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Amendment 1
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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS
Infrastructure of audiovisual services – Communication
procedures

Interworking of H-Series multimedia terminals with
H-Series multimedia terminals and voice/voiceband
terminals on GSTN and ISDN

**Amendment 1: Usage of H.243 multipoint
control messages and support for Unicode
characters in H.320 systems**

ITU-T Recommendation H.246 (1998) – Amendment 1

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ITU-T Recommendation H.246

Interworking of H-Series multimedia terminals with H-Series multimedia terminals and voice/voiceband terminals on GSTN and ISDN

Amendment 1

Usage of H.243 multipoint control messages and support for Unicode characters in H.320 systems

Summary

ITU-T Rec. H.246 describes gateways which provide protocol interworking between H-Series multimedia terminals and other H-Series multimedia terminals, voice/voiceband terminals on GSTN or ISDN, V.70 terminals on the GSTN, and multi-call applications on the GSTN. H.246 gateways provide the required translation of control and media streams to allow interworking between terminals running different protocols.

This Amendment 1 revises Annex A/H.246 (H.323-H.320 interworking) and introduces some editorial changes in the main body of the Recommendation. It introduces a number of enhancements and clarifications to the previous version, primarily the description on the usage of H.243 multipoint control messages and Unicode characters in H.32x systems.

Source

Amendment 1 to ITU-T Recommendation H.246 (1998) was approved on 13 September 2005 by ITU-T Study Group 16 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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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.

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

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ITU-T Recommendation H.246

Interworking of H-Series multimedia terminals with H-Series multimedia terminals and voice/voiceband terminals on GSTN and ISDN

Amendment 1

Usage of H.243 multipoint control messages and support for Unicode characters in H.320 systems

1) Changes to clause 1 – Scope

To help clarify the usage of H.246 with respect to ATM, a reference to an ATM Forum document is added before Figure 1, as follows:

[Begin Correction]

...

Voice/Voiceband terminals on GSTN use the appropriate national standards for call control and G.711 or analogue signals for voice. Voice/Voiceband terminals on ISDN use the appropriate national variant of Q.931 for call control and G.711 for voice.

Interworking of H.323 over ATM with H.323 over non-ATM IP networks is possible through the use of an H.323-H.323 gateway. Transport of H.323 media streams over ATM is described in AF-SAA-0124.000.

...

[End Correction]

2) Changes to clause 2 – References

[Begin Correction]

Add a new reference to AF-SAA-0124.000 as follows:

- ATM Forum Technical Committee, AF-SAA-0124.000, *Gateway for H.323 Media Transport Over ATM*, 1999.

[End Correction]

3) Changes to Annex A

This revised version of Annex A introduces a number of enhancements and clarifications to the previous version, primarily the description on the usage of H.243 multipoint control messages and Unicode characters in H.32x systems.

Annex A

H.323-H.320 interworking

A.1 Summary

This annex specifies the interworking requirements of a H.323 to H.320 protocol conversion device called a H.323 to H.320 Gateway.

A H.323 to H.320 Gateway provides interworking by providing conversion of the audio, video, data, and control protocols as specified in the H.323 and H.320 system specifications.

H.321 and H.322 specifics are for further study in this annex.

A.2 Definitions

In addition to the definitions listed in clause 3, this annex uses the following definitions:

A.2.1 capability: A terminal has a particular capability if it is able to encode and transmit or receive and decode that particular signal.

A.2.2 logical channel: A logical channel is a unidirectional path or bidirectional path for the transmission of information.

A.2.3 mode: A mode is a set of elementary streams that a terminal is transmitting, intends to transmit, or would like to receive.

A.2.4 multimedia communication: Multimedia communication refers to the transmission and/or reception of signals of two or more Medium Types simultaneously.

A.2.5 non-standard: Not conforming to a national or international standard referenced in this Recommendation.

A.2.6 session: A session is a period of communication between two terminals which may be conversational or non-conversational (for example, retrieval from a database).

A.3 Abbreviations

In addition to the abbreviations listed in clause 4, this annex uses the following abbreviations:

MC	H.323 Multipoint Control Entity
QCIF	Quarter CIF
RTCP	Real-time Transport Control Protocol
RTP	Real-time Transport Protocol

A.4 Overview

A H.323 to H.320 Gateway shall support the mandatory functionality as specified for a H.320 terminal in the H.320 system specification on the SCN and the mandatory functionality as specified for a H.323 endpoint in the H.323 system specification on the LAN.

