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

**Gateway control protocol: ITU-T H.248.1
packages for ITU-T H.323 and ITU-T H.324
interworking**

Recommendation ITU-T H.248.12



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Recommendation ITU-T H.248.12

Gateway control protocol: ITU-T H.248.1 packages for ITU-T H.323 and ITU-T H.324 interworking

Summary

Recommendation ITU-T H.248.12 defines several ITU-T H.248.1 packages that are intended for media gateways (MGs) designed to support interworking between ITU-T H.323 terminals and ITU-T H.324 terminals. More specifically, this Recommendation contains: package "h324" for creating terminations supporting ITU-T H.324, package "h245" for creating terminations supporting ITU-T H.245 channels for ITU-T H.324 calls, package "h323bc" for creating terminations supporting ITU-T H.245 channels for ITU-T H.323 calls, package "h245com" for the communication of ITU-T H.245 commands between a media gateway controller (MGC) and an MG, and package "h245ind" for the communication of ITU-T H.245 indications.

This revision allows the MGC to request the MG to report when the h223Skewindication parameter exceeds a certain amount.

History

Edition	Recommendation	Approval	Study Group
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1.3	ITU-T H.248.12 (2001) Amd. 2	2007-08-29	16
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Introduction

This Recommendation gathers packages for ITU-T H.245, ITU-T H.245 parameters specific to ITU-T H-series audiovisual terminals, and Annex C of ITU-T H.324 terminals for use with the ITU-T H.248.1 gateway control protocol. The packages in this Recommendation are in conformance with clause 12 of ITU-T H.248.1 package definition guidelines.

Amendment 1 introduced extended ITU-T H.324, ITU-T H.245 command and ITU-T H.245 indication packages for interworking with ITU-T H.324 terminals having different ITU-T H.324 capabilities, when the interworking function is handled by the media gateway controller (MGC).

Amendment 2 introduced an ITU-T H.245 transport package that allows ITU-T H.245 signalling to be sent between an MGC and a media gateway (MG) across ITU-T H.248.

Recommendation ITU-T H.248.12

Gateway control protocol: ITU-T H.248.1 packages for ITU-T H.323 and ITU-T H.324 interworking

1 Scope

This Recommendation describes packages for the ITU-T H.248.1 gateway control protocol related to interworking of ITU-T H.323 and ITU-T H.324 terminals, as follows:

- Package "h324" for termination of ITU-T H.324 bitstream on MGs.
- Package "h245" for termination of ITU-T H.245 messages on MGs.
- Package "h323bc" for ITU-T H.245 parameters specific to ITU-T H.323.
- Package "h245com" for providing properties that allow the MGC to indicate to the MG that the MGC has sent or received an ITU-T H.245 command.
- Package "h245ind" for providing properties that allow the MGC to indicate to the MG that the MGC has sent or received an ITU-T H.245 indication.

With the terminations implementing "h324", "h245com" and "h245ind" packages, the decomposed gateway may support ITU-T H.324 communication with the ITU-T H.245 control function in the MGC. In the ITU-T H.324 and ITU-T H.323 interworking scenario with this decomposed gateway, ITU-T H.245 control messages are terminated in the MGC (a backhaul is used between the MG and the MGC to transport ITU-T H.245 messages between the MG and the MGC, on the ITU-T H.324 side). The terminations for media on both ITU-T H.324 and ITU-T H.323 sides are managed by the MGC.

With the terminations implementing "h324" and "h245" packages, the decomposed gateway may support ITU-T H.324 communication with ITU-T H.245 control in the MG. In the ITU-T H.324 and ITU-T H.323 interworking scenario with this decomposed gateway, ITU-T H.245 control messages from the ITU-T H.324 side and the ITU-T H.323 side are terminated in the "h245" termination and in the "h323bc" termination respectively, and are processed in the MG. The MG manages the logical channels for media.

Annex A describes the extended ITU-T H.324, ITU-T H.245 command and ITU-T H.245 indication packages for interworking with ITU-T H.324 terminals having different ITU-T H.324 capabilities, when the interworking function is handled by the MGC.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T H.223] Recommendation ITU-T H.223 (2001), *Multiplexing protocol for low bit rate multimedia communication*.

[ITU-T H.245] Recommendation ITU-T H.245 (2006), *Control protocol for multimedia communication*.

[ITU-T H.248.1] Recommendation ITU-T H.248.1 (2002), *Gateway control protocol: Version 2*

- [ITU-T H.248.15] Recommendation ITU-T H.248.15 (2002), *Gateway control protocol: SDP H.248 package attribute*.
- [ITU-T H.323] Recommendation ITU-T H.323 (2000), *Packet-based multimedia communications systems*.
- [ITU-T H.324] Recommendation ITU-T H.324 (2005), *Terminal for low bit-rate multimedia communication*.
- [ITU-T V.8] Recommendation ITU-T V.8 (2000), *Procedures for starting sessions of data transmission over the public switched telephone network*.
- [ITU-T V.8bis] Recommendation ITU-T V.8bis (2000), *Procedures for the identification and selection of common modes of operation between data circuit-terminating equipments (DCEs) and between data terminal equipments (DTEs) over the public switched telephone network and on leased point-to-point telephone-type circuits*.
- [ITU-T V.34] Recommendation ITU-T V.34 (1998), *A modem operating at data signalling rates of up to 33 600 bit/s for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits*.
- [ITU-T V.42] Recommendation ITU-T V.42 (1996), *Error-correcting procedures for DCEs using asynchronous-to-synchronous conversion*.
- [ITU-T V.42bis] Recommendation ITU-T V.42bis (1990), *Data compression procedures for data circuit-terminating equipment (DCE) using error correction procedures*
- [ITU-T V.140] Recommendation ITU-T V.140 (1998), *Procedures for establishing communication between two multiprotocol audiovisual terminals using digital channels at a multiple of 64 or 56 kbit/s*.
- [ITU-T X.691] Recommendation ITU-T X.691 (2002), *Information technology – ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)*.
- [IETF RFC 2327] IETF RFC 2327 (1998), *SDP: Session Description Protocol*.

3 Definitions

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ACK	Acknowledgement
CCSRL	Control Channel Segmentation and Reassembly Layer
IP	Internet Protocol
ISDN	Integrated Services Digital Network
LAPM	Link Access Procedures for Modems (per [ITU-T V.42])
LC	Logical Channel
LSB	Least Significant Bit
MG	Media Gateway
MGC	Media Gateway Controller
MSB	Most Significant Bit

MUX	MUltipleX
NSRP	Numbered Simple retransmission protocol Response Frames
PDU	Protocol Data Unit
PER	Packed Encoding Rules
PSTN	Public Switched Telephone Network
RTP	Real-time Transport Protocol
SCTP	Stream Control Transmission Protocol
SRP	Simple Retransmission Protocol
TCS	Terminal Capability Set
TDM	Time Division Multiplexing

5 ITU-T H.324 package

Package name:	H.324
Package ID:	h324 (0x002c)
Version:	1
Extends:	None
Description:	This package is defined to support terminations for calls using [ITU-T H.324]. The transport mechanism or bearer channel will be different for each environment where the package is used.

Figure 1 shows the functional view of an ITU-T H.324 multimedia call and the MGC control points defined in the ITU-T H.324 package. In [ITU-T H.324], there are three communication modes defined according to the underlying network: a PSTN mode defined in ITU-T H.324 main body (H.324P), a mobile network mode defined in Annex C of [ITU-T H.324] (ITU-T H.324M), and an ISDN mode defined in Annex D of [ITU-T H.324] (ITU-T H.324I). One of these communication modes shall be selected when the termination implementing the ITU-T H.324 package is invoked by the MGC.

In version 1 of the ITU-T H.324 package, only the functionalities required of the ITU-T H.324M mode are defined. The functionalities for ITU-T H.324P and ITU-T H.324I are for further study and will be defined in version 2, or at a later date.

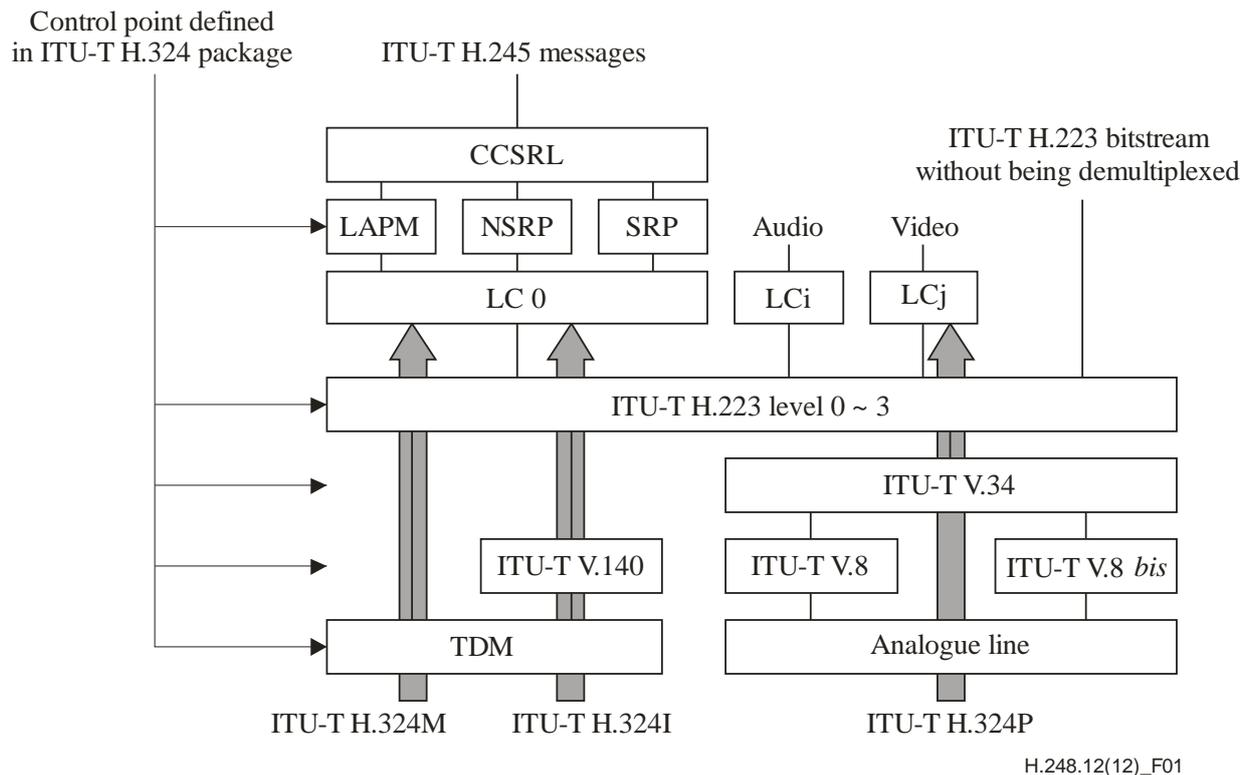


Figure 1 – Control point defined in ITU-T H.324 package

5.1 Properties

5.1.1 Communication mode

Property name: Communication mode

Property ID: cmod (0x0001)

Type: Enumeration

Possible values: H324P (0x0001): H324 operating in the base PSTN mode using a V-series modem
H324M (0x0002): Annex C of [ITU-T H.324] (Mobile)
H324I (0x0003): Annex D of [ITU-T H.324] (ISDN)

Default: Provisioned

Defined in: TerminationState

Characteristics: Read/Write

Description: This property indicates the communication mode to be followed by the termination.

