annex W of Recommendation H.263.

nextPictureHeaderRepetition, when 1, indicates the capability of a decoder to support repetition of the next picture header (with or without a reliable temporal reference indication) as defined in Annex W of Recommendation H.263.

currentPictureHeaderRepetition, previousPictureHeaderRepetition, and nextPictureHeaderRepetition, when 1 and when part of receiver capabilities, indicate that a decoder can recover from a picture header corruption or loss by replacing the corrupted or lost picture header with a picture header transmitted according to Annex W of Recommendation H.263.

pictureNumber, when 1, indicates the capability of a decoder to detect reference picture losses from transmitted picture numbers according to Annex W of Recommendation H.263. It also indicates the capability of an encoder to receive and respond to the three new messages: lostPicture, lostPartialPicture, and recoveryReferencePicture.

spareReferencePictures, when 1, indicates the capability of a decoder to use a spare reference picture if it lacks the actual reference picture as defined in Annex W of Recommendation H.263.

**Table x.44/H.242 - MPU horizontal size in macroblocks (16 luminance samples)**

Bit	Description
00000000	Forbidden
00000001 - 10000000	Valid mpuHorizMBs
10000001 - 11111111	Forbidden

mpuHorizMBs indicates the horizontal size, in units of 16 luminance samples, of the minimum picture unit for sub-picture removal using H.263 Annex U.

**Table x.45/H.242 - MPU vertical size in macroblocks (16 luminance samples)**

<b>Bit</b>	<b>Description</b>
00000000	Forbidden
00000001 - 01001000	Valid mpuVertMBs
01001001 - 11111111	Forbidden

mpuVertMBs indicates the vertical size, in units of 16 luminance samples, of the minimum picture unit for sub-picture removal using H.263 Annex U.

mpuTotalNumber indicates the total memory, in MPUs, available at the decoder for use in buffering reference frames when using the Enhanced Reference Picture Selection Mode of H.263 Annex U, including that memory which would be assumed for a normal decoder. mpuTotalNumber is transmitted using two or three bytes, mpuTotalByte1 and mpuTotalByte2 and optionally mpuTotalByte3 as specified respectively in tables x.47/H.242, x.48/H.242, and x.49/H.242.

mpuTotalNumber shall take a value between 1 and 65536. mpuTotalNumber is calculated by concatenating mpuTotalBits1, mpuTotalBits2 and mpuTotalBits3 if present, making a 14 or 28 bit word with mpuTotalBits1 as MSB.

**Table x.46/H.242 - mpuTotalByte1**

<b>Bit</b>	<b>Description</b>
1	thirdByteIndicator
2-8	mpuTotalBits1

thirdByteIndicator, when 1, indicates the presence of mpuTotalByte3 immediately following mpuTotalByte2. mpuTotalByte3 shall be present if mpuTotalNumber is larger than 16383.

**Table x.47/H.242 - mpuTotalByte2**

<b>Bit</b>	<b>Description</b>
1	Set to 0
2-8	mpuTotalBits2

**Table x.48/H.242 - mpuTotalByte3**

<b>Bit</b>	<b>Description</b>
1	Set to 0
2-8	mpuTotalBits3

mpuTotalByte3 is only present if thirdByteIndicator is 1.

---

*[End Correction]*

### 7.3 Technical and editorial corrections to ITU-T Recommendation H.230

To support a “videoBadMBs” C&I related to video in H.320 systems, a new BAS capability and command along with associated text need to be added to Recommendation H.230.

To support H.263 Annex U and Annex W, three new messages are introduced, and the associated text is added to the Recommendation H.230.

#### 7.3.1 Table 1/H.230

A new capability value is being added in Table 1/H.230 (by using a previously “reserved” value).