The following table summarizes the minimum protocol requirements for a H.323 to H.320 Gateway.

Component	H.323	H.320
Call Control	H.225.0	Q.931
System Control	H.245	H.242
Multiplex	H.225.0	H.221
Audio	G.711	G.711
Video (If video supported)	H.261 QCIF	H.261 QCIF
Data (If data supported)	T.120	T.120

The following subclauses define the mapping between a H.323 terminal on the LAN side of a Gateway to a H.320 terminal or H.231 MCU on the SCN side of a Gateway.

A.5 Mapping H.323 System Control (H.245) to H.320 System Control (H.242)

The following tables focus on the action required in H.245 based on the receipt of a H.242 (H.221 or H.230) command. The action in the reverse case may be produced by consideration of the following tables.

For mandatory terminal or endpoint capabilities or commands, the Gateway shall respond according to the following table mappings. For option terminal or endpoint capabilities or commands, the Gateway shall respond according to the following table mappings if the option is supported. In cases where the Gateway is transcoding audio or video, flow control or channel opening or closing as specified in the tables may not be necessary (e.g., the Gateway may match bit rates via transcoding, mode switches, or flow control).

A.5.1 H.221 commands/CAPS

Generally H.221/H.230 commands are continuously repeated in the unreliable H.221 BAS channel. As the control channel on the LAN is reliable, only new or changed commands should be passed on by the H.323 Gateway to the LAN side.

When a version two H.323 endpoint receives a H.245 empty capability set (i.e., a terminalCapability set that indicates that the endpoint sending the message has no receive capabilities), the endpoint shall close all open logical channels using the standard H.245 procedures and enter a paused state.

Gateway vendors should note that experience has shown when translating a H.245 empty capability set to a H.320 empty cap set, called Mode 0 in H.320, call termination may occur. Many H.320 endpoints forced into Mode 0 after exchanging a non-empty cap set and/or exchanging media will view a subsequent transition to Mode 0 as a signal that the remote terminal is ending the call and initiate a disconnect themselves. Therefore, vendors are recommended to implement this translation by other means such as using mutes in the H.323 to H.320 direction and not sending media packets in the H.320 to H.323 direction.

A.5.1.1 Subclause A.1/H.221 – Commands

In this table it has been assumed that if the audio operates at a well known rate, e.g., 16 kbit/s for G.728, the rate can be inferred from the logical channel open.

In cases where there are matching audio and video capabilities, it is strongly recommended that Gateways avoid transcoding. However, it is up to an individual manufacturer to determine how to resolve conference capabilities in which there are no algorithms in common.

H.221 command	H.245 equivalent
Neutral	<ul style="list-style-type: none"> • Close the logical channel or use flow control for any logical channel being used for audio. • Close any logical data channels that exist only in the I-channel on the SCN side. • Send FlowControlCommand to limit the video rate to be equivalent to the additional channels on the SCN side. • Send FlowControlCommand to limit the HSD data rate to be equivalent to the additional channels on the SCN side if needed. <p>NOTE – The neutral command does not necessarily indicate a long-term bandwidth change.</p>
Capex	The Gateway should send SendTerminalCapabilitySet using genericRequest to the H.323 terminal and then pass the resulting capability to the SCN augmented with its own capabilities to account for its transcoding and translation properties.
Au-off, U	Close the logical channel being used for audio.
Au-off, F	Close the logical channel being used for audio.
A-law, 0U	Open a logical channel with AudioCapability of g711Alaw64k or other algorithm if the Gateway is transcoding .
A-law, 0F	Open a logical channel with AudioCapability of g711Alaw64k or other algorithm if the Gateway is transcoding . Note that the Gateway pads the 56 kbit/s SCN G.711 to put it on the LAN and truncates the 64 kbit/s LAN audio to put it on the SCN as described in Recommendation H.225.0.
μ-law, 0U	Open a logical channel with AudioCapability of g711Ulaw64k or other algorithm if the Gateway is transcoding .
μ-law, 0F	Open a logical channel with AudioCapability of g711Ulaw64k or other algorithm if the Gateway is transcoding . Note that the Gateway pads the 56 kbit/s SCN G.711 to put it on the LAN and truncates the 64 kbit/s LAN audio to put it on the SCN as described in Recommendation H.225.0.
A-law, F6	Open a logical channel with AudioCapability of g711Alaw64k or other algorithm if the Gateway is transcoding . Note that the Gateway pads the 48 kbit/s SCN G.711 to put it on the LAN and truncates the 64 kbit/s LAN audio to put it on the SCN as described in Recommendation H.225.0.
μ-law, F6	Open a logical channel with AudioCapability of g711Ulaw64k or other algorithm if the Gateway is transcoding . Note that the Gateway pads the 48 kbit/s SCN G.711 to put it on the LAN and truncates the 64 kbit/s LAN audio to put it on the SCN as described in Recommendation H.225.0.
G.722-64	Open a logical channel with AudioCapability of g722-64k or other algorithm if the Gateway is transcoding – use payload type 15 (G.722) in RTP.
G.722-56	Open a logical channel with AudioCapability of g722-56k or other algorithm if the Gateway is transcoding . Signal the dynamicRTPPayloadType option of the H2250LogicalChannelParameters in the OpenLogicalChannel command.
G.722-48	Open a logical channel with AudioCapability of g722-48k or other algorithm if the Gateway is transcoding . Signal the dynamicRTPPayloadType option of the H2250LogicalChannelParameters in the OpenLogicalChannel command.
Au-40k	FFS