5.1.2 Highest Multiplexing Level

Property name: Highest Multiplexing level

Property ID: muxlv (0x0002)

Type: Enumeration

Possible values: Level0 (0x0001): ITU-T H.223 level 0 defined in [ITU-T H.223]
Level1 (0x0002): ITU-T H.223 level 1 defined in Annex A of [ITU-T H.223]
Level2 (0x0003): ITU-T H.223 level 2 defined in Annex B of [ITU-T H.223]
Level3 (0x0004): ITU-T H.223 level 3 defined in Annex C of [ITU-T H.223]

Default: Level0

Defined in: TerminationState

Characteristics: Read/Write

Description: This property indicates the highest level of ITU-T H.223 multiplexing which can be used by the termination. The indicated level is used in the multiplex level initialization phase as defined in clause C.6 of [ITU-T H.324]. If the communication mode property is set to 'H324P' or 'H324I', the value of the highest multiplexing level property shall be set to 'Level0'.

5.1.3 Demultiplex

Property name: Demultiplex

Property ID: demux (0x0003)

Type: Boolean

Possible values: TRUE (0x0001): ITU-T H.223 multiplexed stream is demultiplexed
FALSE (0x0000): ITU-T H.223 multiplexed stream is not demultiplexed

Default: TRUE

Defined in: LocalControl

Characteristics: Read/Write

Description: This property specifies the operation on the ITU-T H.223 multiplexed stream received by the termination. If set to 'FALSE', the ITU-T H.223 multiplexed stream is relayed to the other termination without being demultiplexed. If set to 'TRUE', each logical channel data is extracted from the multiplexed stream, and is given to the appropriate termination.

5.1.4 Remote ITU-T H.223 capability

Property name: Remote ITU-T H.223 capability

Property ID: h223capr (0x0004)

Type: Octet String

Possible values: This property indicates the value of the ITU-T H.245 H223Capability structure encoded by applying the Packed Encoding Rules (PER) specified in [ITU-T X.691].

Defined in: LocalControl

Characteristics: Read/Write

Description: This property indicates the remote endpoint's capabilities specific to the ITU-T H.223 multiplex capability. The MGC shall set the value of the 'h223capr' property to the value of the H223Capability in the received ITU-T H.245 message.

5.1.5 Incoming Multiplex Table

Property name: Incoming Multiplex Table

Property ID: muxtbl_in (0x0005)

Type: Octet String

Possible values: This property indicates the value of ITU-T H.245 MultiplexEntrySend message received by the MGC (see description for details). The MultiplexEntrySend structure is encoded by applying PER.

Default: Provisioned

Defined in: LocalControl

Characteristics: Read/Write

Description: This property indicates the ITU-T H.223 multiplex table which associates each octet within an ITU-T H.223 MUX-PDU with a particular logical channel number. Upon receipt of the MultiplexEntrySend message from the remote endpoint, the MGC shall decide whether it confirms or rejects each multiplex table entry. The MGC shall create an equivalent MultiplexEntrySend message that contains only the entries that it confirmed to the remote ITU-T H.324 terminal and the MGC shall send the created message as the content of the muxtbl_in property so that the MG can perform the demultiplexing of the incoming ITU-T H.223 MUX-PDUs.

5.1.6 Outgoing Multiplex Table

Property name: Outgoing Multiplex Table

Property ID: muxtbl_out (0x0006)

Type: Octet String

Possible values: This property indicates the value of ITU-T H.245 MultiplexEntrySend message sent by the MGC (see description for details). The MultiplexEntrySend structure is encoded by applying PER.

Default: Provisioned

Defined in: LocalControl

Characteristics: Read/Write

Description: This property indicates the ITU-T H.223 multiplex table which associates each octet within an ITU-T H.223 MUX-PDU with a particular logical channel number. Upon receipt of the MultiplexEntrySendAck message from the remote endpoint, the MGC shall send multiplex table entries which are confirmed by the remote endpoint as the content of the muxtbl_out property. Thus, the MG can perform the multiplexing of the outgoing ITU-T H.223 MUX-PDUs.

5.2 Events

None.

5.3 Signals

None.

5.4 Statistics

5.4.1 MUXPDU sent

Statistics ID: muxsent (0x0001)

Type: Integer

Units: number of MUX-PDUs

Description: Number of MUX-PDUs sent from the termination.

5.4.2 MUXPDU received

Statistics ID: muxrec (0x0002)

Type: integer

Units: number of MUX-PDUs

Description: Number of MUX-PDUs received by the termination.

5.4.3 MUXPDU error

Statistics ID: muxerr (0x0003)

Units: number of MUX-PDUs

Description: Number of the received MUX-PDU in which MUX-PDU header error is detected.

5.5 Procedures

The MGC shall create an ITU-T H.324 termination with the appropriate value of the "cmod" property. The MG shall establish the connection according to procedures defined in [ITU-T H.324] for the communication mode indicated by the 'cmod' property.

For version 1 of the package, only H324M mode is supported.

After the connection is established with the 'H324M' communication mode of, the MG shall immediately start the ITU-T H.223 level set-up procedure as defined in Annex C of [ITU-T H.324] according to the value of the 'muxlv' property. After agreement of ITU-T H.223 multiplexing level, the MG shall start to receive and transmit ITU-T H.223 MUX-PDUs.

If the 'demux' property is set to 'FALSE', the received MUX-PDUs should be passed to the termination connected to the ITU-T H.324 termination without being demultiplexed. If the 'demux' property is set to 'TRUE', the MG shall demultiplex the received MUX-PDUs to logical channels. The first logical channel opened after the connection is established, is logical channel 0 for ITU-T H.245 control messages. The MGC may choose whether ITU-T H.245 control is located in the MGC or in the MG.

If the MGC decides to allow the MG to manage ITU-T H.245 control, the termination which implements the ITU-T H.245 package shall be invoked and connected to the ITU-T H.324 termination. The ITU-T H.245 messages are exchanged between the remote endpoint and the ITU-T H.245 termination via the ITU-T H.324 termination, and the media logical channels may be opened or closed without indication from the MGC.

If the MGC decides to execute ITU-T H.245 control on itself, the MGC shall not invoke the ITU-T H.245 termination connected to the ITU-T H.324 termination. The ITU-T H.245 messages received/transmitted by the ITU-T H.324 termination are forwarded to/from the MGC. The MG shall control the ITU-T H.223 operation according to the 'h223capr' property indicated by the MGC. The 'muxtbl' property shall be used to inform the MG of the incoming/outgoing multiplex table entry.

6 ITU-T H.245 package

Package name: H.245
Package ID: h245 (0x002a)
Version: 1
Extends: None
Description: This package is defined to support MGC-MG configurations where ITU-T H.245 messages are received on the MG device. This package shall be implemented only if the MG supports the scenario where the ITU-T H.245 control function is in the MG. This package shall not be used for ITU-T H.324 communication where the ITU-T H.245 control is in the MGC.

6.1 Properties

6.1.1 ITU-T H.245 channel state

Property ID: cs (0x0001)
Type: Boolean
Possible values: TRUE (0x0001): The ITU-T H.245 channel is open
FALSE (0x0000): Close the ITU-T H.245 channel
Default: TRUE
Defined in: TerminationState
Characteristics: Read/Write
Description: This property specifies whether the ITU-T H.245 termination is open or closed.

6.1.2 Terminal Type

Property ID: termtype (0x0002)
Type: Enumeration
Possible values: H.324M (0x0001): ITU-T H.245 termination is associated with an ITU-T H.324M terminal
H.323 (0x0002): ITU-T H.245 termination is associated with an ITU-T H.323 terminal/endpoint
Default: Provisioned
Defined in: TerminationState
Characteristics: Read/Write

Description: This property defines the type of terminal that is associated with this termination. In this version of the package only two terminal types are defined, but the possible values may be extended in future versions of the package.

6.2 Events

6.2.1 ITU-T H.245 message

Event name: Incoming H.245 message

Event ID: h245msg (0x0001)

Description: This event occurs when the MG detects an incoming ITU-T H.245 message on the termination realizing this package.

EventsDescriptor parameters:

Parameter name: Type of H.245 Message to be detected

Parameter ID: h245mt (0x0001)

Type: Sub-list

Possible values:

Value for binary encoding	Value for text encoding	Description
0xffff	"none"	No ITU-T H.245 Messages
0x0001	"all"	All ITU-T H.245 Messages
0x0002	"Req"	All ITU-T H.245 Request Messages
0x0003	"Res"	All ITU-T H.245 Response Messages
0x0004	"Com"	All ITU-T H.245 Command Messages
0x0005	"Ind"	All ITU-T H.245 Indication Messages
0x0006	"NSreq"	Non-Standard Request
0x0007	"MSD"	Master Slave Determination
0x0008	"TCS"	Terminal Capability Set Request
0x0009	"OLC"	Open Logical Channel Request
0x000a	"CLC"	Close Logical Channel Request
0x000b	"RCC"	Request Channel Close Request
0x000c	"MES"	Multiplex Entry Send Request
0x000d	"RME"	Request Multiplex Entry Request
0x000e	"RM"	Request Mode Request
0x000f	"RTD"	Roundtrip Delay Request
0x0010	"ML"	Maintenance Loop Request
0x0011	"CM"	Communication Mode Request
0x0012	"CR"	Conference Request
0x0013	"MR"	Multilink Request
0x0014	"LCR"	Logical Channel Rate Request
0x0015	"NSres"	Non-Standard Response
0x0016	"MSDack"	Master Slave Determination Ack