An editorial correction is being made by replacing the text “Reserved” by VSTRDENCLVL in value [21] (as defined in table 4/H.230 and in section 3.1.9). Table 1/H.230 is updated as follows:

*[Begin Correction]*

(000)	[21]	VSTRDENCLVL	X	X	X	X	3.1
	[24]	VBMBC	...	X	X	X	3.1
	[25]-[30]	Reserved for video-related symbols					

*[End Correction]*

#### 7.3.2 Table 2/H.230 - Values assigned to type identification bytes in MBE messages

Four new MBE messages are being added in Table 2/H.230 (by using a previously “reserved” value):

*[Begin Correction]*

0001 0010 <videoBadMBs>  
 0001 0011 <lostPicture>  
 0001 0100 <recoveryReferencePicture>  
 0001 0101 <lostPartialPicture>

*[End Correction]*

### 7.3.3 Table 4/H.230 - Occupancy of escape table reached from (111) [17] of Table A.1/H.221

A new capability value is being added in Table 4/H.230 (as already described in Table 1/H.230):

---

*[Begin Correction]*

(000) [24] VBMBC (cap)

---

*[End Correction]*

### 7.3.4 Section 3.1/H.230 - C&I related to video

The following new sections 3.1.19, 3.1.20, 3.1.21, 3.1.22, and 3.1.23 are inserted at the end of H.230 section 3.1:

---

*[Begin Correction]*

**3.1.19 video capability “videoBadMBsCap” (VBMBC):** When present, indicates the capability of a video encoder to process **videoBadMBs** commands and to take appropriate corrective action toward recovery of video quality.

**3.1.20 video command “videoBadMBs” - using MBE videoBadMBs:** The message has the form:

{startMBE/7/<videoBadMBs><firstMBByte1><firstMBByte2><numberOfMBsByte1><numberofMBsByte2><trByte1><trByte2>}

**videoBadMBs** commands the far-end video encoder to take corrective action when a set of MBs has not been properly received. The encoder shall use this information to take action toward recovery of video quality. Unlike **videoNotDecodedMBs**, the **videoBadMBs** command lacks any specific definition of how the decoder has treated the specified set of MBs. The encoder should respond to this command by ensuring that the specified set of macroblocks is not used for the prediction of video pictures subsequent to the encoder’s receipt of the command. The specific action to be taken by the encoder is not defined, but may include any appropriate remedial action, such as sending an INTRA frame.

This command shall not be transmitted by a video decoder if the corresponding far-end encoder has not indicated the **VBMBC** capability. This command shall only be used with video compression algorithms that define MBs, for example, H.261, H.262, and H.263. The MB numbering is done according to raster-scan order within the picture, with the upper left MB of the picture defined as macroblock number 1, and the MB number increasing first from left to right and then from top to bottom.

firstMBByte1 and firstMBByte2 together indicate the index number of first MB that has been erroneously received and numberOfMBsByte1 and numberOfMBsByte2 together indicate the total number of successive MBs that have been erroneously received. firstMBByte1 and numberOfMBsByte1 shall take values from 0-223. firstMBByte2 and numberOfMBsByte2 shall also take values from 0-223. The first MB received erroneously is given by  $224 * \text{firstMBByte1} + \text{firstMBByte2}$ . Similarly, total number of successive MBs that have been erroneously received is

given by  $224 * \text{numberOfMBsByte1} + \text{numberOfMBsByte2}$ . The decoder shall ensure that the first referenced and the total number of successive MBs are within the valid range of the video compression algorithm in use. The encoder should ignore the message if values outside the valid range are received.

The temporal reference of the picture containing erroneously received MBs is indicated by `trByte1` and `trByte2` which shall take values from 0-223. The temporal reference is given by  $224 * \text{trByte1} + \text{trByte2}$ . The decoder shall ensure that the temporal reference is valid for the video compression algorithm in use. The encoder should ignore the message if a value outside the valid range is received.

**3.1.21 video command "lostPicture" - using MBE lostPicture:** The message has the form:

{startMBE/3/<lostPicture><Byte1><Byte2>}, where the most significant bits of Byte1 and Byte2 must be set to 0 by the transmitter.

**lostPicture** message commands the far-end video encoder to take corrective action due to the loss or corruption of the indicated pictures. The message body contains two bytes. The two bytes together represent two parameters: `shortOrLongTermPictureIndication`, and `picNumberOrIndex`.