H.221 command	H.245 equivalent
Au-32k	FFS
Au-24k	FFS
G.723.1	Open a logical channel with AudioCapability of g7231 or other algorithm if the Gateway is transcoding.
G.728	Open a logical channel with AudioCapability of g728 or other algorithm if the Gateway is transcoding.
G.729	Open a logical channel with AudioCapability of g729 or other algorithm if the Gateway is transcoding.
Au4k	FFS

A.5.1.2 Subclause A.2/H.221 – Commands

In general, SCN transfer rates are translated into H.245 maximum bit rate capabilities that apply to the audio and video logical channels on the LAN. The following table illustrates the Gateway requirements.

NOTE – When the Gateway is transcoding media, the LAN and SCN media rates may not be equal.

Media	LAN Side	SCN Side
Audio	max bit rate is implied by the algorithm chosen; the LAN transmitter shall not exceed the negotiated rate. The Gateway should use FlowControlMessages to correct for clock synchronization issues	max bit rate is implied by algorithm.
Video	max bit rate is taken from H261VideoCapability's maxBitRate field. Endpoint procedures are the same as for audio. The Gateway should use FlowControlMessages to correct for clock synchronization issues or fluctuations in bandwidth due to dynamic data channels	If the Gateway is not transcoding, the max bit rate should be at least the transfer rate minus the audio minus the FAS/BAS minus the data bandwidth. The Gateway must compute this value dynamically and close/open the video logical channel or use flow control when it changes. The Gateway may set the max bit rate higher and then use flow control to adapt the rate based on data or audio channel bandwidth changes. If the Gateway contains a rate reducer, the LAN max bit rate does not need to match the SCN max bit rate.
Data	max bit rate is taken from DataApplicationCapability's maxBitRate field. Flow control is provided by the underlying data protocol.	max bit rate is implied by the data rate in use. Changes in max bit rate on the SCN side result in a close/re-open sequence or flow control for the associated LAN logical channel for data.

The LAN side is unaware of the differences between SCN multilink or single channels. The total bandwidth on the LAN and SCN link may be unequal since control on the LAN side is essentially unconstrained, and the audio or video may be transcoded in the Gateway.

If an "Initial Channel Lost" (loss-ic) is received by the Gateway, it should translate into a lower LAN bit rate for the appropriate media channels via closing and reopening the logical channels or via the use of flow control commands.