0x0017	"MSDrej"	Master Slave Determination Reject
0x0018	"TCSack"	Terminal Capability Set Ack
0x0019	"TCSrej"	Terminal Capability Set Reject
0x001a	"OLCack"	Open Logical Channel Ack
0x001b	"OLCrej"	Open Logical Channel Reject
0x001c	"CLCack"	Close Logical Channel Ack
0x001d	"RCCack"	Request Channel Close Ack
0x001e	"RCCrej"	Request Channel Close Reject
0x001f	"MESack"	Multiplex Entry Send Ack
0x0020	"MESrej"	Multiplex Entry Send Reject
0x0021	"RMEack"	Request Multiplex Entry Ack
0x0022	"RMErej"	Request Multiplex Entry Reject
0x0023	"RMack"	Request Mode Ack
0x0024	"RMrej"	Request Mode Reject
0x0025	"RTDres"	Roundtrip Delay Response
0x0026	"MLack"	Maintenance Loop Ack
0x0027	"MLrej"	Maintenance Loop Reject
0x0028	"CMres"	Communication Mode Response
0x0029	"Cres"	Conference Response
0x002a	"MLres"	Multilink Response
0x002b	"LCRack"	Logical Channel Rate Ack
0x002c	"LCRrej"	Logical Channel Rate Reject
0x002d	"NScom"	Non-Standard Command
0x002e	"MLO"	Maintenance Loop Off Command
0x002f	"STCS"	Send Terminal Capability Set Command
0x0030	"ENC"	Encryption Command
0x0031	"FC"	Flow Control Command
0x0032	"ES"	End Session Command
0x0033	"MC"	Miscellaneous Command
0x0034	"CMcom"	Communication Mode Command
0x0035	"Ccom"	Conference Command
0x0036	"h223MR"	H223 Multiplex Reconfiguration Command
0x0037	"NAVcom"	New ATM VC Command
0x0038	"MMRcom"	Mobile Multilink Reconfiguration Command
0x0039	"NSind"	Non-Standard Indication
0x003a	"FNU"	Function Not Understood
0x003b	"MSDrel"	Master Slave Determination Release
0x003c	"TCSrel"	Terminal Capability Set Release
0x003d	"OLCcon"	Open Logical Channel Confirm
0x003e	"RCCrel"	Request Channel Close Release
0x003f	"MESrel"	Multiplex Entry Send Release
0x0040	"RMErel"	Request Multiplex Entry Release

0x0041	"RMrel"	Request Mode Release
0x0042	"MI"	Miscellaneous Indication
0x0043	"JI"	Jitter Indication
0x0044	"h223SI"	H223 Skew Indication
0x0045	"NAVind"	New ATM VC Indication
0x0046	"UII"	User Input Indication
0x0047	"H2250MSI"	H2250 Maximum Skew Indication
0x0048	"MCL"	MC Location Indication
0x0049	"CI"	Conference Indication
0x004a	"VI"	Vendor Identification
0x004b	"FNS"	Function Not Supported
0x004c	"MLI"	Multilink Indication
0x004d	"LCRrel"	Logical Channel Rate Release
0x004e	"FCind"	Flow Control Indication
0x004f	"MMRind"	Mobile Multilink Reconfiguration Indication

Default: ES

Description: This parameter defines the type of message(s) that the MGC wants the MG to detect. The MGC may specify "all" if it wants the MG to detect and notify for all the ITU-T H.245 messages received on the ITU-T H.245 termination. The MGC may specify "Req", "Res", "Com" or "Ind" if it wants the MG to detect all the ITU-T H.245 Request messages, all the ITU-T H.245 Response messages, all the ITU-T H.245 Command messages, or all the ITU-T H.245 Indication messages received on the ITU-T H.245 termination. Alternatively, the MGC may specify a more specific list of messages for which it wants to be notified by the MG. In principle, the MGC should not specify individual messages if it uses "all" or "none" in the sub-list. "none" or "all", if present, should be the only element in the sub-list. There may be situations where the MGC wants all the ITU-T H.245 Requests to be detected along with some other ITU-T H.245 messages; this is allowed in the sub-list. The MG should ignore all the other elements in the sub-list if "none" is present. If "none" is not present, but "all" is present, the MG should ignore all other elements in the sub-list. The MG should also ignore all elements that specify individual ITU-T H.245 Request messages, if the element "Req" is present in the sub-list. The same is true with the presence of "Res", "Com" or "Ind", wherein the MG should ignore elements specifying individual ITU-T H.245 Responses, Commands or Indications. Support for the event notification of commands is optional. Support for the event notification of the EndSession command is recommended in order to ensure smooth call release.

ObservedEventsDescriptor parameters:

Parameter name: Contents of H.245 message detected

Parameter ID: h245mc (0x0002)

Type: Octet String

Description: Specifies the actual contents of the ITU-T H.245 message detected by the MG. The octet string is the actual X.691 encoding received by the MG.

6.2.2 ITU-T H.245 Channel Closed

Event name: H.245 Channel Closed

Event ID: h245ChC (0x0002)

Description: This event occurs when the MG completes the closing of an ITU-T H.245 channel.

EventsDescriptor Parameters: None

ObservedEventsDescriptor Parameters: None

6.3 Signals

None.

6.4 Statistics

None.

6.5 Procedures

This package may be used on terminations that carry ITU-T H.245 information, if the MGC wants to process this information on the MG. The MGC may ask the MG for notification on detecting a particular type of ITU-T H.245 message on the h245 termination.

The MGC shall set the "cs" (Channel State) property to true initially. When the MGC wants the MG to close the ITU-T H.245 channel, it shall modify the value of the "cs" property to "FALSE". The MG shall follow the procedures defined in Annex F of [ITU-T H.246] to close the ITU-T H.245 channel.

7 ITU-T H.323 Bearer Control package

Package name: H.323 Bearer Control

Package ID: h323bc (0x002b)

Version: 1

Extends: None

Description: This package specifies an extension to the h245 package to support ITU-T H.323 fast start and the ITU-T H.323 use of ITU-T H.245 tunnelling. This package shall be implemented only if the MG supports ITU-T H.323 communication where the ITU-T H.245 control function is in the MG. This package shall not be used for ITU-T H.323 communication where the ITU-T H.245 control is in the MGC.

7.1 Properties

7.1.1 Fast Connect

Property ID: fastconnect (0x0001)

Type: Enumeration

Possible values: noFastStart (0x0001): MGC using separate ITU-T H.245 channel or using ITU-T H.245 tunnelling
fastStart (0x0002): Only fastStart procedures are being used, no parallel ITU-T H.245control
parallelH245 (0x0003) Parallel ITU-T H.245 control is supported

Default: noFastStart

Defined in: LocalControl

Characteristics: Read/Write

Description: This property specifies if the fast connect procedure is used. If the MGC rejects or does not initiate the fast connect procedure, this field shall contain "noFastStart". This property indicates to the MG that the MGC has decided to use ITU-T H.245 tunnelling or a separate channel for ITU-T H.245 to the ITU-T H.323 endpoint. If the MGC accepts or initiates a request for the fast connect procedure, this field shall be set to "fastStart". If however the MGC also decides to support the parallel ITU-T H.245 procedures along with fast connect, this field shall be set to "parallelH245".

7.1.2 ITU-T H.245 Message Encapsulation

Property ID: h245encapstatus (0x0002)

Type: Boolean

Possible values: FALSE (0x0000): ITU-T H.245 message encapsulation is disabled
TRUE (0x0001): ITU-T H.245 message encapsulation is enabled

Default: FALSE

Defined in: LocalControl

Characteristics: Read/Write

Description: This property specifies whether ITU-T H.245 message encapsulation is enabled or not enabled on the connection to the ITU-T H.323 endpoint. Practically this property reflects the value of **h245Tunneling** element in the ITU-T H.225.0 messages.

7.2 Events

Event name: Switch to separate H.245 channel

Event ID: sepH245 (0x0001)

Description: The MG shall notify the MGC with this event when the MG requires the opening of a separate ITU-T H.245 channel to the ITU-T H.323 endpoint. This typically happens in a case where the call was set-up using fastStart procedures and the ITU-T H.245 message tunnelling was disabled. The MGC shall ignore this event if a separate ITU-T H.245 channel is already open to the ITU-T H.323 endpoint.

7.3 Signals

None.

7.4 Statistics

None.

7.5 Procedures

This package supports various ways to start ITU-T H.245 procedures as specified in clause 8.2 of [ITU-T H.323]. The termination that realizes this package shall be made if and only if the processing of ITU-T H.245 messages from the ITU-T H.323 side of the gateway is to be performed in the MG. In the following description, it is premised that the MGC requests the creation of the termination that terminates ITU-T H.245 control.

The MGC that decides to utilize ITU-T H.245 tunnelling or initiates a separate ITU-T H.245 channel with the ITU-T H.323 side, shall generate the termination with the 'fastconnect' property set to the value "noFastStart".

The MGC that decides to use the fast connect procedure shall request the creation of a termination that has the value of the 'fastconnect' property set to other than "noFastStart" according to the procedure to be taken.

If the MGC decides to use ITU-T H.245 tunnelling or fast connect procedures (with or without parallelH245), ITU-T H.245 messages shall terminate at the MGC, and the MGC shall be responsible for redirecting ITU-T H.245 messages to the H323bc termination at the MG. The MGC can implement this ITU-T H.245 message redirection by using one of its own addresses as the remote address of the h323bc termination when this is created.

The MGC shall indicate a switch to a separate ITU-T H.245 channel by changing the value of the fastconnect property from "fastStart" or "parallelH245" to "noFastStart", and the value of h245encapstatus property to FALSE (using a MODIFY command). The MGC should not MODIFY the value of the fastconnect property to "fastStart" or "parallelH245" from "noFastStart" if the MG has already received a message on that termination. In the event of a switch from fastStart (or parallel ITU-T H.245) procedures to a **separate ITU-T H.245 channel**, the MGC may need to subtract and request the creation of a new ITU-T H.245 termination. This termination should be a direct ITU-T H.245 channel between the MG and the remote ITU-T H.323 endpoint.

NOTE 1 – A state where value h245encapstatus property is "FALSE", and the value of the fastconnect property is other than "noFastStart", indicates that a switch to a separate ITU-T H.245 channel would be required if any further ITU-T H.245 messages are generated.

NOTE 2 – The intent of this package is that it be used by an MG supporting ITU-T H.323 calls when an ITU-T H.245 termination is needed on the MG. As an optional capability, the MG may also use this package (and the other procedures of this Recommendation) in support of ITU-T H.323 calls that employ Fast Connect or ITU-T H.245 tunnelling. The value for the inherited property "termtype" shall always be ITU-T H.323.

8 ITU-T H.245 Command Package

Package name:	ITU-T H.245 Command
Package ID:	h245com (0x002d)
Version:	1
Extends:	None
Description:	This package defines properties that may be used to indicate that the MGC has sent or received an ITU-T H.245 command message and that the MG should take appropriate action.

8.1 Properties

8.1.1 Incoming MiscellaneousCommand

Property name: Incoming H.245 MiscellaneousCommand
Property ID: misc_in (0x0001)
Type: Octet String
Possible values: This property indicates the value of the ITU-T H.245 MiscellaneousCommand received by the MGC. The MiscellaneousCommand structure is encoded by applying PER.
Default: Provisioned
Defined in: LocalControl
Characteristics: Read/Write
Description: The MG shall take appropriate action as described in clause B.13.5 of [ITU-T H.245].

8.1.2 Outgoing MiscellaneousCommand

Property name: Outgoing H.245 MiscellaneousCommand
Property ID: misc_out (0x0002)
Type: Octet String
Possible values: This property indicates the value of the ITU-T H.245 MiscellaneousCommand sent by the MGC. The MiscellaneousCommand structure is encoded by applying PER.
Default: Provisioned
Defined in: LocalControl
Characteristics: Read/Write
Description: The MG shall take appropriate action as described in clause B.13.5 of [ITU-T H.245].