`shortOrLongTermPictureIndication` =  $(\text{Byte1} \gg 6) \& 0x1$ ;

`picNumberOrIndex` =  $((\text{Byte1} \& 0x7) \ll 7) | (\text{Byte2} \& 0x7F)$ ;

The first parameter indicates the lost picture is a short-term picture or long-term picture. If `shortOrLongTermPictureIndication` is 1, the lost picture is a short-term picture, and `picNumberOrIndex` represents the picture number of the lost picture. If `shortOrLongTermPictureIndication` is 0, the lost picture is a long-term picture, `picNumberOrIndex` represents the long-term picture index of the lost picture. An encoder capable of Annex U/H.263 (Enhanced Reference Picture Selection, with or without sub-picture removal) and/or Annex.W.6.3.12/H.263 (Picture Number) shall be capable of understanding this message and taking corrective action.

**3.1.22 video command "recoveryReferencePicture" - using MBE recoveryReferencePicture:**

The message has the form:

{startMBE/3/<recoveryReferencePicture><Byte1><Byte2>}, where the most significant bits of Byte1 and Byte2 must be set to 0 by the transmitter.

**recoveryReferencePicture** message commands the far-end encoder to use only the indicated pictures for prediction. The message body contains two Bytes, which together represent two parameters: `shortOrLongTermPictureIndication`, and `picNumberOrIndex`.

`shortOrLongTermPictureIndication` =  $(\text{Byte1} \gg 6) \& 0x1$ ;

`picNumberOrIndex` =  $((\text{Byte1} \& 0x7) \ll 7) | (\text{Byte2} \& 0x7F)$ ;

The first parameter indicates the requested picture is a short-term picture or long-term picture. If `shortOrLongTermPictureIndication` is 1, the request picture is a short-term picture, and

picNumberOrIndex represents the picture number of the requested picture. If shortOrLongTermPictureIndication is 0, the requested picture is a long-term picture, picNumberOrIndex represents the long-term picture index of the requested picture. An encoder capable of Annex U/H.263 (Enhanced Reference Picture Selection, with or without sub-picture removal) and/or Annex.W.6.3.12/H.263 (Picture Number) shall be capable of understanding this message and taking corrective action. It may be sent from a decoder that considers the indicated pictures to have been received and decoded correctly, and considers other (unspecified) pictures to have been corrupted by transmission.

**3.1.23 video command "lostPartialPicture" - using MBE lostPartialPicture:** The message has the form:

{startMBE/7/<lostPartialPicture><Byte1><Byte2><Byte3><Byte4><Byte5><Byte6>},  
where the most significant bits of Byte1, Byte2, Byte3, Byte4, Byte5, and Byte6 must be set to 0 by the transmitter.

**lostPartialPicture** commands the far-end video encoder to take corrective action when a set of MBs has not been properly received. It is the same as videoBadMBs except that the picture is indicated by either pictureNumber, a short term picture number, or longTermPictureIndex, a long term picture index. The message body contains 6 bytes and collectively represent four parameters: shortOrLongTermPictureIndication, picNumberOrIndex, firstMB, and numberOfMBs:

shortOrLongTermPictureIndication = (Byte1 >> 6) & 0x1;  
picNumberOrIndex = ((Byte1 & 0x7) << 7) | (Byte2 & 0x7F);  
firstMB = ((Byte3 & 0x7F) << 7) | (Byte4 & 0x7F);  
numberOfMBs = ((Byte5 & 0x7F) << 7) | (Byte6 & 0x7F);

The meaning of the first two parameters are exactly the same as those of the lostPicture message, while the firstMB and numberOfMBs indicate the spatial location of the partial picture lost. firstMB is the index of the first Macroblock that is lost or corrupted. numberOfMBs indicates the number of MBs lost or corrupted. The MB numbering is done according to raster-scan order within the picture, with the upper left MB of the picture defined as macroblock number 1, and the MB number increasing first from left to right and then from top to bottom. An encoder capable of Annex U/H.263 (Enhanced Reference Picture Selection, with or without sub-picture removal) and/or Annex.W.6.3.12/H.263 (Picture Number) shall be capable of understanding this message and taking corrective action.

---

*[End Correction]*

H.320 RECOMMENDATION SERIES DEFECT REPORT FORM

<b>DATE:</b>	
<b>CONTACT INFORMATION</b>  <b>NAME:</b> <b>COMPANY:</b> <b>ADDRESS:</b>  <b>TEL:</b> <b>FAX:</b> <b>EMAIL:</b>	
<b>AFFECTED RECOMMENDATIONS:</b>	
<b>DESCRIPTION OF PROBLEM:</b>	
<b>SUGGESTIONS FOR RESOLUTION:</b>	

NOTE - Attach additional pages if more space is required than is provided above.