A.5.1.3 Subclause A.3/H.221 – Commands

H.221 command	H.245 equivalent
Video-off	Close the video logical channel.
H.261_on	Open a logical channel with VideoCapability of H261VideoCapability and a maxBitRate to force a match to the SCN side video rate unless transcoding to another algorithm or bit rate.
H.262S_on (Simple Profile)	Open a logical channel with VideoCapability of H262VideoCapability and a maxBitRate to force a match to the SCN side video rate unless transcoding to another algorithm or bit rate. Use the Simple Profile at the Main Level.
H.262M_on (Main Profile)	Open a logical channel with VideoCapability of H262VideoCapability and a maxBitRate to force a match to the SCN side video rate unless transcoding to another algorithm or bit rate. Use the Main Profile at the Main Level.
H.263_on	Open a logical channel with VideoCapability of H263VideoCapability and a maxBitRate to force a match to the SCN side video rate unless transcoding to another algorithm or bit rate.
Video-MPEG-1_on	FFS
Freeze-pic (H.230 VCF)	Send videoFreezePicture
Fast-update (H.230 VCU)	Send videoFastUpdatePicture
Encrypt Encryp-on (ECS channel active)	FFS NOTE – Although the ECS channel is in effect always open on the LAN link, receiving this command from the SCN may require a close/re-open logical channel command to correct for changes in the data rates of the media.
Encrypt Encryp-off (ECS channel inactive)	See Encrypt Encryp-on.
Au-loop	Send mediaLoop on the logical channel carrying audio.
Vid-loop	Send mediaLoop on the logical channel carrying video.
Dig-loop	A Gateway shall implement this on the SCN side, looping the H.320 stream back to the SCN side. The Gateway should continue to pass the stream onto the LAN side. Any input from the LAN side may be lost while this loop is in effect.
Loop-off	Send the MaintenanceLoopOffCommand .
SM-comp	Close/re-open logical channels affected by video, audio, or data max bit rate changes.
Cancel-SM-comp	Close/re-open logical channels affected by video, audio, or data max bit rate changes.
6B-H ₀ -comp	Close/re-open logical channels affected by video, audio, or data max bit rate changes.
Not-6B-H ₀ -comp	Close/re-open logical channels affected by video, audio, or data max bit rate changes.
Restrict	Close/re-open logical channels affected by video, audio, or data max bit rate changes.
Derestrict	Close/re-open logical channels affected by video, audio, or data max bit rate changes.

A.5.1.4 Subclause A.4/H.221 – Commands

The Gateway, upon receipt of a LSD/HSD/MLP command, should not seek to open a logical channel until an application command is received. At that time, the Gateway should open a logical channel with the appropriate application and a maxBitRate derived from the LSD/HSD/MLP rate in effect.

In the reverse direction, once the Gateway receives an open logical channel, it should seek to open the appropriate LSD/HSD/MLP channel and turn on the requested application. When the far end SCN terminal responds with both the rate and the application command, the Gateway should send **OpenLogicalChannelAck** to the LAN side.

In either direction, the Gateway will require buffering to ensure that data is not lost.

A.5.1.5 Subclauses A.5/A.6/A.7/A.8/A.10/H.221 – Capabilities

Audio, video, and encryption capabilities map one to one with H.245 capabilities. MBE, HSD, LSD, MLP, and transfer rate capabilities are not applicable on the LAN.

LSD and HSD channels on the LAN are differentiated by logical channel number.

NOTE – **temporalSpatialTradeOffCapability** should be terminated at a H.245 device and not passed to H.242 as there is no equivalent command.

A.5.1.6 Subclause A.9/H.221 – Escape Table Values

H.221 command	H.245 equivalent
Table A.6	The transfer rates (commands & caps) should be translated into maxBitRates for logical channels.
Table A.2	The Au-ISO related caps/cmds shall be ignored; their translation is FFS. The HSD/MLP transfer rate commands result in the opening of a logical channel. See the section on A.4 for a discussion of the issues.
H.230	See H.230 section.
SBE numbers	The values 0-9, #, and * shall be sent using UserInputIndication . Other values may be optionally forwarded by a Gateway in either direction.
SBE characters	The characters are always embedded in other messages so there is no direct translation (e.g., they are associated with MLP or H.230 commands).
Start-MBE	No translation is needed as all existing MBEs are translated into LAN messages.
NS-cap	If the Gateway does not understand the non-standard capability, it should send the Capability with nonStandard set to the appropriate NonStandardParameter . The Gateway should map the H.221 country code and manufacturer code into the h221NonStandard field of NonStandardIdentifier and place the actual non-standard H.221 cap in NonStandardParameter.data .
NS-comm	Send NonStandardMessage with nonStandardIdentifier set to h221NonStandard . The Gateway should map the H.221 country code and manufacturer code into the h221NonStandard field of NonStandardIdentifier , and place the actual non-standard H.221 cap in NonStandardParameter.data .
Cap-mark	When H.320 cap set ends, the H.245 cap set should be sent.
Table A.4	See Section on Table A.4.

A.5.1.7 Table A.4/H.221 – Data applications

Reserved code points are ignored in this table. Note that on the SCN (H.221) side, the data channel is opened, and then various applications are turned on and off. On the H.245 side, the application is specified when the logical channel is opened. Thus, opening logical data channels on the LAN side are deferred until it is clear what application is to be used.