8.1.3 Incoming H223MultiplexReconfiguration Command

Property name: Incoming H.223MultiplexReconfiguration Command
Property ID: h223mr_in (0x0003)
Type: Octet String
Possible values: This property indicates the value of the H223MultiplexReconfiguration command received by the MGC. The H223MultiplexReconfiguration structure is encoded by applying PER.
Default: Provisioned
Defined in: LocalControl
Characteristics: Read/Write
Description: The MG which supports the ITU-T H.223 level change procedure shall start the dynamic ITU-T H.223 level change procedure as defined in clause C.7 of [ITU-T H.324].

8.1.4 Outgoing H223MultiplexReconfiguration Command

Property name:	Outgoing H.223MultiplexReconfiguration Command
Property ID:	h223mr_out (0x0004)
Type:	Octet String
Possible values:	This property indicates the value of the H223MultiplexReconfiguration command sent by the MGC. The H223MultiplexReconfiguration structure is encoded by applying PER.
Default:	Provisioned
Defined in:	LocalControl
Characteristics:	Read/Write
Description:	The MG which supports ITU-T H.223 level change procedure shall start the dynamic ITU-T H.223 level change procedure as defined in clause C.7 of [ITU-T H.324].

8.2 Events

None.

8.3 Signals

None.

8.4 Statistics

None.

8.5 Procedures

The ITU-T H.245 Command package defines the properties that may be used by the MGC to pass on the ITU-T H.245 commands that it sends or receives to/from the remote terminal. The presence of the property in the LocalDescriptor or the RemoteDescriptor indicates whether the command was sent or received by the MGC (see the descriptions with individual properties for more details).

9 ITU-T H.245 Indication package

Package name:	H.245 Indication
Package ID:	h245ind (0x002e)
Version:	1
Extends:	None
Description:	This package defines properties that may be used to indicate that the MGC has sent or received an ITU-T H.245 indication message and the MG should take appropriate action.

9.1 Properties

9.1.1 Incoming MiscellaneousIndication

Property name:	Incoming H.245 MiscellaneousIndication
Property ID:	misc_in (0x0001)
Type:	Octet String

Possible values: This property indicates the value of the H.245 MiscellaneousIndication received by the MGC. The MiscellaneousIndication structure is encoded by applying PER.

Default: Provisioned

Defined in: LocalControl

Characteristics: Read/Write

Description: The MG shall take appropriate action as described in clause B.14.2 of [ITU-T H.245].

9.1.2 Outgoing MiscellaneousIndication

Property name: Outgoing H.245 MiscellaneousIndication

Property ID: misc_out (0x0002)

Type: Octet String

Possible values: This property indicates the value of the H.245 MiscellaneousIndication sent by the MGC. The MiscellaneousIndication structure is encoded by applying PER.

Default: Provisioned

Defined in: LocalControl

Characteristics: Read/Write

Description: The MG shall take appropriate action as described in clause B.14.2 of [ITU-T H.245].

9.2 Events

None.

9.3 Signals

None.

9.4 Statistics

None.

9.5 Procedures

This package defines the properties that may be used by the MGC to pass on the ITU-T H.245 indications that it sends or receives to/from the remote terminal. The presence of the property in the LocalDescriptor or the RemoteDescriptor indicates whether the command was sent or received by the MGC (see the descriptions with individual properties for more details).

10 Call flows

This clause describes possible configurations of decomposed gateway and its communication procedures.

10.1 ITU-T H.323-[ITU-T H.324] Annex C interworking with [ITU-T H.245] in MG

10.1.1 Calls with origination by the ITU-T H.324 Annex C side

The MG which supports interworking between an ITU-T H.323 and ITU-T H.324 Annex C endpoints may support ITU-T H.245 signalling, ITU-T H.245 messages translation as specified in Annex F of [ITU-T H.246], and resource control (for example, audio/video streams, transcoding units, and so on) without direct commands from the MGC. The MG may support event notification to the MGC, such as the result of opening/closing audio/video logical channels. If the MGC decides to allow the MG to control a resource for an ITU-T H.323-Annex C or ITU-T 324 call, and uses a separate ITU-T H.245 channel on the ITU-T H.323 side, the decomposed gateway configuration looks like that shown in Figure 2. In this case, the MG shall manage audio and video streams without commands from the MGC.

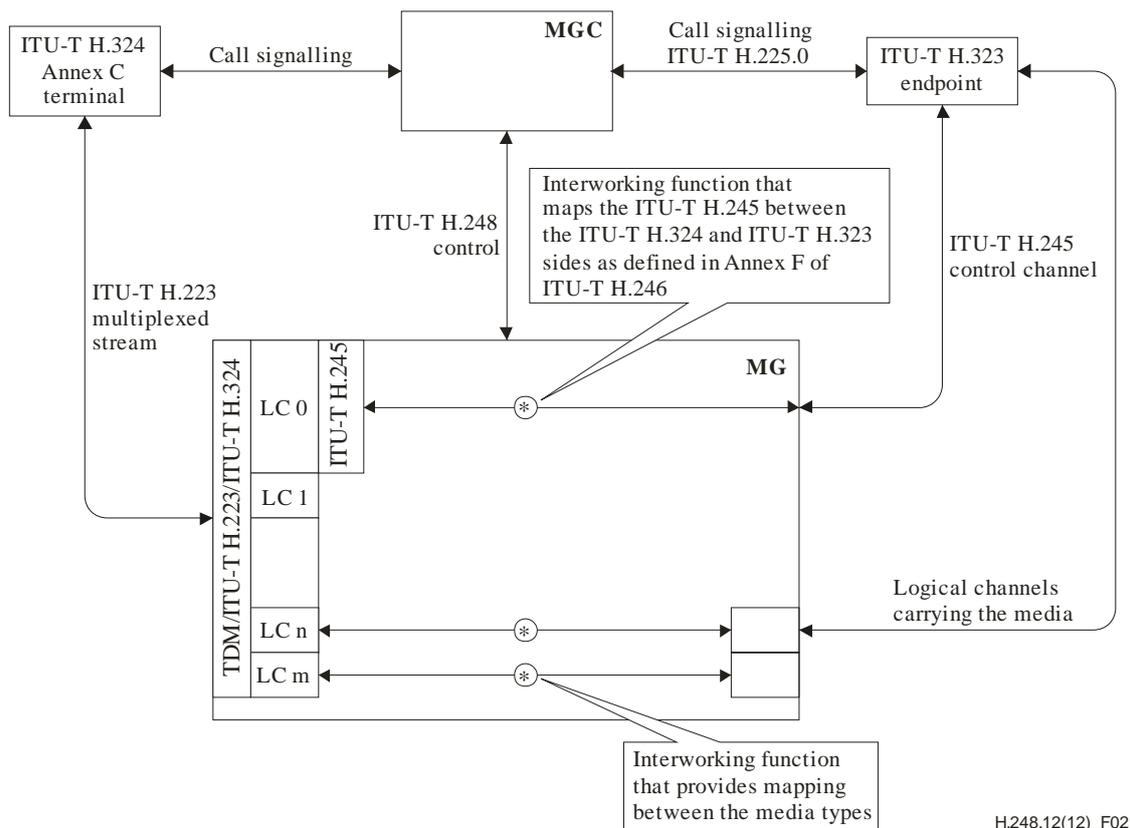


Figure 2 – Resource control at the MG (without fastStart/H.245 tunnelling)

The following steps are involved in a call originated by the ITU-T H.324M side.

- 1) The MGC detects an incoming call from an ITU-T H.324M terminal.
- 2) The MGC shall establish a call using ITU-T H.225.0 with the ITU-T H.323 side without using fastStart or ITU-T H.245 message encapsulation.
- 3) The MGC shall create a TDM termination, specify an appropriate value for h324/Muxlv, and set h324/demux property to TRUE. H.324/cmud shall be set to "H324M" (0x0002).
- 4) The MGC shall create a termination that realizes h245 package and initialize properties to appropriate values. The h245/termtype property shall be set to "H324M". The MGC shall add this termination as the first in the MuxDescriptor of the h324 termination created in step 2).

- 5) The MGC shall create a termination that realizes the h323bc package and set the fastconnect property to "noFastStart", and the h245encapstatus property to FALSE. The MGC assigns appropriate addressing information in both local and remote descriptors according to the values exchanged in the ITU-T H.225.0 channel.
- 6) The MGC shall associate the ITU-T H.245 termination created in step 4) and the h323bc termination created in step 5) in a context.
- 7) The MG shall perform ITU-T H.245 mapping between the two terminations as defined in Annex F of [ITU-T H.246].

If the MGC decides to use ITU-T H.245 tunnelling but no fastStart, it shall set the h245encapstatus to TRUE, and specify the transport address (which may be an IPv4 address) such that a channel is formed between the MG and the MGC. The MGC shall then relay the messages received in the h245Control element of the ITU-T H.225.0 messages to the MG on this channel. The MG can safely treat them as messages originating directly at the remote ITU-T H.323 endpoint. The MGC shall encapsulate any ITU-T H.245 messages received on this channel from the MG in the h245Control field of the ITU-T H.225.0 messages for transport to the ITU-T H.323 endpoint.

10.1.2 Calls with origination by the ITU-T H.323 side

Described in this clause are the four different methods of ITU-T H.323 call set-up:

- conventional ITU-T H.323 call set-up using a separate connection for the ITU-T H.245 channel
- call set-up with ITU-T H.225.0 tunnelling of ITU-T H.245 messages
- Fast Connect
- Fast Connect with the use of ITU-T H.245 tunnelling (i.e., parallel ITU-T H.245).

The following steps are involved for calls originating from the ITU-T H.323 side if no ITU-T H.245 message encapsulation or fast connect procedures are used (i.e., conventional ITU-T H.323 call set-up):

- 1) The MGC detects an incoming call from ITU-T H.323 endpoint.
- 2) The MGC shall establish a call to the ITU-T H.324M terminal.
- 3) The MGC shall create an h324 termination with MediaTx property as TDM Circuit, and specify the appropriate Multiplex level, and Demultiplex property set to TRUE. H.324/cmod shall be set to "H324M" (0x0002).
- 4) The MGC shall create a termination that realizes the h245 package and initialize properties to appropriate values. The h245/termtype property shall be set to "H324M". The MGC shall add this termination as the first in the MuxDescriptor of the h324 termination created in step 3) above.
- 5) The MGC shall create a termination that realizes the h323bc package and set the fastconnect property to "noFastStart", and the h245encapstatus property to FALSE. The MGC assigns appropriate addressing information in both local and remote descriptors according to the values exchanged in the ITU-T H.225.0 channel.
- 6) The MGC shall associate the ITU-T H.245 termination created in step 4) and the h323bc termination created in step 5) in a context.
- 7) The MG shall perform ITU-T H.245 mapping between the two terminations as defined in Annex F of [ITU-T H.246].
- 8) The MG shall be responsible for the creation of any logical channels that are negotiated via ITU-T H.245 channel. Each of these new logical channels shall be a locally controlled media stream.