## II **Draft revised Implementor's Guide for the ITU-T H.324 Recommendation series**

### **Introduction**

This document is a text revision of the H.324 Implementor's Guide approved in February 2000. The changes from the previous version 4 of the Implementor's Guide are clarifying procedures as they appeared and were agreed in Q11-L-09r1 (Osaka).

Changes from the previous published version appear in the following sections:

15. 7.2.1 Section C.2 - used to be 7.2.2 (Q11L09r1 + editor)
16. 7.2.2 Section C.4 - used to be 7.2.3 (editor)
17. 7.2.3 Section C.5 (Q11L09r1)
18. 7.2.4.1 Section C.7 (Q11L09r1 + editor)
19. 7.2.4.2 Section C.7 - level change procedure text that used to be in 7.2.1 (Q11L09r1 + editor)
20. 7.3.1 Section D.5.1.2 (Q11L09r1)
21. 7.3.2 Section D.5.4 (Q11L09r1)
22. 7.4 and 7.4.1 Annex F - used to be 7.3 and 7.3.1 and incorrectly numbered 7.2 and 7.2.1 in IG version 4 (editor)

## **Implementor's Guide for the ITU-T H.324 Recommendation series Version 2 - Terminal for low bit-rate multimedia communication**

### **Abstract**

This document is a compilation of reported defects identified with the 1997-2000 editions of the ITU-T H.324-series Recommendations. It is intended to be read in conjunction with the Recommendations to serve as an additional authoritative source of information for implementors. The changes, clarifications and corrections defined herein are expected to be included in future versions of affected H.324-series Recommendations.

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### **Document history**

<b>Revision</b>	<b>Date</b>	<b>Description</b>
1	8-11 June 1998	Initial version - Reviewed at the Q.11/SG 16 meeting.
2	22 September 1998	Second version - Completed at the ITU-T Study Group 16 Rapporteurs meeting.
3	24 May 1999	Third version - Completed at the ITU-T Study Group 16 Rapporteurs meeting.
4	7-18 February 2000	Fourth version - Completed at the ITU-T Study Group 16 Rapporteurs meeting.
5	13-17 November 2000	Fifth version - Completed at the ITU-T Study Group 16 Rapporteurs meeting.

## 1. Introduction

This document is a compilation of reported defects identified with the 1997-2000 editions of the ITU-T H.324-series Recommendations. It is intended to be read in conjunction with the Recommendations to serve as an additional authoritative source of information for implementors. The changes, clarifications and corrections defined herein are expected to be included in future versions of affected H.324-series Recommendations.

The first version of the guide was produced following the September 1998 ITU-T Study Group 16 meeting. Wide distribution of this document is expected and encouraged.

## 2. Scope

This guide resolves defects in the following categories:

- editorial errors;
- technical errors such as omissions or inconsistencies;
- ambiguities.

In addition the Guide may include explanatory text found necessary as a result of interpretation difficulties apparent from the defect reports.

This Guide will not address proposed additions, deletions or modifications to the Recommendations that are not strictly related to implementation difficulties in the above categories. Proposals for new features should be made in the normal way through contributions to the ITU-T.

## 3. Policies for updating this document

This document is managed by the ITU-T Study Group 16 Question 11 Rapporteur's Group. It can be revised at any recognized Q.11/16 Rapporteur's Group meeting provided the proposed revisions are unanimously accepted by the members of the group. A revision history cataloguing the evolution of this document is included.

## 4. Defect resolution procedure

Upon discovering technical defects with any components of the H.324 Recommendations series, please provide a written description directly to the editors of the affected Recommendations with a copy to the Q.11/16 Rapporteur. The template for a defect report is enclosed. Contact information for these parties is included in this document. Return contact information should also be supplied so a dialogue can be established to resolve the matter and an appropriate reply to the defect report can be conveyed. This defect resolution process is open to anyone interested in H.324-series Recommendations. Formal membership in the ITU is not required to participate in this process.