H.221 command	H.245 equivalent
V.120 LSD	Open a logical channel with DataApplicationCapability of userData and DataModeProtocol of v120 . Set maxBitRate using LSD rate in effect.
V.120 HSD	Open a logical channel with DataApplicationCapability of userData and DataModeProtocol of v120 . Set maxBitRate using HSD rate in effect.
V.14 LSD	FFS
V.14 HSD	FFS
H.224_MLP_on/off	FFS
H.224_LSD_on/off	FFS
H.224_HSD_on/off	FFS
T.120_on/off	Open a logical channel with DataApplicationCapability of t120 and DataModeProtocol of separateStack . Set maxBitRate using MLP rate in effect.

The following table shows application capability mappings within LSD and HSD channels. Note that there is no differentiation of HSD from LSD except for logical channel number on the LAN side.

H.221 capability	H.245 equivalent
Still Image (Annex D/H.261)	Use H261VideoCapability stillImageTransmission field.
V.120 LSD	Use DataApplicationCapability of userData and DataProtocolCapability of v120 .
V.120 HSD	Use DataApplicationCapability of userData and DataProtocolCapability of v120 .
V.14 LSD	FFS
V.14 HSD	FFS
H.224_MLP	FFS
H.224_LSD	FFS
H.224_HSD	FFS
T.120	DataApplicationCapability of t120 on DataProtocolCapability of SeparateStack .
H.224_sim	Not applicable
Nil_data	Not applicable

A.5.1.8 Subclause A.11/H.221 – HSD/H-MLP commands

HSD/H-MLP commands are translated into open logical channel requests. Flow control commands and the **maxBitRate** are in general used to match the SCN side rate. The channel should not be opened until the data application code is sent by the SCN side.

A.5.1.9 Subclauses A.12/A.13/H.221 – Au-ISO commands and capabilities

These command are not applicable to H.245 conversion.

A.5.1.10 Subclauses A.14/A.15/H.221 – Data application commands and capabilities

See Table A.4/H.221-~~above~~.

A.5.1.11 Subclause A.16/H.221 – Transfer rate commands and capabilities used in channel aggregation

Transfer rate changes on the SCN may require the close and re-open of LAN logical channels to account for bit rate changes.

A.5.2 H.230 commands

H.245 equivalents for H.230 commands and indications are for the most part defined in the H.245 commands **ConferenceCommand** and **ConferenceIndication**.

A.5.2.1 Video Commands and Indications (C&I)

H.230 command/indication	H.245 equivalent
VIS	Send logicalChannelInactive for the video channel.
VIA	Send logicalChannelActive for the video channel.
VIA2	Same as VIA for video source number 2.
VIA3	Same as VIA for video source number 3.
VIR	Send videoIndicateReadyToActivate .
VCF	Send videoFreezePicture .
VCU	Send VideoFastUpdatePicture .

A.5.2.2 Audio C&I

H.230 command/indication	H.245 equivalent
AIM	Send logicalChannelInactive for the audio channel.
AIA	Send logicalChannelActive for the audio channel.
ACE	Not applicable on LAN as audio and video are time-stamped independently by the transmitter.
ACZ	Not applicable on LAN as audio and video are time-stamped independently by the transmitter.

A.5.2.3 Maintenance C&I

H.230 command/indication	H.245 equivalent
LCV	Send mediaLoop on the logical channel carrying video.
LCD	Not applicable on LAN.
LCA	Send mediaLoop on the logical channel carrying audio. A Gateway should implement this on the SCN side, looping the H.320 stream back to the SCN side, while continuing to pass the stream onto the LAN side. Any input from the LAN side may be lost while this loop is in effect.
LCO	Send the MaintenanceLoopOffCommand .