- 9) When an EndSession command is encountered, the MG shall follow the procedures of Annex F of [ITU-T H.246] and close any logical channels that are open. The MG shall notify the MGC when the ITU-T H.245 logical channel is closed from its side.

If the MGC decides to use fastStart or parallel ITU-T H.245, it shall do the following in step 5).

If the MGC decides to use ITU-T H.245 tunnelling but no fastStart, it shall set the h245encapstatus to TRUE, and specify the transport address (which may be an IPv4 address) such that a channel is formed between the MG and the MGC. The MGC shall then relay the messages received in the h245Control element of the ITU-T H.225.0 messages to the MG on this channel (see Figure 3). The MG can safely treat them as messages originating directly at the remote ITU-T H.323 endpoint. The MGC shall encapsulate any ITU-T H.245 messages received on this channel from the MG in the h245Control field of the ITU-T H.225.0 messages for transport to the ITU-T H.323 endpoint.

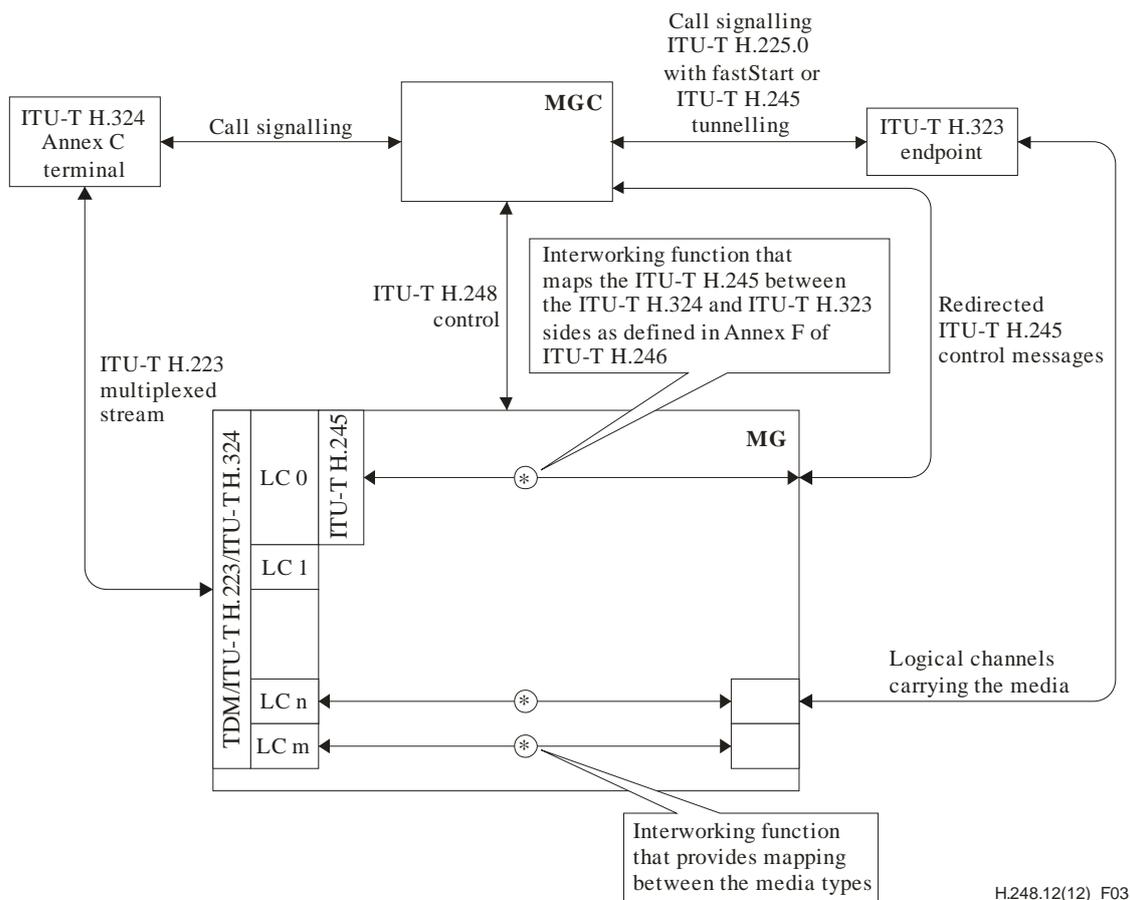


Figure 3 – Resource control at the MG (with fastStart/ITU-T H.245 tunnelling)

If the MGC decides to use fastStart or parallel ITU-T H.245, it shall do the following in step 5).

It shall set the fastconnect property to "fastStart" or parallelH245 accordingly. h245encapstatus property shall be set to reflect the h245Tunneling flag in the ITU-T H.225.0 messages exchanged with the ITU-T H.323 endpoint. MGC shall specify the transport address (which may be an IPv4 address) such that a channel is formed between the MG and the MGC. The MGC shall then relay the messages received in the fastStart or parallelH245 element of the ITU-T H.225.0 messages to the MG on this channel. The MG can safely treat them as messages originating directly at the remote ITU-T H.323 endpoint. The MGC shall encapsulate any Logical Channel messages received on this channel from the MG in the fastStart field of the ITU-T H.225.0 messages for transport to the ITU-T H.323 endpoint. Capability Exchange and Master Slave determination messages shall be sent in the **h245Control/parallelH245Control** field.

The MGC shall set the fastconnect property to "noFastStart" as soon as the fast connect procedures are completed, regardless of whether these procedures were successful or not.

10.2 ITU-T H.323-Annex C of ITU-T H.324 interworking with ITU-T H.245 in MGC

Figure 4 shows the configuration of the decomposed gateway where the ITU-T H.245 control is in the MGC. In this configuration, the MGC shall know the ITU-T H.324 related capabilities of the MG before starting the ITU-T H.245 capability negotiation with the remote endpoint. The retrieval of the capability set of the MG is out of the scope of this Recommendation.

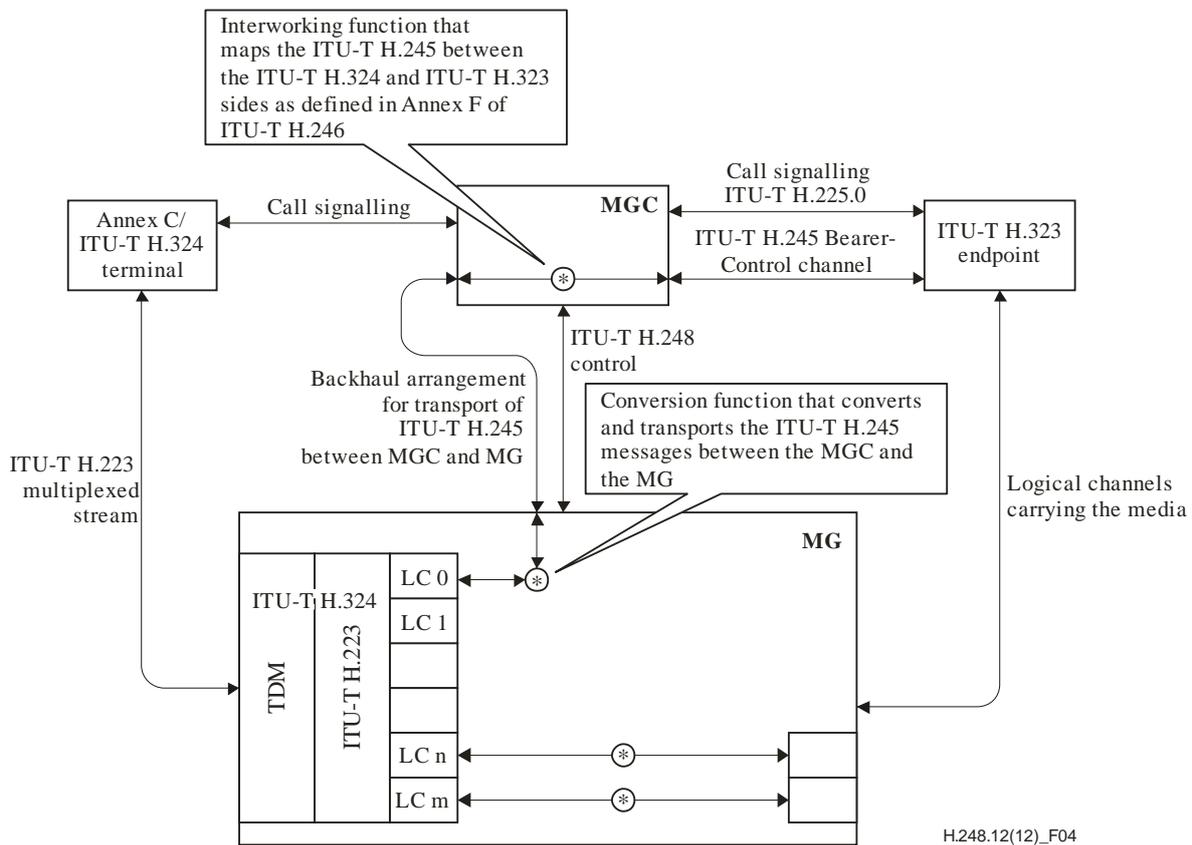


Figure 4 – Resource control concentrated at the MGC

The following is an example call flow for the call originated by the ITU-T H.324 Annex C terminal.

- 1) The MGC detects an incoming call from the remote endpoint. The MGC may identify the incoming call type as ITU-T H.324 call using the information contained in the call signalling messages.
- 2) The MGC establishes a call with the remote ITU-T H.324 endpoint.
- 3) The MGC creates an h324 termination with MediaTx property as TDM Circuit, and specifies the appropriate Multiplex level, and Demultiplex property set to TRUE.
- 4) After the MG establishes the digital communication with the remote endpoint, the MG, which wants to start ITU-T H.324 Annex C communication, shall initiate ITU-T H.223 level set-up procedure according to the Multiplex level indicated in the previous step. After the level set-up, the ITU-T H.245 control channel shall be opened according to the procedure given in clause C.8 of [ITU-T H.324].

- 5) The MG and MGC shall transport the ITU-T H.245 messages between each other. One way is an SCTP connection between the MGC and the MG as defined in [b-IETF RFC 4960] to reliably transport the ITU-T H.245 message, and associate the SCTP connection to the h324 termination. The exact nature of interfaces with SCTP for transport of ITU-T H.245 messages between the MG and the MGC is out of the scope of this Recommendation. As a result the MG will transmit any h245 messages detected on the h324 termination to the MGC via the SCTP connection. Also the MG will transmit any messages received via the SCTP connection to the ITU-T H.324M terminal.
 Another method is to use the h245transport/h245msgout to send messages over the ITU-T H.248 connection and to use h245transport/h245msgin event to receive messages over the ITU-T H.248 connection.
- 6) The MGC shall map the ITU-T H.245 control information between the ITU-T H.324 and the ITU-T H.323 endpoints as defined in Annex F of [ITU-T H.246].
- 7) The MGC shall create and associate appropriate media terminations on the MG to realize the creation of a logical channel.
- 8) When the end session procedure is initiated by either the remote endpoint or the MGC, the MGC shall transmit the ITU-T H.245 EndSessionCommand message, and then stop all ITU-T H.245 message transmissions. After the completion of the end session procedure, the MGC shall send a Subtract message to the MG to disconnect the ITU-T H.324 termination from its Context.