## 5. References

This document refers to the following H.324-series Recommendations:

- ITU-T Recommendation H.324 (1998), *Terminal for low bit-rate Multimedia Communication*.
- ITU-T Recommendation H.324 Annex F (1998), *Multilink operation*
- ITU-T Recommendation H.223 (1996), *Multiplexing protocol for low bit rate multimedia communication*

- ITU-T Recommendation H.223 Annex D (1999), *Optional multiplexing protocol for low bit rate multimedia mobile communication over highly error-prone channels*

## 6. Nomenclature

In addition to traditional revision marks, the following marks and symbols are used to indicate to the reader how changes to the text of a Recommendation should be applied:

Symbol	Description
<u><i>[Begin Correction]</i></u>	Identifies the start of revision marked text based on extractions from the published Recommendations affected by the correction being described.
<u><i>[End Correction]</i></u>	Identifies the end of revision marked text based on extractions from the published Recommendations affected by the correction being described.
...	Indicates that the portion of the Recommendation between the text appearing before and after this symbol has remained unaffected by the correction being described and has been omitted for brevity.
<b>--- SPECIAL INSTRUCTIONS ---</b> <i>{instructions}</i>	Indicates a set of special editing instructions to be followed.

## 7. Technical and editorial corrections

### 7.1 Additions to H.324

In order to allow the use of G.722.1 in H.324 systems, a new section 6.7.4 is being added with the following text:

*[Begin Correction]*

#### 6.7.4 Use of Recommendation G.722.1 for wideband audio

Recommendation G.722.1 may be used for wideband audio applications. G.722.1 frames shall be sent using AL2. Audio frame boundaries within each AL-SDU shall be implied by the ratio of AL-SDU size to G.722.1 frame size at the currently selected G.722.1 bitrate.

*[End Correction]*

## 7.2 Technical and editorial corrections to H.324 Annex C

### 7.2.1 Additions to Section C.2 - General

A clarification to the level change procedure and a reference to H.223 Annex D are being added to the H.223 Level 3 description as follows:

*[Begin Correction]*

---

#### C.2 General

...

- H.223 Level 1: Described in Annex A/H.223. The HDLC flag in H.223 used to delimit MUX-PDUs in Level 0 is replaced with a longer flag that leads to improved MUX-PDU synchronization. HDLC bit stuffing is not used. The Control Channel Segmentation and Reassembly Layer (CCSRL) is introduced for the transmission of the control channel.

The transmitter side shall take necessary precaution to prevent possible flag emulation for the control channel. Flag emulation can be prevented, e.g. by detecting N 16-bit flags in each MUX-SDU for the channel and by breaking the SDU into N+1 segments. This may also apply to data channels.

- H.223 Level 2: Described in Annex B/H.223. Includes the features of Annex A/H.223. In addition, the header describing the MUX-PDU contents includes error protection.
- H.223 Level 3: Described in H.223/Annex C. Includes the features of H.223/Annex B. In addition, error protection and other features are provided to increase the protection of the AL-PDUs. Described in H.223/Annex D as an optional definition of H.223/Annex C.

In addition to the hierarchy offered by the level structure, some of the multiplex levels contain options.

If the terminal is connected to an octet oriented network interface, the transmitter shall align the first transmitted bit to the network octet timing. Note that the MUX-PDU of H.223 level 1 and higher levels have an octet-aligned structure. Therefore, the receiver may use the octet timing information from the network interface to detect the start of a MUX-PDU to reduce the mis-synchronisation.

Mobile terminals shall support the NSRP and the SRP mode of H.324/Annex A. If both terminals start the session in level 0 initially the SRP mode shall be used. Otherwise both terminals shall start with NSRP mode.

If both terminals in a session support ~~Annex C/H.223~~ (level 3 of H.223), then adaptation layers AL1M, AL2M, and AL3M as defined in ~~Annex C/H.223~~ level 3 of H.223 may also be used in H.223, H.223 Annex A and B (levels 1 and 2). However, bidirectional channels shall use either the H.223 adaptation layers, or the ~~Annex C/H.223~~ adaptation layers for level 3 of H.223, but not a mixture of the two.

...

*[End Correction]*

---

## 7.2.2 Additions to Section C.4 – Interworking

A reference to Annex D is being added to Section C.4 as follows:

---

*[Begin Correction]*

---

### C.4 Interworking

Since all mobile terminals support H.223 level 0, no interworking function is needed when communicating with an H.324 terminal that does not support any of the robust multiplexing annexes (Annexes A, B, ~~and C~~ and D of Recommendation H.223).