A.5.2.4 Multipoint C&I

A.5.2.4.1 Multipoint Control C&I

H.230 command/indication	H.245 equivalent
MCC	Send multipointConference indication to indicate the presence of an H.231 MCU. The Gateway may have to adapt the maxBitRate on the LAN media channels to match the SCN transfer and audio rate as required by MCC.
MMS	Send multipointModeCommand . Once in receipt of this command, the LAN endpoint is required to follow all mode requests from the sender of MMS.
Cancel-MCC	Send cancelMultipointConference .
Cancel-MMS	Send cancelMultipointModeCommand .
MIZ	Send multipointZeroComm .
Cancel-MIZ	Send cancelMultipointZeroComm .
MIS	Send multipointSecondaryStatus .
Cancel-MIS	Send cancelMultipointSecondaryStatus .
MIM	FFS
MCV	Send broadcastMe either conferenceRequest.broadcastMyLogicalChannel or conferenceCommand.broadcastMyLogicalChannel with the LCN of the video channel in the direction from the gateway to the H.323 endpoint. <u>If the gateway has previously both sent and received the MVC capability to/from the H.230 side (indicating that both ends of the terminal-MCU or inter-MCU link have declared the MVC capability or the H.245 equivalent), then the H.245 side shall use the conferenceRequest form of the message. Otherwise, it shall use the conferenceCommand form of the message.</u>
Cancel-MCV	Send cancelBroadcastMe Send conferenceCommand.cancelBroadcastMyLogicalChannel .
MIV	Send seenByAtLeastOneOther .
Cancel-MIV	Send cancelSeenByAtLeastOneOther .
MCS/MCN	Send multipointConference indication to indicate the presence of an H.231 MCU. The Gateway may have to adapt the maxBitRate on the LAN media channels to match the SCN transfer and audio rate as required by MCC.
MIL	FFS
MIH	FFS
MIJ	FFS
<u>MVA</u>	Send conferenceResponse.broadcastMyLogicalChannel.grantedBroadcastMyLogicalChannel .
<u>MVC</u>	Send conferenceCapability.multipointVisualizationCapability .
<u>MVR</u>	Send conferenceResponse.broadcastMyLogicalChannel.deniedBroadcastMyLogicalChannel .
RAN	FFS

A.5.2.4.2 Terminal Numbering C&I

H.230 command/indication	H.245 equivalent
TCI	Send enterH243TerminalID .
TII	Send terminalIDResponse .
TIS	Not applicable
TIC(cap)	Not applicable
TIx	Not applicable
TIA	Send terminalNumberAssign .
TIN	Send terminalJoinedConference .
TID	Send terminalLeftConference .
TCU	Send terminalListRequest .
TCA	Send requestChairTokenOwner .
TIL	Send terminalListResponse .
TIR	Send chairTokenOwnerResponse .
TIE	Not applicable
TIP	Send mCterminalIDResponse .
<u>TIP-5</u>	<u>Send mCUnicodeTerminalIDResponse.</u>
TCP	Send requestTerminalID .
<u>TCP-5</u>	<u>Send requestUnicodeTerminalID.</u>

A.5.2.4.3 Conference Query C&I

H.230 command/indication	H.245 equivalent
TCS_1	Send enterH.243Password .
TCS_2	Send enterH243TerminalID .
TCS_3	Send enterH.243ConferenceID .
TCS_4	Gateway should return desired H.323 extension if known via IIS; otherwise, send enterExtensionAddress to the LAN and upon receiving extensionAddressResponse , send the extension via IIS.
<u>TCS-5</u>	<u>Send enterH243UnicodeTerminalID.</u>
IIS	Send terminalIDResponse or passwordResponse depending on the IIS value as defined in Recommendation H.230.
<u>IIS-5 (value of n=5)</u>	<u>Send unicodeTerminalIDResponse.</u>

A.5.2.4.4 Video Selection and Notification C&I

H.230 command/indication	H.245 equivalent
VIN	Send terminalYouAreSeeing .
VCB/Cancel-VCB	Send makeTerminalBroadcaster/cancelMakeTerminalBroadcaster .
VCS/Cancel-VCS	Send sendThisSource/cancelSendThisSource .
VCR	Send videoCommandReject .
VIN2	FFS Send terminalYouAreSeeingInSubPictureNumber .
VIC	FFS Send videoIndicateCompose .
VIM	FFS Send videoIndicateMixingCapability .

A.5.2.4.5 Chair Control C&I

H.230 command/indication	H.245 equivalent
CCA	Send makeMeChair .
CIS	Send cancelMakeMeChair .
CIT	Send grantedChairToken from makeMeChairResponse .
CCR	Send deniedChairToken from makeMeChairResponse if in response to makeMeChairRequest , otherwise send withdrawChairToken .
CCD	Send dropTerminal .
CCK	Send dropConference .
CIR	Send terminalDropReject .
CIC (cap)	Send chairControlCapability from MiscellaneousCapability .
TIF	Send requestForFloor . In reverse direction floorRequested or requestForFloor should cause a TIF to be sent to the SCN.