10.3 Tunnelling of Annex C/ITU-T H.324 bitstream

The scenario described in this clause enables the ITU-T H.324 bitstream transmission over an IP-based network between the gateways. The configuration of the decomposed gateway that supports this scenario is shown in Figure 5. The MGC, which decides to create IP tunnelling for an ITU-T H.324 call between MGs, creates a context that contains ITU-T H.324 terminations on the TDM and IP sides. It is optional for the decomposed gateway to support this function.

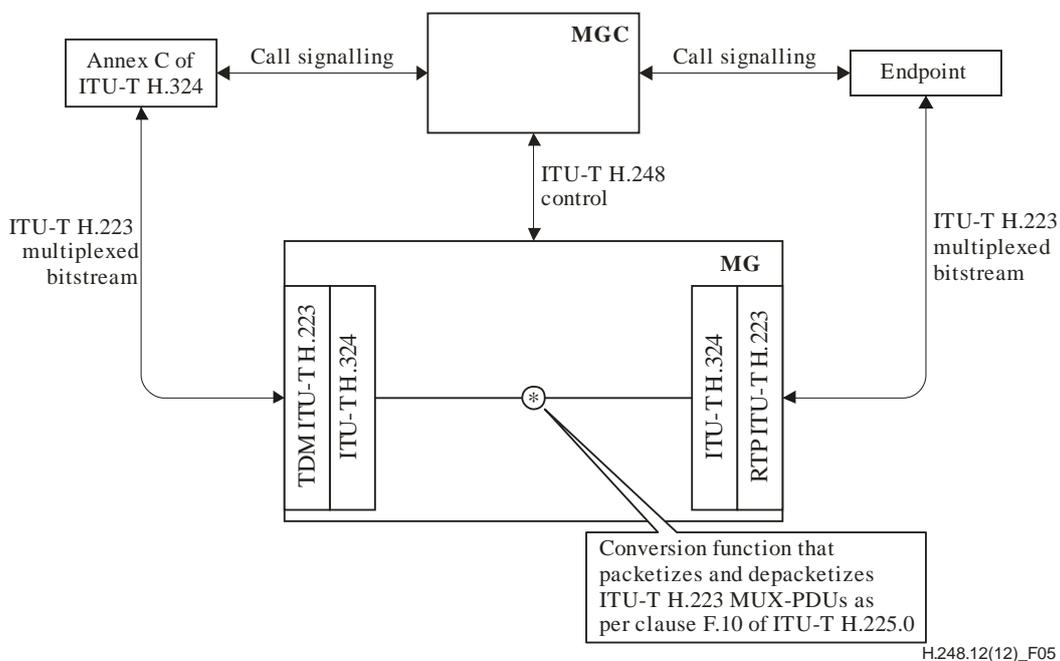


Figure 5 – Configuration for IP tunnelling of Annex C of ITU-T H.324 bitstream

The following is the call flow example for this scenario.

- 1) If the MGC decides to create IP tunnelling for ITU-T H.324 upon receipt of the audiovisual call from the ITU-T H.324 endpoint, the MGC shall request the MG to create a new context and create terminations which support the ITU-T H.324 package, in the context. On the ITU-T H.324 side, the 'h324' termination is created with MediaTx property of TDM, 'muxlv' property of appropriate value, and 'demux' property of 'FALSE'. On the IP side, the 'h324' termination is created with MediaTx property of RTP, 'muxlv' property of 'Level0', and 'demux' property of 'FALSE'.
- 2) The MG shall perform the mapping of the ITU-T H.324 bitstream (i.e., ITU-T H.223 multiplexed bitstream) from TDM to RTP, and vice versa, according to procedures stated in clause F.10 of [ITU-T H.225.0].
- 3) Upon receipt a message to release the call (e.g., ITU-T Q.931 release complete message), the MGC shall send subtract message/s to the MG to disconnect the corresponding ITU-T H.324 termination/s from the context.

Annex A

Extended ITU-T H.324, ITU-T H.245 command and ITU-T H.245 indication packages

(This annex forms an integral part of this Recommendation.)

A.1 Scope

This annex defines properties for ITU-T H.324 and ITU-T H.323 interworking, which are needed together with the properties in the ITU-T H.324 package, ITU-T H.245 command package, ITU-T H.245 indication package, and ITU-T H.245 transport package, for interworking with ITU-T H.324 terminals having different ITU-T H.324 capabilities, when the interworking function is handled by the MGC.

A.2 References

See clause 2.

A.3 Definitions

N/A.

A.4 Abbreviations and acronyms

This annex uses the following abbreviations and acronyms:

LSB	Least Significant Bit
MGC	Media Gateway Controller
MSB	Most Significant Bit
MUX	MUltipleX
PDU	Protocol Data Unit
PER	Packed Encoding Rules
TCS	Terminal Capability Set

A.5 Extended H.324 package

Package ID:	h324ext (0x0063)
Description:	The extended ITU-T H.324 package extends the ITU-T H.324 package defined in the main body of this Recommendation. The package defines new properties for ITU-T H.324 and ITU-T H.323 interworking, which are needed when the interworking function is handled by the MGC.
Version:	1
Designed to be extended only:	No
Extends:	h324 (0x002d) version 1

A.5.1 Properties

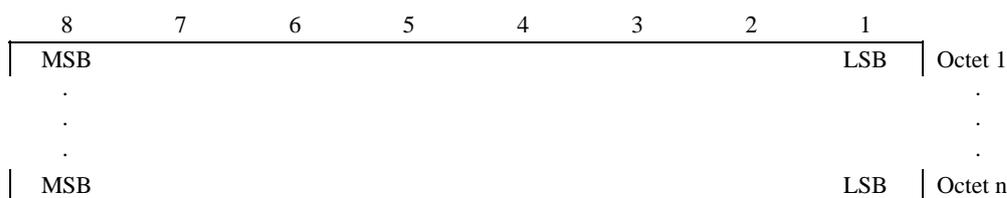
A.5.1.1 Maximum ITU-T H.223 MUX PDU size

Property ID:	maxH223MUXPDUSize (0x0007)
Description:	This property indicates the maximum size for ITU-T H.223 MUX PDU in number of octets.
Type:	Integer
Characteristics:	Read/Write
Defined in:	LocalControl
Possible values:	Any positive integer
Default:	Provisioned

A.5.1.2 Local ITU-T H.223 capability

Property ID:	h223cap1 (0x0008)
Description:	This property indicates the local endpoint's capabilities specific to the ITU-T H.223 multiplex capability.
Type:	Octet String
Characteristics:	Read/Write
Defined in:	LocalControl
Possible values:	This property indicates the ITU-T H.245 H223Capability structure encoded by applying the PER specified in [ITU-T X.691].
Default:	Provisioned
Binary encoding:	

Structure of the octet string



NOTE – Octet 1 contains the most significant octet of data.

Text encoding:	Shall be encoded using the mechanism defined in clause B.3 of [ITU-T H.248.1].
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A.5.1.3 ITU-T H.223 logical channel parameters

Property ID:	h223lcparm (0x0009)
Description:	This property is used to indicate parameters specific to using ITU-T H.223. It indicates both adaptation layer and multiplex layer properties used for the logical channel.
Type:	Octet String
Characteristics:	Read/Write
Defined in:	Local and remote descriptors

Possible values: This property indicates the ITU-T H.245 H223LogicalChannelsParameters structure encoded by applying the PER specified in [ITU-T X.691]. Value encoded as per clause A.5.1.2. For text encoding the mechanism defined in [ITU-T H.248.15] is used.

Default: Provisioned

A.5.2 Events

None.

A.5.3 Signals

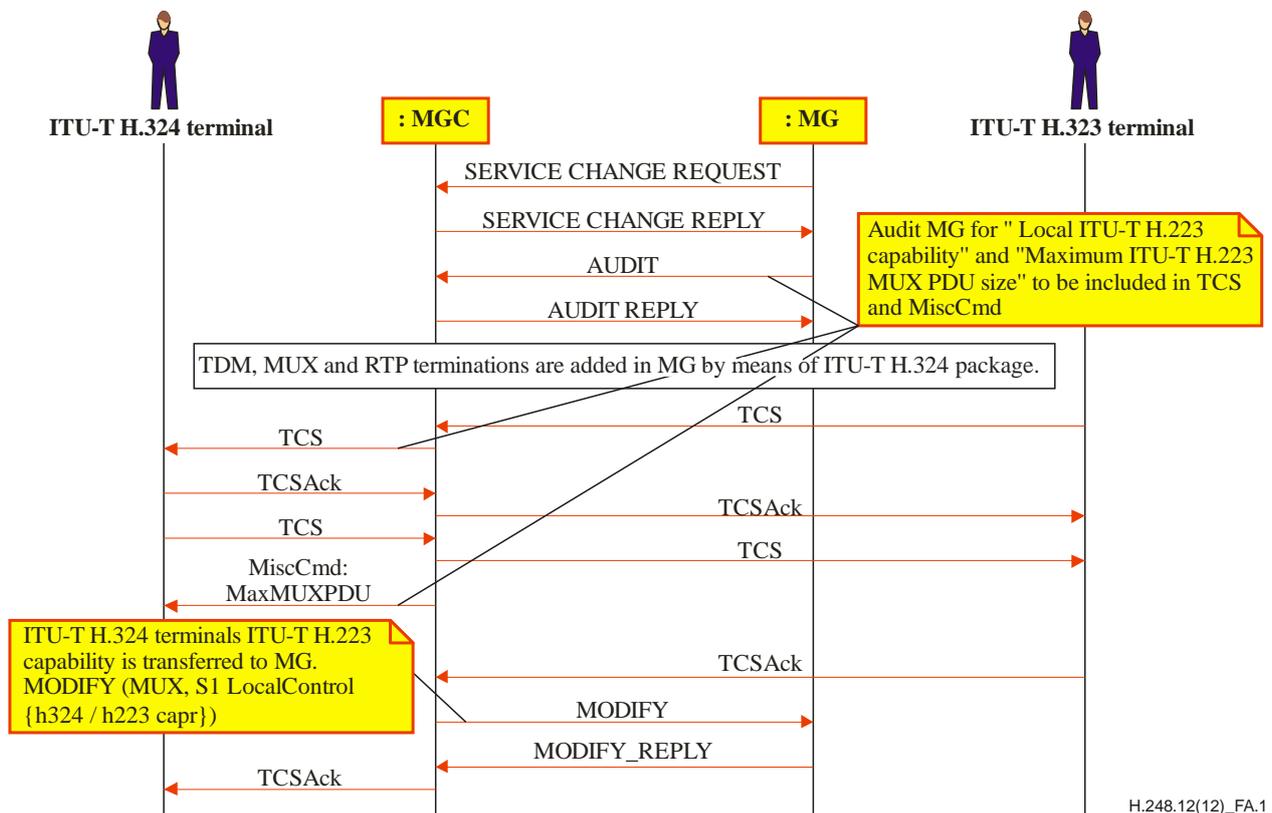
None.