---

*[End Correction]*

---

## 7.2.3 Clarifications to Section C.5 - Terminal procedures

Clarifying text to allow H.324 Annex D terminals to support Annex C mode is being added to section C.5 as follows:

---

*[Begin Correction]*

---

### C.5 Terminal procedures

...

- Phase D: The value of timer T401 shall be defined using the procedures in Annex E. The transmission of 16 consecutive HDLC flags is replaced with the level setup procedure defined in section C.6

...

---

*[End Correction]*

---

## 7.2.4 Clarifications to Section C.7 - Dynamic change of level or option during session

### 7.2.4.1 "mobileOperationTransmitCapability"

Text describing the usage of the H.245 **mobileOperationTransmitCapability** in H.324 Annex C is being added as follows:

---

*[Begin Correction]*

---

### C.7 Dynamic change of level or option during session

The procedure described below for changing multiplex options during a session assumes that a capabilities exchange has taken place between a receiver (Terminal A) and a transmitter (Terminal B), and that an H.245 command for a level change will be sent by the receiver terminal to the transmitter terminal. A terminal, which has the capability to change H.223 multiplex levels or options during a session, shall set **modeChangeCapability** in **mobileOperationTransmitCapability** to True. Levels and options supported by the terminal are indicated using the codepoint in **mobileOperationTransmitCapability**.

A terminal, which has the above capability and has received the H.245 message with modeChangeCapability of True, may start the H.223 mode change procedure ~~The procedure is~~ illustrated in Figure C.1. Only levels supported by both terminals may be commanded. Note that the "replacementFor" procedure described in Recommendation H.245 may be used when changing from a mobile adaptation layer (ALXM) to a regular H.223 adaptation layer (ALX) or vice versa.

...

---

*[End Correction]*

#### 7.2.4.2 Clarifications to level change procedure

This section describes the editorial corrections to clarify the level change procedure in the H.324 Annex C. The following text is being added at the end of section C.7.

---

*[Begin Correction]*

Note that after changing from level 0 to some higher levels, MUX-PDU octet alignment shall be preserved. Therefore, the transmitter shall add as many "0" bits after the level change sequence to octet align the first synchronization flag of the new level. In the transmitter, the reference for the octet alignment is the first bit of the first transmitted synchronization flag. In the receiver, the reference for the octet alignment is the first bit of the first detected synchronization flag in the initial level set-up procedure.

---

*[End Correction]*

### 7.3 Technical and editorial corrections to H.324 Annex D

#### 7.3.1 Clarifications to Section D.5.1.2 - Received signals

Clarifying text to allow H.324 Annex D terminals to support Annex C mode is being added to section D.5.1.2 as follows:

---

*[Begin Correction]*

##### D.5.1.2 Received signals

While executing the V.140 Phase 1 procedure, the H.324/I terminal shall search the received data for signals conforming to:

- V.140 signature;
- H.324 directly on the digital channel (search for initial H.245 messages in H.223 framing) HDLC flags followed by an H.223 MUX\_PDU on the digital channel or, if Annex C is supported, all possible stuffing sequences defined in Table C.1;
- H.320 (search for H.221 FAS and BAS signalling);
- If V.8 bis is supported, V.8 bis (search for initial V.8 bis messages in G.711 audio);
- V.8 (search for initial V.8 messages in G.711 audio).

Additionally, bits 1-6 of each octet may be decoded as audio according to Recommendation G.711 and delivered to the user while executing this procedure, so that voice telephony is established immediately upon connection of the circuit, if the far-end terminal supports voice telephony.

---

*[End Correction]*

### **7.3.2 Clarifications to Section D.5.4 - Phases D through G**

Clarifying text to allow H.324 Annex D terminals to support Annex C mode is also being added to section D.5.4 as follows:

---

*[Begin Correction]*

All remaining phases (D through G) shall proceed as specified in the body of this Recommendation, or, as defined in section C.5 if Annex C is supported.