A.5.2.4.6 Data Channel Related C&I

H.230 command/indication	H.245 equivalent
DCA-L,DIT-L,DCR-L,DIS-L,DCC-L	FFS
DCA-H,DIT-H,DCR-H,DIS-H,DCC-H	FFS
DCM (sent by Gateway to SCN)	The H.323 terminal sends a RequestMode with a dataMode of t120 and a DataModeProtocol of SeparateStack to the Gateway. The H.323 Gateway sends a DCM to the attached MCU or terminal. When the MLP rate command and T120_on have been received by the Gateway, it sends OpenLogicalChannel to the H.323 terminal to open a t120 channel and uses the channel maxBitRate to constrain the LAN to SCN data flow to match the signalled MLP channel rate.

H.230 command/indication	H.245 equivalent
DCM (received by Gateway from SCN)	<p>This implies that the H.323 Gateway is acting as an MCU; the Gateway sends RequestMode with dataMode of t120 and a DataModeProtocol of SeparateStack. Since it is in receipt of multipointModeCommand the H.323 endpoint responds with an OpenLogicalChannel to the Gateway. At the same time, the Gateway sends an MLP rate command and T120_on to the H.320 SCN side endpoint to open the MLP channel and turn on T.120.</p> <p>Alternatively, the GW/MCU could send OpenLogicalChannel to the H.323 endpoint.</p>

A.5.2.5 Channel Aggregation C&I

Table A.1/H.230 command/indication	H.245 equivalent
AggIN	FFS
NII	FFS
RIR	Received if H.323 Gateway is acting as a master MCU on the SCN; an H.245 equivalent is FFS.
RID	Not applicable
RIU	Received if H.323 Gateway is acting as a master MCU on the SCN; an H.245 equivalent is FFS.

A.5.2.6 Transfer of Network Address C&I

Table A.1/H.230 command/indication	H.245 equivalent
MIL	Not applicable
NCA-i, NCA-a, NIS, NIC, NID, NIR	Not applicable
NIA-s, NIQ-s, NIQ-m	Not applicable
NIA-m	Not applicable
NIAP	Not applicable
AU_MAP	Not applicable
AU_COM	Not applicable

A.6 Mapping H.323 Call Control (H.225.0) to H.320 Call Control on N-ISDN (Q.931)

The Gateway shall terminate the Q.931 Call Signalling Channel between an H.323 endpoint and the Gateway on one hand and the call signalling channel (if any) between the Gateway and the SCN endpoint on the other. The following applies only if the SCN side supports a call signalling protocol such as Q.931 or Q.2931.

The Gateway shall conform to the call signalling procedures recommended for the SCN side independent from the LAN side. The Gateway shall conform to the call signalling procedures of this Recommendation for the LAN side independent from the SCN side.

In addition, call signalling messages received from one side (LAN/SCN) may require forwarding to the other side (SCN/LAN). Some forwarded messages may contain information elements or parts of information elements which are unmodified or uninterpreted by the Gateway. Other forwarded messages may contain modified information elements or parts of information elements which may be added or removed by the Gateway, as required.

In the following, an overview of the actions to be taken by the Gateway in response to Q.931 messages and the information elements, is provided. Messages and information elements that are forbidden in H.225.0 are not considered.

Q.931 messages originating on the H.323 side:

- A SETUP message side shall lead to initiation of call setup procedure for the SCN side contingent upon proper endpoint authorization to use the Gateway and the approval of a Gatekeeper via the ARQ/ACF sequence if the Gateway is registered to one.
- A RELEASE COMPLETE shall lead to initiation of the call disconnect as defined for the SCN side.
- A CALL PROCEEDING message shall be forwarded to the SCN side. This shall not be done if a CALL PROCEEDING has been sent before to the SCN in compliance to the respective SCN specification (Q.931 in the ISDN case).
- A CONNECT message shall be forwarded to the SCN side upon receipt from an H.323 endpoint if it has not already been sent.
- The Gateway is required to respond to a calling H.323 endpoint in either CONNECT, RELEASE COMPLETE, CALL PROCEEDING or ALERTING. Hence, if the connection on the SCN takes longer than the H.225.0 specified time-out, CALL PROCEEDING shall be sent to the calling H.323 endpoint.
- A CONNECT ACKNOWLEDGE message shall be sent to the SCN in compliance with the respective SCN specification. CONNECT ACKNOWLEDGE is forbidden on the LAN.
- Messages for supplementary services (FACILITY, NOTIFY, and the INFORMATION messages) that are not processed by the Gateway, should be forwarded to the SCN side.
- All messages forbidden to be originated from an H.323 endpoint shall be generated by the Gateway autonomously as required by the SCN protocol.