A.5.4 Statistics

None.

A.5.5 Procedures

These procedures are related to the scenario in which MGC executes ITU-T H.245 control itself as shown in Figures A.1 to A.3.



NOTE – Messages to ITU-T H.323 and ITU-T H.324 terminals show ITU-T H.245 signalling. ITU-T H.245 signalling between MGC and ITU-T H.324 terminal is transported via MG, but that is not shown in the sequence in order to simplify the figure.

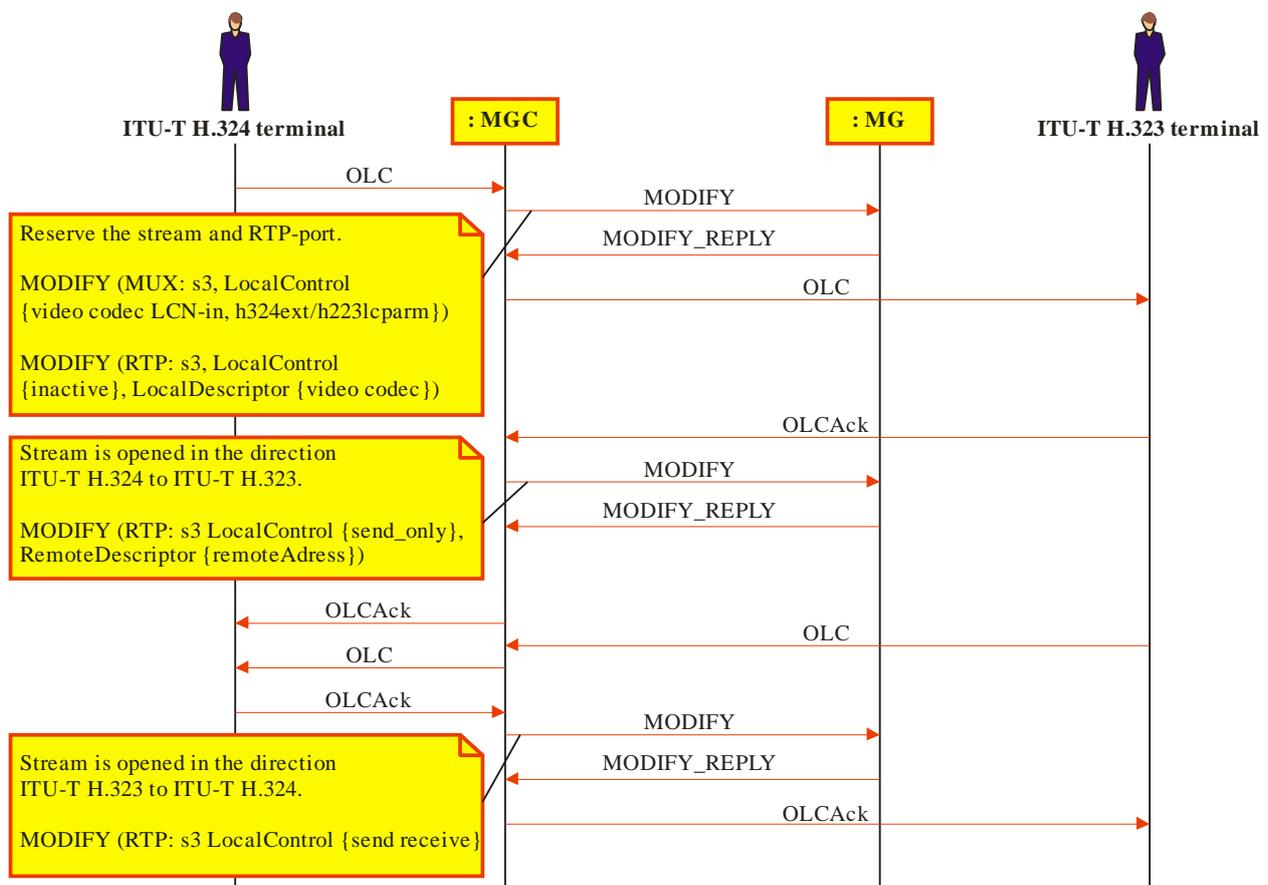
Figure A.1 – Sequence diagram terminal capability exchange at ITU-T H.324 and ITU-T H.323 interworking

The MGC will participate in ITU-T H.245 terminal capability exchange procedures after it has created an ITU-T H.324 termination in the MG as per Figure A.1.

In order to know the ITU-T H.223 multiplex capabilities to be provided to ITU-T H.324 terminal, the MGC audits the MG for the "Local H.223 capability" and "Maximum H.223 MUX PDU size".

When logical channels are opened between terminals by the ITU-T H.245 protocol, the MGC adds the streams between the multiplex and RTP terminations in the MG as per Figure A.2. The streams are described in the usual manner, as described in clause 7.1 of [ITU-T H.248.1]. The ITU-T H.223 logical channel parameters define the ITU-T H.223 multiplexing properties used for the stream towards the ITU-T H.324 terminal, e.g., the adaptation layer to be used. When textual encoding is used, the property is coded within SDP by using [ITU-T H.248.15].

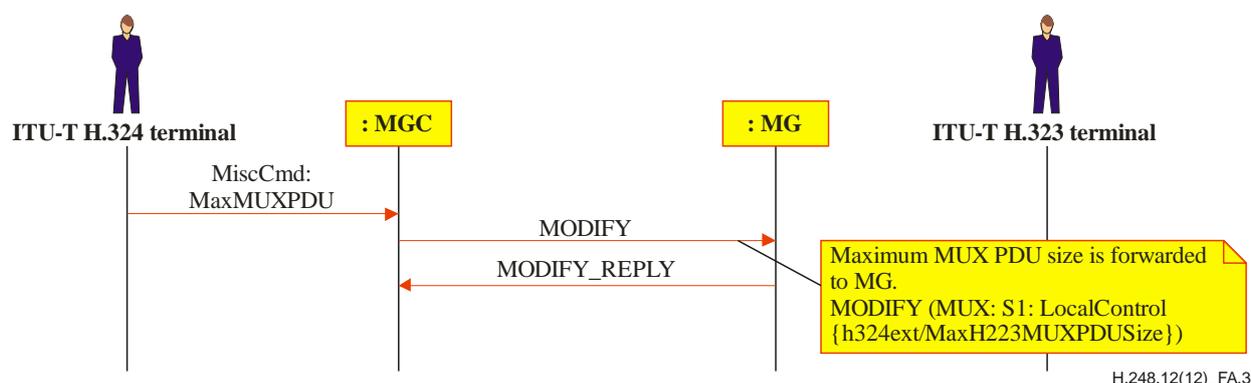
At any time when a remote ITU-T H.324 terminal commands to restrict the size of the ITU-T H.223 MUX-PDUs, the MGC shall order the MG to restrict the ITU-T H.223 MUX PDU size that it transmits to a maximum of the specified number of octets, as per Figure A.3.



H.248.12(12)_FA.2

NOTE – Messages to ITU-T H.323 and ITU-T H.324 terminals show ITU-T H.245 signalling. ITU-T H.245 signalling between MGC and ITU-T H.324 terminal is transported via MG, but that is not shown in the sequence in order to simplify the figure.

Figure A.2 – Sequence diagram for opening the logical channel



NOTE – Messages to ITU-T H.323 and ITU-T H.324 terminals show ITU-T H.245 signalling. ITU-T H.245 signalling between MGC and ITU-T H.324 terminal is transported via MG, but that is not shown in the sequence in order to simplify the figure.

Figure A.3 – Sequence diagram for maximum PDU specification

A.6 Extended ITU-T H.245 command package

Package ID: h245comext (0x0064)

Description: The extended ITU-T H.245 command package extends the ITU-T H.245 command package defined in the main body of this Recommendation. The package defines new properties for ITU-T H.324 and ITU-T H.323 interworking, which are needed when the interworking function is handled by the MGC.

Version: 1

Designed to be extended only: No

Extends: h245com (0x002e) version 1

A.6.1 Properties

A.6.1.1 ITU-T H.245 version

Property ID: h245version (0x0005)

Description: This property indicates the highest version of the ITU-T H.245 protocol used.

Type: Integer

Characteristics: Read Only

Defined in: LocalControl descriptor

Possible values: Any positive integer as per the version from the ITU-T H.245 **protocolIdentifier** structure.

Default: Provisioned

A.6.1.2 Flow control command

Property ID: flowControlCom (0x0006)

Description: This property indicates the FlowControl to be used.

Type: Octet String

Characteristics: Read/Write

Defined in: LocalControl descriptor

Possible values: This property indicates the ITU-T H.245 FlowControlCommand structure encoded by applying the PER specified in [ITU-T X.691]. Value encoded as per clause A.5.1.2.

Default: Provisioned

A.6.2 Events

None.

A.6.3 Signals

None.

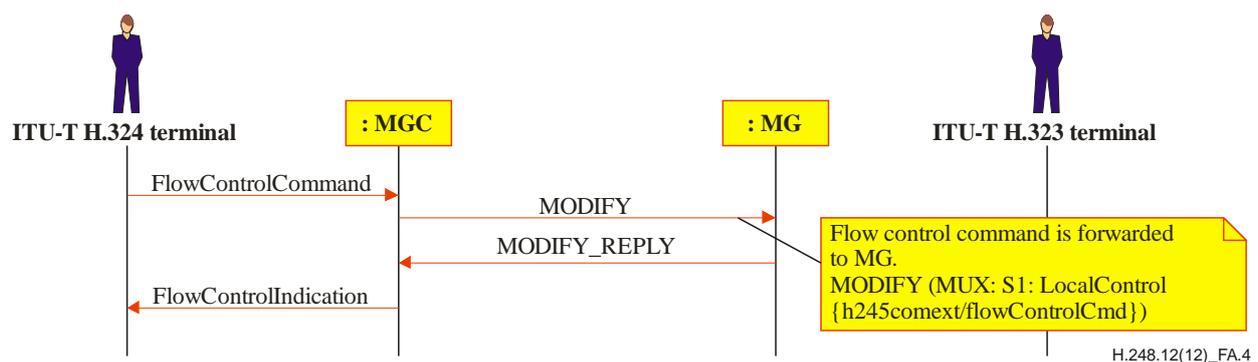
A.6.4 Statistics

None.