---

*[End Correction]*

### **7.4 Technical and editorial corrections to H.324 Annex F**

#### **7.4.1 Clarification to Section F.5.2.2.1 – Responder request to add additional connections**

To clarify the order of the procedures of Annex F, a reference to Section F.5.2.1 is being added to section F.5.2.2.1 as follows:

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*[Begin Correction]*

At any time after exchange of call information according to Section F.5.2.1, the responder may request that the initiator add physical connections. This shall be done using the **MultilinkRequest.addConnection** message in H.245.

...

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*[End Correction]*

## **8. Implementation clarifications**

This section describes the procedures for using the supplementary services Call Hold and Explicit Call Transfer in H.324/ISDN. Implementation of these procedures is optional.

### **8.1 Procedures for Call Hold (CH)**

The two procedures as described below should be used if a terminal supports the Call Hold supplementary service.

#### **8.1.1 Invocation procedure for CH**

Initial situation: Terminal A is connected to terminal B. Either Terminal A or terminal B has established the call.

Objective: Terminal A wishes to put terminal B on hold.



- 1) In case Multilink is used, terminal A should remove all but one B-channel connections from the H.Multilink Channel Set according to the Multilink procedures.
- 2) Terminal A should proceed with phase F of Annex D/H.324. The **EndSessionCommand** message should indicate to the far end that the terminal will be put on hold by signalling **terminalOnHold** in **isdnOptions**.
- 3) Terminal A should invoke the CH supplementary service by D-channel signalling, requesting the network to put all B-channel connections with terminal B on hold.

### 8.1.2 Retrieval after invocation of CH

Initial situation: Terminal A has terminal B on hold.

Objective: Terminal A wishes to retrieve the call with terminal B.

- 1) Terminal A should apply D-channel signalling to retrieve all the B-channel connections with terminal B.
- 2) Terminal A should initiate phase A of Annex D/H.324 starting with the execution of H.Dispatch, because the channel is already established.
- 3) Terminal A should add the additional B-channel connections to the H.Multilink Channel Set using the Multilink procedures.

NOTE - The CH procedures should only be used if both terminals A and B are H.324/I terminals.

## 8.2 Procedures for Explicit Call Transfer (ECT)

The procedure as described below should be used if a terminal supports the invocation of ECT.

Initial situation: Terminal A is connected to terminal B. Either terminal A or terminal B has established the call.

Objective: Terminal A wishes to put terminal B on HOLD, make a call to terminal C and then connect terminal B to terminal C.

### 8.2.1 Invocation procedure for ECT

- 1) In case Multilink is used, terminal A should disconnect all but one B-channel connections with terminal B according to the Multilink procedures defined in Annex F/H.324.
- 2) Terminal A should put terminal B on hold according to the procedures of the CH supplementary service.
- 3) Terminal A should establish a call with terminal C.
- 4) ECT should not be activated when terminal A does not succeed in establishing a call with terminal C or when terminal C is not a H.324/I terminal; appropriate indications should be given to the user(s).
- 5) In case Multilink is used, terminal A should disconnect all but one B-channel connections with terminal C according to the Multilink procedures defined in Annex F/H.324.

- 6) Terminal A should put terminal C on hold according to the procedures of the CH supplementary service.
- 7) Terminal A should invoke the ECT supplementary service by D-channel signalling, requesting the network to connect terminal B to C.

NOTE 1 - The procedure for ECT should only be used if all terminals A, B and C are H.324/I terminals. The implementation of ECT in case not all the terminals A, B and C are H.324/I terminals is left for further study.

NOTE 2 - The method used for addressing phone numbers in H.Multilink in case calls are transferred is left for further study.

NOTE 3 - The network provider may restrict the invocation of the ECT supplementary service to either the calling or the called terminal.

H.324 RECOMMENDATION SERIES DEFECT REPORT FORM

<b>DATE:</b>	
<b>CONTACT INFORMATION</b>  <b>NAME:</b> <b>COMPANY:</b> <b>ADDRESS:</b>  <b>TEL:</b> <b>FAX:</b> <b>EMAIL:</b>	
<b>AFFECTED RECOMMENDATIONS:</b>	
<b>DESCRIPTION OF PROBLEM:</b>	
<b>SUGGESTIONS FOR RESOLUTION:</b>	

NOTE - Attach additional pages if more space is required than is provided above.

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