The information elements of the respective messages are to be converted as follows:

- The contents of connection specific information elements (such as Call Reference Value) shall be adapted as required by the SCN protocol.
- Information elements that are not in use on the H.323 side shall be generated by the Gateway as required by the SCN protocol.
- Translation of other information elements shall be done as required by the SCN protocols and procedures. Where interoperability is not an issue, conversion is left to the discretion of the manufacturer.
- Only the user-data part of the user-user information element shall be forwarded to the SCN side. It shall be re-encoded following Figure 4-36/Q.931 and Table 4-26/Q.931.

All call signalling messages originating on the SCN side should be forwarded to the H.323 endpoint without modification except for the following:

- Messages forbidden by Table 4/H.225.0 shall not be passed to the H.323 side.
- The call reference value shall be mapped to the appropriate value for the H.323 side.
- The user data field is copied into the corresponding ASN.1 user-user information element structure.
- The user-user information element structure shall be generated according to the specification in Recommendation H.225.0.

A.7 Inward and outward calling

A.7.1 Inward calling

There are many strategies for accepting a H.320 call from the SCN, determining the H.323 endpoint which is being dialled, and routing a call to the desired destination. Some example methods include H.320 BAS code processing, Direct Inward Dialling (DID), Multiple Subscriber Number (MSN), and ISDN sub-addressing.

A.7.1.1 H.320 BAS Code processing

When accepting a call from the SCN and using the H.320 BAS Code method for extracting the destination location, the Gateway should have multiple strategies for querying the calling endpoint for an extension. Although H.230 includes TCS-4 (Request Remote Extension) and its associated response, many existing H.320 systems do not support this optional H.320 request. To account for this, a Gateway should have the capability to prompt for an extension via an audio prompt and then collect the extension via DTMF signalling.

To accomplish this, a Gateway may request a remote extension from a caller via the TCS-4 command at the same time it plays an audio prompt requesting the extension information. The Gateway should then be prepared to retrieve the intended destination by either DTMF tone detection or by the reception of an IIS message indicating the desired H.323 endpoint. If the endpoint does not provide the intended location by either method, the Gateway should route the call to an operator or have some other means to deal with the inbound call.

NOTE – TCS-4/IIS support is mandatory for a H.323 to H.320 Gateway. DTMF support is optional for a H.323 to H.320 Gateway.

A.7.1.2 Calling an H.323 MC

If a H.323 Gateway connects an inbound H.320 call to a H.323 endpoint that has an active MC, the Gateway should act as an MCU to its attached H.320 endpoint.

H.323 Gateways should pass the H.245 multipointConference command from the H.323 link to the H.320 link as a H.230 MCC command when it is received. Failure to do so could lead to interoperability problems for H.320 endpoints participating in a H.323 multipoint call.

A.7.2 Outward calling

A.7.2.1 Calling an H.320 MCU

A H.323 Gateway should determine the type of H-Series device it is connecting with before it responds to a H.323 setup message. If the H-Series device is a MCU, then the Gateway should indicate that it is a H.323 MCU in its H.245 Master/Slave terminal type. In this situation, the T.120 top provider will either be in the H-Series MCU, or be in an MCU which is cascaded to it. If the H-series device is not an MCU, then the Gateway should signal that it has no MC. If the H.323 endpoint has an active MC, then the Gateway should act as an MCU to its attached H-Series endpoint.

Failing to alter the device type in the H.245 Master/Slave negotiation, can lead to a situation where a H.323 terminal becomes the MC of a conference in which it is attached to a H.320 MCU through a Gateway. While this call can operate if the Gateway shields the two sides of the call from each other, it cannot handle requested mode changes by the MCU like switching from CIF to QCIF unless the Gateway can transcode or the terminal, which could think it is a MC, has advertised transmit capabilities and is willing to accept a request mode command.

H.323 Gateways should pass the H.230 MCC command from the H.320 link to the H.323 link as a H.245 multipointConference command when it is received. Failure to do so ~~will~~ could lead to interoperability problems for H.323 endpoints participating in a H.320 multipoint call.

A.7.2.2 Calling another Gateway

To allow for the case of a H.323 endpoint dialling through two Gateways and then back to another H.323 terminal, a H.320 to H.323 Gateway shall support the TCS4/IIS H.230 BAS commands so that the remote extension can be passed between the Gateways.

A.8 Securing encrypted connections between H.320 and H.323 terminals

For further study.

[End Correction]

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