A.6.5 Procedures

These procedures are related to the scenario in which MGC executes ITU-T H.245 control itself as shown in Figure A.4 below.

The MGC may audit the ITU-T H.245 version, which the MG supports, after a service change.



NOTE – Messages to ITU-T H.323 and ITU-T H.324 terminals show ITU-T H.245 signalling. ITU-T H.245 signalling between MGC and ITU-T H.324 terminal is transported via MG, but that is not shown in the sequence in order to simplify the figure.

Figure A.4 – Sequence diagram for flow control modification

When a remote ITU-T H.324 or ITU-T H.323 terminal wants to restrict the bit rate of a channel, or whole multiplex, and the MGC accepts the request, the MGC orders the MG to restrict the bit rate of the stream(s) as per Figure A.4.

A.7 Extended ITU-T H.245 indication package

Package ID: h245indext (0x0065)

Description: The extended ITU-T H.245 indication package extends the ITU-T H.245 indication package defined in the main body of this Recommendation. The package defines new properties for ITU-T H.324 and ITU-T H.323 interworking, which are needed when the interworking function is handled by the MGC.

Version: 2

Designed to be extended only: No
Extends: h245ind (0x002e) version 1

A.7.1 Properties

A.7.1.1 ITU-T H.223 skew indication

Property ID: h223SkewInd (0x0003)
Description: This property indicates the average skew between two transmitted media streams represented by two logical channels (i.e., the amount the video signal trails the audio signal).
Type: Octet String
Characteristics: Read/Write
Defined in: LocalControl
Possible values: This property indicates the ITU-T H.245 H223SkewIndication structure encoded by applying the PER specified in [ITU-T X.691]. Value encoded as per clause A.5.1.2.
NOTE – The above structure contains two logical channel numbers. To indicate which media stream/logical channel the skew is measured against the "Stream H.223 skew measured against" property should be used. If not used a default of StreamID of "1" is assumed.
Default: Provisioned

A.7.1.2 Jitter indication

Property ID: jitterIndication (0x0004)
Description: This property indicates the jitter.
Type: Octet String
Characteristics: Read/Write
Defined in: LocalControl descriptor
Possible values: This property indicates the ITU-T H.245 **JitterIndication** structure encoded by applying the PER specified in [ITU-T X.691]. Value encoded as per clause A.5.1.2.
Default: Provisioned

A.7.1.3 Stream ITU-T H.223 skew measured against

Property ID: skewstr (0x0005)
Description: This property indicates the media stream/logical channel against which the "ITU-T H.223 skew indication" is measured.
Type: Integer
Characteristics: Read/Write
Defined in: LocalControl
Possible values: 0-65535
Default: 1

A.7.2 Events

A.7.2.1 Skew Update

Event name: Skew Update
Event ID: skewup (0x0001)
Description: This event allows the MG to indicate to the MGC when the synchronization time (skew) between two received streams has changed.

A.7.2.1.1 EventsDescriptor parameters

A.7.2.1.1.1 Threshold

Parameter name: Threshold
Parameter ID: thres (0x0001)
Description: This parameter indicates the threshold for the generation of a Skew Update event. If the MG detects that the skew between the stream defined by the "Skew Stream" property and the stream that the Event is set on differs by more than the threshold value since the last report then the "Skew Update" ObservedEvent is reported.
Type: Integer
Optional: Yes
Possible values: 1-4095, in milliseconds
Default: 50ms

A.7.2.1.2 ObservedEventsDescriptor parameters

A.7.2.1.2.1 H223 Skew Value

Parameter name: Skew Value
Parameter ID: skewval (0x0001)
Description: This parameter indicates the difference in time synchronization between the Stream represented by the ObservedEvent and the Stream indicated by the "Stream H.223 skew measured against" (skewstr) property.
Type: Integer
Optional: No
Possible values: 1-4095 in milliseconds
Default: None

A.7.3 Signals

None.

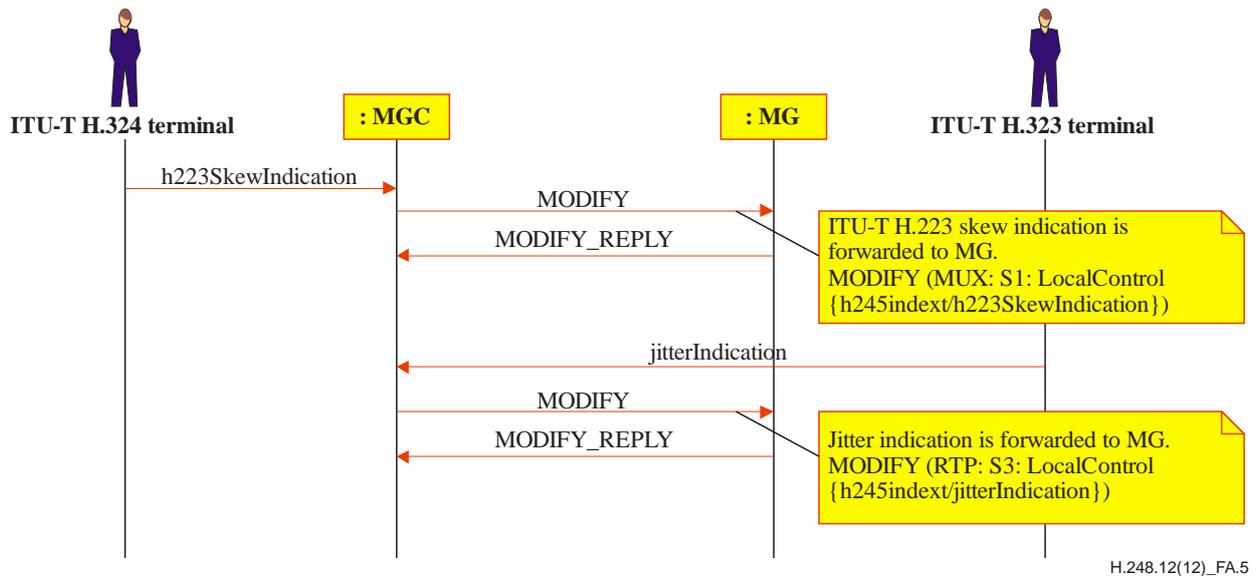
A.7.4 Statistics

None.

A.7.5 Procedures

As Figure A.2 above shows, when establishing a multiplex Termination to support ITU-T H.324 the MGC may establish individual ITU-T H.248 streams for each of the ITU-T H.245 logical channels used in the ITU-T H.223 multiplex. The MGC can then assign a logical channel number (i.e., via the "LCN" property clause C.12 of [ITU-T H.248.1]) and other related ITU-T H.223 logical channel properties to a stream. The MGC and MG are then both unambiguously aware of the mapping between the "Logical Channel Number" and the "H.248 StreamID".

These procedures are related to the scenario in which MGC executes ITU-T H.245 control itself, as shown in Figure A.5 below.



NOTE – Messages to ITU-T H.323 and ITU-T H.324 terminals show ITU-T H.245 signalling. ITU-T H.245 signalling between MGC and ITU-T H.324 terminal is transported via MG, but that is not shown in the sequence in order to simplify the figure.

Figure A.5 – Sequence diagram for skew and jitter indication

When a remote ITU-T H.324 terminal indicates the average amount of skew between two logical channels, the MGC forwards the skew to the MG in order for the MG to take the skew into consideration at synchronization of the channels, or at packetization of the channels, into RTP as per Figure A.5. This is based on an allocation of an audio stream to StreamID = 1 and that the stream where the h223SkewIndication property is set represents a video stream. If the MGC requires another mapping the "Stream H.223 skew measured against" (*skewstr*) is used to indicate the media stream/logical channel the skew is measured against.

Where the MGC/MG measures the skew and originates a ITU-T H.245 H223SkewIndication message the MGC may set the "SkewUpdate" (*skewup*) event. Upon setting of the event, once the skew can be determined the MG shall return an ObservedEvent with the initial skew value. Subsequent reporting of the event will occur whenever the value of the "Threshold" (*thres*) event parameter is exceeded. On reception of the ObservedEvent the MGC may send a ITU-T H.245 H223SkewIndication based on the skew value received. The logical channel numbers used may be derived from the associated media stream where the event was set and the media stream specified by the *skewstr* property.

At any time when the remote ITU-T H.323 terminal indicates the amount of jitter in the received media, the MGC forwards the information to the MG in order for the MG to choose the bit rate and buffer control in video channels as per Figure A.5.

A.8 ITU-T H.245 transport package

Package ID:	h245tp (0x00b4)
Description:	This package defines a new signal for sending ITU-T H.245 messages from a MGC to an MG and a new event for sending ITU-T H.245 messages from the MG to the MGC which are needed when the interworking function is handled by the MGC.
Version:	1
Designed to be extended only:	No
Extends:	None

A.8.1 Properties

None.

A.8.2 Events

A.8.2.1 Incoming ITU-T H.245 message

Event name:	Incoming ITU-T H.245 message
Event ID:	h245msgin (0x0001)
Description:	This event occurs when the MG detects an incoming ITU-T H.245 message on the termination realizing this package.

A.8.2.1.1 EventsDescriptor Parameters

None.

A.8.2.1.2 ObservedEventsDescriptor Parameters

A.8.2.1.2.1 Contents of ITU-T H.245 message

Parameter name:	Contents of ITU-T H.245 message
Parameter ID:	h245mc (0x0001)
Description:	Specifies the actual contents of an ITU-T H.245 message.
Type:	Octet String
Optional:	No
Possible values:	The octet string is the actual [ITU-T X.691] encoding of the ITU-T H.245 message.
Default:	None

A.8.3 Signals

A.8.3.1 Outgoing ITU-T H.245 message

Signal name:	Outgoing ITU-T H.245 message
Signal ID:	h245msgout (0x0001)
Description:	Sends a ITU-T H.245 message.
Signal Type:	Brief
Duration:	Provisioned

A.8.3.1.1 Additional parameters

A.8.3.1.1.1 Contents of ITU-T H.245 message

Parameter name:	Contents of ITU-T H.245 message
Parameter ID:	h245mc (0x0001)
Description:	Specifies the actual contents of a ITU-T H.245 message.
Type:	Octet String
Optional:	No
Possible values:	The octet string is the actual [ITU-T X.691] encoding of the ITU-T H.245 message.
Default:	None

A.8.4 Statistics

None.

A.8.5 Procedures

The MGC shall indicate the MG for notification on detecting any ITU-T H.245 message. When the MG receives a ITU-T H.245 message from the remote end, it shall notify the contents of the message to the MGC through the event "h245transport/h245msgin". When the MGC sends a ITU-T H.245 message to the remote end, it indicates the content of the message to the MG through the signal "h245transport/h245msgout". In both cases, the MG shall relay the ITU-T H.245 message between the MGC and the remote end without modifying it.

Bibliography

[b-IETF RFC 4960] IETF RFC 4960 (2000), *Stream Control Transmission Protocol*.

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